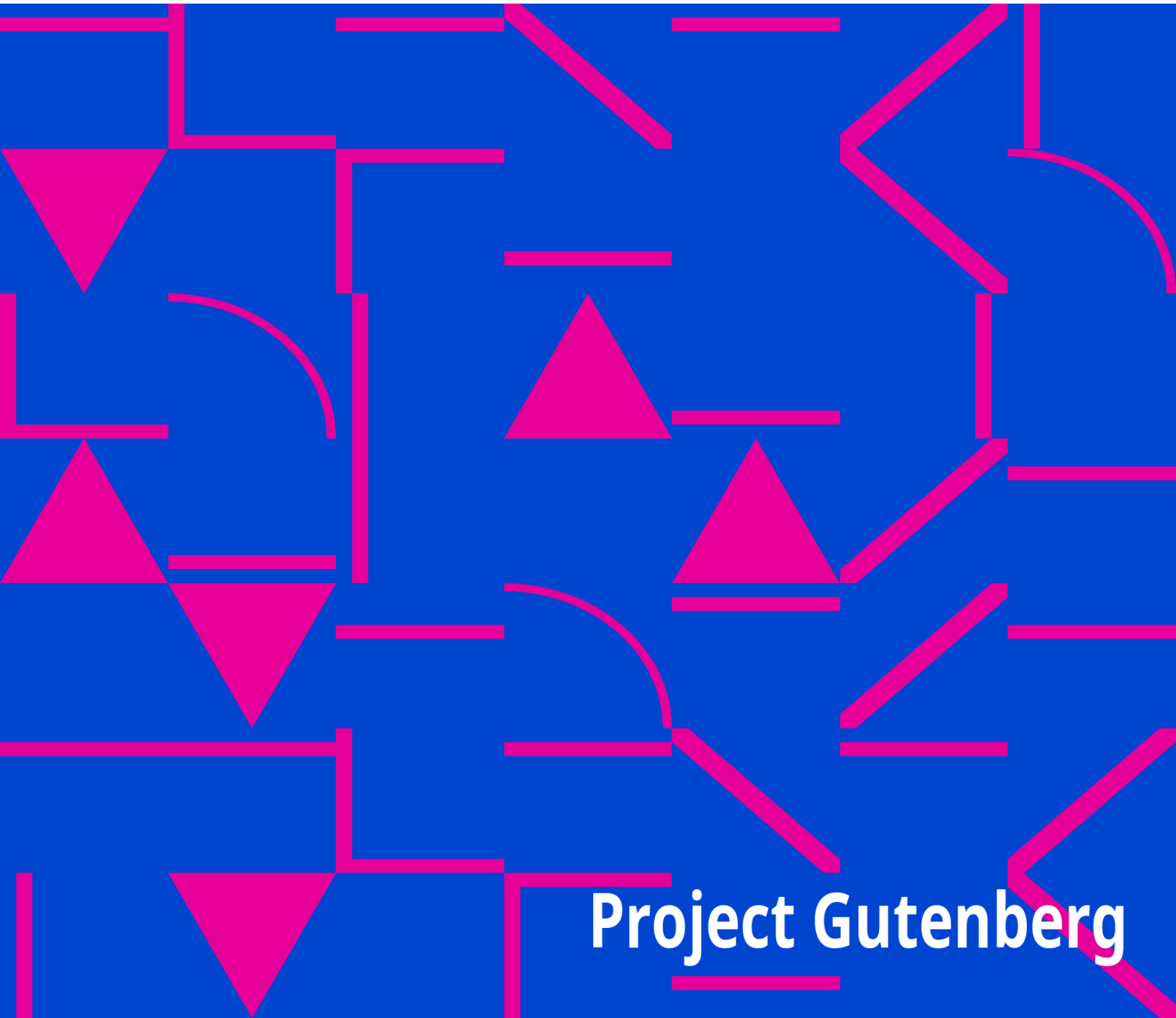
Elements of Military Art and Science

H. W. Halleck



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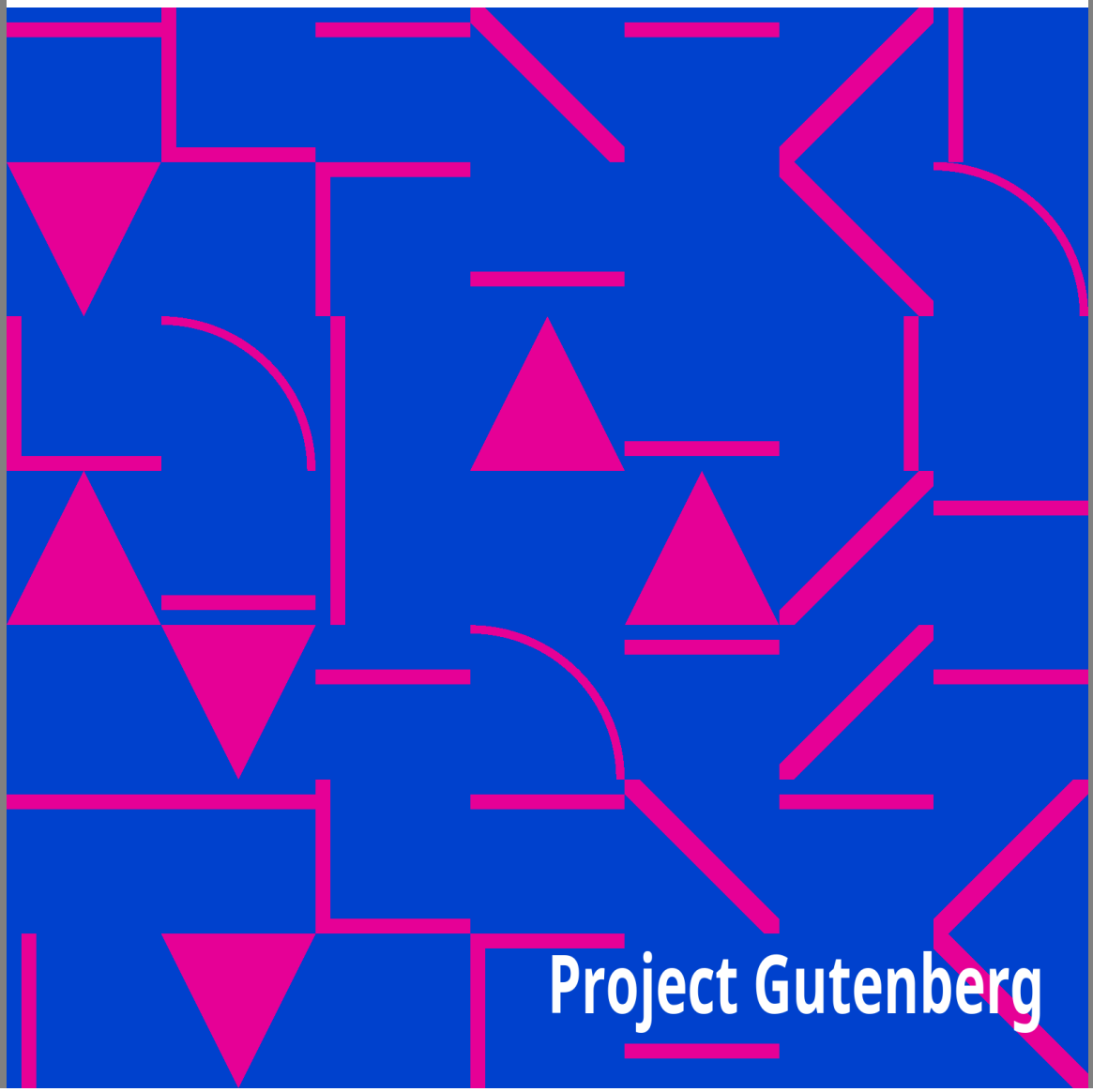

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ELEMENTS

OF

MILITARY ART AND SCIENCE:

OR,

COURSE OF INSTRUCTION IN STRATEGY, FORTIFICATION, TACTICS OF BATTLES, &c.

EMBRACING THE DUTIES OF STAFF, INFANTRY, CAVALRY, ARTILLERY, AND ENGINEERS.

ADAPTED TO THE USE OF VOLUNTEERS AND MILITIA.

THIRD EDITION.

WITH CRITICAL NOTES ON THE MEXICAN AND CRIMEAN WARS.

BY

H. WAGER HALLECK, A.M., MAJOR GENERAL, U.S.A.

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I. INTRODUCTION.—Dr. Wayland's Arguments on the Justifiableness of War briefly examined.

II. STRATEGY.—General Divisions of the Art.—Rules for planning a Campaign.—Analysis of the Military Operations of Napoleon.

III. FORTIFICATIONS.—Their importance in the Defence of States proved by numerous Historical Examples.

IV. LOGISTICS.—Subsistence.—Forage.—Marches.—Convoys.—Castrametation.

V. TACTICS.—The Twelve Orders of Battle, with Examples of each.—Different Formations of Infantry, Cavalry, Artillery, and Engineers on the Field of Battle, with the Modes of bringing Troops into action./p>

VI. MILITARY POLITY.—The Means of National Defence best suited to the character and condition of a Country, with a brief Account of those adopted by the several European Powers.

VII. DEFENCE OF OUR SEA-COAST.—Brief Description of our Maritime Fortifications, with an Examination of the several Contests that have taken place between Ships and Forts, including the Attack on San Juan d'Ulloa, and on St. Jean d'Acre.

VIII. OUR NORTHERN FRONTIER DEFENCES.—Brief Description of the Fortifications on the Frontier, and an analysis of our Northern Campaigns.

IX. ARMY ORGANIZATION.—Staff and Administrative Corps.—Their History, Duties, Numbers, and Organization.

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XI. ARMY ORGANIZATION.—Artillery.—Its History and Organization, with a Brief Notice of the different kinds of Ordnance, the Manufacture of Projectiles, &c.

XII. ARMY ORGANIZATION.—Engineers.—Their History, Duties, and Organization,—with a Brief Discussion, showing their importance as a part of a modern Army Organization.

XIII. PERMANENT FORTIFICATIONS. Historical Notice of the progress of this Art.—Description of the several parts of a Fortress, and the various Methods of fortifying a Position.

XIV. FIELD ENGINEERING.—Field Fortifications.—Military Communications.—Military Bridges.—Sapping, Mining, and the Attack and Defence of a Fortified Place.

XV. MILITARY EDUCATION.—Military Schools of France, Prussia, Austria, Russia, England, &c.—Washington's Reasons for establishing the West Point Academy.—Rules of Appointment and Promotion in Foreign Services.—Absurdity and Injustice of our own System.

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PREFACE

The following pages were hastily thrown together in the form of lectures, and delivered, during, the past winter, before the Lowell Institute of Boston. They were written without the slightest intention of ever publishing them; but several officers of militia, who heard them delivered, or afterwards read them in manuscript, desire their publication, on the ground of their being useful to a class of officers now likely to be called into military service. It is with this view alone that they are placed in the hands of the printer. No pretension is made to originality in any part of the work; the sole object having been to embody, in a small compass, well established military principles, and to illustrate these by reference to the events of past history, and the opinions and practice of the best generals.

Small portions of two or three of the following chapters have already appeared, in articles furnished by the author to the New York and Democratic Reviews, and in a "Report on the Means of National Defence," published by order of Congress.

H.W.H.

MAY, 1846.

ELEMENTS OF MILITARY ART AND SCIENCE.

CHAPTER I.

INTRODUCTION.

Our distance from the old world, and the favorable circumstances in which we have been placed with respect to the other nations of the new world, have made it so easy for our government to adhere to a pacific policy, that, in the sixty-two years that have elapsed since the acknowledgment of our national independence, we have enjoyed more than fifty-eight of general peace; our Indian border wars have been too limited and local in their character to seriously affect the other parts of the country, or to disturb the general conditions of peace. This fortunate state of things has done much to diffuse knowledge, promote commerce, agriculture, and manufactures; in fine, to increase the greatness of the nation and the happiness of the individual. Under these circumstances our people have grown up with habits and dispositions essentially pacific, and it is to be hoped that these feelings may not soon be changed. But in all communities opinions sometimes run into extremes; and there are not a few among us who, dazzled by the beneficial results of a long peace, have adopted the opinion that war in any case is not only useless, but actually immoral; nay, more, that to engage in war is wicked in the highest degree, and even *brutish*.

All modern ethical writers regard *unjust* war as not only immoral, but as one of the greatest of crimes—murder on a large scale. Such are all wars of mere ambition, engaged in for the purpose of extending regal power or national sovereignty; wars of plunder, carried on from mercenary motives; wars of propagandism, undertaken for the unrighteous end of compelling men to adopt certain religious or political opinions, whether from the alleged motives of "introducing a more orthodox religion," or of "extending the area of freedom." Such wars are held in just abhorrence by all moral and religious people: and this is believed to be the settled conviction of the great mass of our own citizens.

But in addition to that respectable denomination of Christians who deny our right to use arms under any circumstances, there are many religious enthusiasts in other communions who, from causes already noticed, have adopted the same theory, and hold *all* wars, even those in self-defence, as unlawful and immoral. This opinion has been, within the last few years, pressed on the public with great zeal and eloquence, and many able pens have been enlisted in its cause. One of the most popular, and by some regarded one of the most able writers on moral science, has adopted this view as the only one consonant with the principles of Christian morality.

It has been deemed proper, in commencing a course of lectures on war, to make a few introductory remarks respecting this question of its justifiableness. We know of no better way of doing this than to give on the one side the objections to war as laid down in Dr. Wayland's Moral Philosophy, and on the other side the arguments by which other ethical writers have justified a resort to war. We do not select Dr. Wayland's work for the purpose of criticizing so distinguished an author; but because he is almost the only writer on ethics who advocates these views, and because the main arguments against war are here given in brief space, and in more moderate and temperate language than that used by most of his followers. I shall give his arguments in his own language.

"I. All wars are contrary to the revealed will of God."

It is said in reply, that if the Christian religion condemns all wars, no matter how just the cause, or how necessary for self-defence, we must expect to find in the Bible some direct prohibition of war, or at least a prohibition fairly implied in other direct commandments. But the Bible nowhere prohibits war: in the Old Testament we find war and even conquest positively commanded, and although war was raging in the world in the time of Christ and his apostles, still they said not a word of its unlawfulness and immorality. Moreover, the fathers of the church amply acknowledge the right of war, and directly assert, that when war is justly declared, the Christian may engage in it either by stratagem or open force. If it be of that highly wicked and immoral character which some have recently attributed to it, most assuredly it would be condemned in the Bible in terms the most positive and unequivocal.

But it has been said that the use of the sword is either directly or typically forbidden to the Christian, by such passages as "Thou shalt not kill," (Deut. v. 17,) "I say unto you, that ye resist not evil: but whosoever shall smite thee on thy right cheek, turn to him the other also," (Matt. v. 39,) &c. If these passages are to be taken as literal commands, as fanatics and religious enthusiasts would have us believe, not only is war unlawful, but also all our penal statutes, the magistracy, and all the institutions of the state for the defence of individual rights, the protection of the innocent, and the punishment of the guilty. But if taken in conjunction with the whole Bible, we must infer that they are hyperbolical expressions, used to impress strongly on our minds the general principle of love and forgiveness, and that, so far as possible, we over come evil with good. Can any sober-minded man suppose, for a moment, that we are commanded to encourage the attacks of the wicked, by literally turning the left cheek when assaulted on the right, and thus induce the assailant to commit more wrong? Shall we invite the thief and the robber to persevere in his depredations, by literally giving him a cloak when he takes our coat; and the insolent and the oppressor to proceed in his path of crime, by going two miles with him if he bid us to go one?

Again, if the command, "Thou shalt not kill," is to be taken literally, it not only prohibits us from engaging in just war, and forbids the taking of human life by the state, as a punishment for crime; it also forbids, says Dr. Leiber, our taking the life of any animal, and even extends to the vegetable kingdom,—for undoubtedly plants have life, and are liable to violent death —to be *killed*. But Dr. Wayland concedes to individuals the right to take vegetable and animal life, and to society the right to punish murder by death. This passage undoubtedly means, thou shalt not unjustly kill,—thou shalt do no murder; and so it is rendered in our prayer-books. It cannot have reference to war, for on almost the next page we find the Israelites commanded to go forth and smite the heathen nations,—to cast them out of the land,—to utterly destroy them,—to show them no mercy, &c. If these passages of the Bible are to be taken literally, there is no book which contains so many contradictions; but if taken in connection with the spirit of other passages, we shall find that we are permitted to use force in preventing or punishing crime, whether in nations or in individuals; but that

we should combine love with justice, and free our hearts from all evil motives.

II. All wars are unjustifiable, because "God commands us to love every man, alien or citizen, Samaritan or Jew, as ourselves; and the act neither of society nor of government can render it our duty to violate this command."

It is true that no act of society can make it our duty to violate any command of God: but is the above command to be taken literally, and as forbidding us to engage in just war? Is it not rather intended to impress upon us, in a forcible manner, that mutual love is a great virtue; that we should hate no one, not even a stranger nor an enemy, but should treat all with justice, mercy, and loving-kindness? If the meaning attempted to be given to this command in the above quotation be the true one, it is antagonistical not only to just war, but to civil justice, to patriotism, and to the social and domestic affections.

But are we bound to love all human beings alike; that is, to the same degree? Does the Bible, as a whole, inculcate such doctrine? On the contrary, Christ himself had his *beloved* disciple,—one whom he loved pre-eminently, and above all the others; though he loved the others none the less on that account. We are bound to love our parents, our brothers, our families first, and above all other human beings; but we do not, for this reason, love others any the less. A man is not only permitted to seek first the comfort and happiness of his own family, but if he neglect to do so, he is worse than an infidel. We are bound to protect our families against the attacks of others; and, if necessary for the defence of their lives, we are permitted to take the life of the assailant; nay more, we are bound to do so. But it does not follow that we *hate* him whom we thus destroy. On the contrary, we may feel compassion, and even love for him. The magistrate sentences the murderer to suffer the penalty of the law; and the sheriff carries the sentence into execution by taking, in due form, the life of the prisoner: nevertheless, both the magistrate and the sheriff may have the kindest feelings towards him whom they thus deprive of life.

So it is in the external affairs of the state. Next to my kindred and my neighbors do I love my countrymen. I love them more than I do foreigners, because my interests, my feelings, my happiness, my ties of friendship and

affection, bind me to them more intimately than to the foreigner. I sympathize with the oppressed Greek, and the enslaved African, and willingly contribute to their relief, although their sufferings affect me very remotely; but if my own countrymen become oppressed and enslaved, nearer and dearer interests are affected, and peculiar duties spring from the ties and affections which God has formed. If my countrymen be oppressed, my neighbors and kindred will be made unhappy and suffering; this I am bound to take all proper measures in my power to prevent. If the assailant cannot be persuaded by argument to desist from his wicked intentions, I unite with my fellow-citizens in forcibly resisting his aggressions. In doing this I am actuated by no feelings of hatred towards the hostile forces; I have in my heart no malice, no spirit of revenge; I have no desire to harm individuals, except so far as they are made the instruments of oppression. But as instruments of evil, I am bound to destroy their power to do harm. I do not shoot at my military enemy from hatred or revenge; I fight against him because the paramount interests of my country cannot be secured without destroying the instrument by which they are assailed. I am prohibited from exercising any personal cruelty; and after the battle, or as soon as the enemy is rendered harmless, he is to be treated with kindness, and to be taken care of equally with the wounded friend. All conduct to the contrary is regarded by civilized nations with disapprobation.

That war does not properly beget personal malignity but that, on the contrary, the effects of mutual kindness and courtesy on the battle-field, frequently have a beneficial influence in the political events of after years, may be shown by innumerable examples in all history. Soult and Wellington were opposing generals in numerous battles; but when the former visited England in 1838, he was received by Wellington and the whole British nation with the highest marks of respect; and the mutual warmth of feeling between these two distinguished men has contributed much to the continuance of friendly relations between the two nations. And a few years ago, when we seemed brought, by our civil authorities, almost to the brink of war by the northeastern boundary difficulties, the pacific arrangements concluded, through the intervention of General Scott, between the Governors of Maine and New Brunswick, were mainly due to ancient friendships contracted by officers of the contending armies during our last war with Great Britain.

III. "It is granted that it would be better for man in general, if wars were abolished, and all means, both of offence and defence, abandoned. Now, this seems to me to admit, that this is the law under which God has created man. But this being admitted, the question seems to be at an end; for God never places man under circumstances in which it is either wise, or necessary, or innocent, to violate his laws. Is it for the advantage of him who lives among a community of thieves, to steal; or for one who lives among a community of liars, to lie?"

The fallacy of the above argument is so evident that it is scarcely necessary to point out its logical defects.

My living among a community of thieves would not justify me in stealing, and certainly it would be no reason why I should neglect the security of my property. My living among murderers would not justify me in committing murder, and on the other hand it would be no reason why I should not fight in the defence of my family, if the arm of the law were unable to protect them. That other nations carry on unjust wars is no reason why we should do likewise, nor is it of itself any reason why we should neglect the means of self-defence.

It may seem, to us short-sighted mortals, better that we were placed in a world where there were no wars, or murders, or thefts; but God has seen fit to order it otherwise. Our duties and our relations to our fellow-men are made to suit the world as it is, and not such a world as we would make for ourselves.

We live among thieves: we must therefore resort to force to protect our property—that is, to locks, and bars, and bolts; we build walls thick and high between the robber and our merchandise. And more: we enact laws for his punishment, and employ civil officers to forcibly seize the guilty and inflict that degree of punishment necessary for the prevention of other thefts and robberies.

We live among murderers: if neither the law nor the ordinary physical protections suffice for the defence of our own lives and the lives of our innocent friends, we forcibly resist the murderer, even to his death, if need be. Moreover, to deter others from like crimes, we inflict the punishment of death upon him who has already taken life.

These relations of individuals and of society are laid down by all ethical writers as in accordance with the strictest rules of Christian morality. Even Dr. Wayland considers it not only the right, but the duty of individuals and of society to resort to these means, and to enact these laws for self-protection. Let us extend the same course of reasoning to the relations of different societies.

We live among nations who frequently wage unjust wars; who, disregarding the rights of others, oppress and rob, and even murder their citizens, in order to reach some unrighteous end. As individuals, we build fences and walls for the protection of our grounds and our merchandise; so, as a nation, we build ships and forts to protect our commerce, our harbors, and our cities. But the walls of our houses and stores are useless, unless made so strong and high that the robber cannot break through or scale them without great effort and personal danger; so our national ships and forts would be utterly useless for protection, unless fully armed and equipped.

Further: as individuals and as societies we employ civil officers for the protection of our property and lives, and, when necessary, arm them with the physical means of executing the laws, even though the employment of these means should cost human life. The prevention and punishment of crime causes much human suffering; nevertheless the good of community requires that crime should be prevented and punished. So, as a nation, we employ military officers to man our ships and forts, to protect our property and our persons, and to repel and punish those who seek to rob us of our life, liberty, and pursuit of happiness. National aggressions are far more terrible in their results than individual crime; so also the means of prevention and punishment are far more stupendous, and the employment of these means causes a far greater amount of human suffering. This may be a good reason for greater *caution* in resorting to such means, but assuredly it is no argument against the *moral right* to use them.

IV. War is unjustifiable because unnecessary:

"1st. The very fact that a nation relied solely upon the justice of its measures, and the benevolence of its conduct, would do more than any thing else to prevent the occurrence of injury. The moral sentiment of every

community would rise in opposition to injury inflicted upon the just the kind, and the merciful."

The moral duty of nations in this respect is the same as that of individuals. Active benevolence and forbearance should be employed, so far as may be proper; but there are points at which forbearance ceases to be a virtue. If we entirely forbear to punish the thief, the robber, and the murderer, think you that crime will be diminished? Reason and experience prove the contrary. Active benevolence and kindness should always attend just punishment, but they were never designed to prohibit it. The laws of God's universe are founded on justice as well as love. "The moral sentiment of every community rises in opposition to injury inflicted upon the just, the kind, and the merciful;" but this fact does not entirely prevent wicked men from robbing and murdering innocent persons, and therefore wise and just laws require that criminals shall be punished, in order that those who are dead to all moral restraints may be deterred from crime through fear of punishment.

"2d. But suppose the [national] injury to be done. I reply, the proper appeal for moral beings, upon moral questions, is not to physical force, but to the consciences of men. Let the wrong be set forth, but be set forth in the spirit of love; and in this manner, if in any, will the consciences of men be aroused to justice."

Argument, and "appeals to the consciences of men" should always be resorted to in preference to "physical force;" but when they fail to deter the wicked, force must be employed. I may reason with the robber and the murderer, to persuade him to desist from his attempt to rob my house, and murder my family; but if he refuse to listen to moral appeals, I employ physical force,—I call in the strong arm of the law to assist me; and if no other means can be found to save innocent life that is assailed, the life of the assailant must be sacrificed.

"If," says Puffendorf, "some one treads the laws of peace under his feet, forming projects which tend to my ruin, he could not, without the highest degree of impudence, (impudentissime,) pretend that after this I should consider him as a sacred person, who ought not to be touched; in other words, that I should betray myself, and abandon the care of my own preservation, in order to give way to the malice of a criminal, that he may

act with impunity and with full liberty. On the contrary, since he shows himself unsociable towards me, and since he has placed himself in a position which does not permit me safely to practice towards him the duties of peace, I have only to think of preventing the danger which menaces me; so that if I cannot do this without hurting him, he has to accuse himself only, since he has reduced me to this necessity." *De Jure Nat. et Gent*, lib. ii., ch. v., §1. This same course of reasoning is also applied to the duties of a nation towards its enemy in respect to war.

"3d. But suppose this method fail. Why, then, let us suffer the evil."

This principle, if applied to its full extent, would, we believe, be subversive of all right, and soon place all power in the hands of the most evil and wicked men in the community. Reason with the nation that invades our soil, and tramples under foot our rights and liberties, and should it not desist, why, then, suffer the evil! Reason with the murderer, and if he do not desist, why, then, suffer him to murder our wives and our children! Reason with the robber and the defaulter, and if they will not listen, why, then, let them take our property! We cannot appeal to the courts, for if their decisions be not respected, they employ *force* to *compel* obedience to their mandates. But Dr. Wayland considers the law of benevolence to forbid the use of force between men. He forgets this, it is true, in speaking of our duties towards our fellow-men of the same *society*, and even allows us to punish the murderer with death; but towards the foreigner he requires a greater forbearance and benevolence than towards our neighbor; for if another nation send its armies to oppress, and rob, and murder us by the thousand, we have no right to employ physical force either to prevent or to punish them, though we may do so to prevent or punish a neighbor for an individual act of the same character. The greater the scale of crime, then, the less the necessity of resorting to physical force to prevent it!

"4th. But it may be asked, what is to prevent repeated and continued aggression? I answer, first, not instruments of destruction, but the moral principle which God has placed in the bosom of every man. I think that obedience to the law of God, on the part of the injured, is the surest preventive against the repetition of injury. I answer, secondly, suppose that acting in obedience to the law of benevolence will not prevent the repetition of injury, will acting on the principle of retaliation prevent it?" Again; "I

believe aggression from a foreign nation to be the intimation from God that we are disobeying the law of benevolence, and that this is his mode of teaching nations their duty, in this respect, to each other. So that aggression seems to me in no manner to call for retaliation and injury, but rather to call for special kindness and good-will."

This argument, if such it can be called, is equally applicable to individual aggressions. We are bound to regard them as intimations of our want of benevolence, and to reward the aggressors for the intimations! Is it true, that in this world the wicked only are oppressed, and that the good are always the prospered and happy? Even suppose this true, and that I, as a sinful man, deserve God's anger, is this any reason why I should not resist the assassin, and seek to bring him to punishment? The whole of this argument of Dr. Wayland applies with much greater force to municipal courts than to war.

V. "Let us suppose a nation to abandon all means both of offence and of defence, to lay aside all power of inflicting injury, and to rely for self-preservation solely upon the justice of its own conduct, and the moral effect which such a course of conduct would produce upon the consciences of men. * * * * How would such a nation be protected from external attack, and entire subjugation? I answer, by adopting the law of benevolence, a nation would render such an event in the highest degree improbable. The causes of national war are, most commonly, the love of plunder and the love of glory. The first of these is rarely, if ever, sufficient to stimulate men to the *ferocity necessary to war*, unless when assisted by the second. And by adopting as the rule of our conduct the law of benevolence, all motive arising from the second cause is taken away. There is not a nation in Europe that could be led on to war against a harmless, just, forgiving, and defenceless people."

History teaches us that societies as well as individuals have been attacked again and again notwithstanding that they either would not or could not defend themselves. Did Mr. White, of Salem, escape his murderers any the more for being harmless and defenceless? Did the Quakers escape being attacked and hung by the ancient New Englanders any the more because of their non-resisting principles? Have the Jews escaped persecutions throughout Christendom any the more because of their imbecility and non-

resistance for some centuries past? Poland was comparatively harmless and defenceless when the three great European powers combined to attack and destroy the entire nation, dividing between themselves the Polish territory, and enslaving or driving into exile the Polish people.

> "Oh, bloodiest picture in the book of time,
> Sarmatia fell, unwept, without a crime!"

We need not multiply examples under this head; all history is filled with them.

Let us to-morrow destroy our forts and ships of war, disband our army and navy, and apply the lighted torch to our military munitions and to our physical means of defence of every description; let it be proclaimed to the world that we will rely solely upon the consciences of nations for justice, and that we have no longer either the will or the ability to defend ourselves against aggression. Think you that the African and Asiatic pirates would refrain, any the more, from plundering our vessels trading to China, because we had adopted "the law of benevolence?" Would England be any the more likely to compromise her differences with us, or be any the more disposed to refrain from impressing our seamen and from searching our merchant-ships? Experience shows that an undefended state, known to suffer every thing, soon becomes the prey of all others, and history most abundantly proves the wisdom and justice of the words of Washington—"IF WE DESIRE TO SECURE PEACE, IT MUST BE KNOWN THAT WE ARE AT ALL TIMES READY FOR WAR."

But let us bring this case still nearer home. Let it be known to-morrow that the people of Boston or New York have adopted the strictly non-resisting principle, and that hereafter they will rely solely on the consciences of men for justice; let it be proclaimed throughout the whole extent of our Union, and throughout the world, that you have destroyed your jails and houses of correction, abolished your police and executive law officers, that courts may decide justice but will be allowed no force to compel respect to their decisions, that you will no longer employ walls, and bars, and locks, to secure your property and the virtue and lives of your children; but that you will trust solely for protection to "the law of active benevolence." Think you that the thieves, and robbers, and murderers of Philadelphia, and

Baltimore, and New Orleans, and the cities of the old world, will, on this account, refrain from molesting the peace of New York and Boston, and that the wicked and abandoned men now in these cities, will be the more likely to turn from the evil of their ways?

Assuredly, if this "law of active benevolence," as Dr. Wayland denominates the rule of non-resistance, will prevent nations from attacking the harmless and defenceless, it will be still more likely to prevent individuals from the like aggressions; for the moral sense is less active in communities than where the responsibility is individual and direct.

Throughout this argument Dr. Wayland assumes that all wars are wars of aggression, waged for "plunder" or "glory," or through "hatred" or "revenge," whereas such is far from being true. He indeed sometimes speaks of war as being *generally* of this character; at others he speaks of it as being *always* undertaken either from a spirit of aggression or retaliation. Take either form of his argument, and the veriest schoolboy would pronounce it unsound: viz.,

All wars are undertaken either for aggression or retaliation;

Aggression and retaliation are forbidden by God's laws;—therefore,

All wars are immoral and unjustifiable.

Or,

Wars are *generally* undertaken either for aggression or retaliation;

Aggression and retaliation are forbidden by God's laws—therefore,

All wars are immoral and unjustifiable.

VI. "Let any man reflect upon the amount of pecuniary expenditure, and the awful waste of human life, which the wars of the last hundred years have occasioned, and then we will ask him whether it be not evident, that the one-hundredth part of this expense and suffering, if employed in the honest effort to render mankind wiser and better, would, long before this time, have banished wars from the earth, and rendered the civilized world like the garden of Eden? If this be true, it will follow that the cultivation of a military spirit is injurious to a community, inasmuch as it aggravates the

source of the evil, the corrupt passions of the human breast, by the very manner in which it attempts to correct the evil itself."

Much has been said to show that war begets immorality, and that the cultivation of the military spirit has a corrupting influence on community. And members of the clergy and of the bar have not unfrequently so far forgotten, if not truth and fact, at least the common courtesies and charities of life, as to attribute to the military profession an unequal share of immorality and crime. We are declared not only parasites on the body politic, but professed violators of God's laws—men so degraded, though unconsciously, that "in the pursuit of justice we renounce the human character and assume that of the beasts;" it is said that "murder, robbery, rape, arson, theft, if only plaited with the soldier's garb, go unwhipped of justice."[1] It has never been the habit of the military to retort these charges upon the other professions. We prefer to leave them unanswered. If demagogues on the "stump," or in the legislative halls, or in their Fourth of-July addresses, can find no fitter subjects "to point a moral or adorn a tale," we must be content to bear their misrepresentations and abuse.

[1]

Sumner's Oration.

Unjust wars, as well as unjust litigation, are immoral in their effects and also in their cause. But just wars and just litigation are not demoralizing. Suppose all wars and all courts of justice to be abolished, and the wicked nations as well as individuals to be suffered to commit injuries without opposition and without punishment; would not immorality and unrighteousness increase rather than diminish? Few events rouse and elevate the patriotism and public spirit of a nation so much as a just and patriotic war. It raises the tone of public morality, and destroys the sordid selfishness and degrading submissiveness which so often result from a long-protracted peace. Such was the Dutch war of independence against the Spaniards; such the German war against the aggressions of Louis XIV., and the French war against the coalition of 1792. But without looking abroad for illustration, we find ample proof in our own history. Can it be said that the wars of the American Revolution and of 1812, were demoralizing in their effects? "Whence do Americans," says Dr. Lieber, "habitually take

their best and purest examples of all that is connected with patriotism, public spirit, devotedness to common good, purity of motive and action, if not from the daring band of their patriots of the Revolution?"

The principal actors in the military events of the Revolution and of 1812, held, while living, high political offices in the state, and the moral tone which they derived from these wars may be judged of by the character stamped on their administration of the government. These men have passed away, and their places have, for some time, been filled by men who take their moral tone from the relations of peace. To the true believer in the efficacy of *non-resistance,* and in the demoralizing influence of all wars, how striking the contrast between these different periods in our political history! How infinitely inferior to the rulers in later times were those, who, in the blindness of their infatuation, appealed to physical force, rather than surrender their life, liberty, and pursuit of happiness! Let us trace out this contrast:—

In the earlier ages of our republic, and under the rule of those whose moral character had been corrupted by war, party spirit ran higher and was less pure than at later periods in our history. The object of the principal leaders of the great political parties was then to render the opinions of the opposite party odious: now, their only object is to sustain their own opinions by argument. Then, each party claimed to itself an exclusive love of country, and stigmatized the other as aliens and the natural enemies of the state: now, they both practise great forbearance, love, and charity, towards political opponents. Then, men obtained place through intrigue and corruption, and a universal scramble for the loaves and fishes of office on the one side, and a universal political proscription on the other, were regarded as the natural results of an election: now, this disgusting strife for office has ceased; men no longer seek place, but wait, like Cincinnatus, to be called from their ploughs; and none are proscribed for opinion's sake. Then, in electing men to office the most important social and constitutional principles were forgotten or violated: now, we have the august spectacle of a nation-choosing its rulers under the guidance of strict moral principle. Then, the halls of congress were frequently filled with demagogues, and tiplers, and the *small men* of community: now, the ablest and best of the country are always sought for as representatives. Then, the magnates of party were the mere timid, temporizing slaves of expediency, looking, not

to the justice and wisdom of their measures, but to their probable popularity with then sneaking train of followers: now, they rely for respect and support upon the judgment of the honest and enlightened. Then, the rank and file of party were mere political hirelings, who sold their manhood for place, who reviled and glorified, and shouted huzzas and whispered calumnies, just as they were bidden; they could fawn upon those who dispensed political patronage with a cringing servility that would shame the courtiers of Louis XIV., or the parasites and hirelings of Walpole: now, all political partisans, deriving their moral tone from the piping times of peace, are pure, disinterested patriots, who, like the Roman farmer, take office with great reluctance, and resign it again as soon as the state can spare their services. Then, prize-fighters, and blacklegs, and gamblers, having formed themselves into political clubs, were courted by men high in authority, and rewarded for their dirty and corrupting partisan services by offices of trust and responsibility: now, no man clothed with authority would dare to insult the moral sense of community by receiving such characters in the national councils, or by bestowing public offices upon these corrupt and loathsome dregs of society.

Such, the advocates of non resistance would persuade us, are the legitimate results in this country of war on the one hand and of a long-protracted peace on the other. But there are men of less vivid imaginations, and, perhaps, of visions less distorted by fanatical zeal, who fail to perceive these results, and who even think they see the reverse of all this. These men cannot perceive any thing in the lives of Washington, Hamilton, and Knox, to show that they were the less virtuous because they had borne arms in their country's service: they even fail to perceive the injurious effects of the cultivation of a military spirit on the military students of West Point, whose graduates, they think, will compare favorably in moral character with the graduates of Yale and Cambridge. Nay, more, some even go so far as to say that our army, as a body, is no less moral than the corresponding classes in civil life; that our common soldiers are as seldom guilty of riots, thefts, robberies, and murders, as similarly educated men engaged in other pursuits; that our military officers are not inferior in moral character to our civil officers, and that, as a class, they will compare favorably with any other class of professional men—with lawyers, for example. In justification of these opinions—which may, perhaps, be deemed singularly erroneous—

they say, that in the many millions of public money expended during the last forty years, by military officers, for the army, for military defences, and for internal improvements, but a single graduate of West Point has proved a defaulter, even to the smallest sum, and that it is exceedingly rare to see an officer of the army brought into court for violating the laws.

But even suppose it true that armies necessarily diffuse immorality through community, is it not equally true that habitual submission to the injustice, plunder, and insult of foreign conquerors would tend still more to degrade and demoralize any people?

With regard to "pecuniary expenditures" required in military defence, many absurd as well as false statements have been put forth. With respect to our own country, the entire amounts expended, under the head of war department, whether for Indian pensions, for the purchase of Indian lands, the construction of government roads, the improvement of rivers and harbors, the building of breakwaters and sea-walls, for the preservation of property, the surveying of public lands, &c., &c.; in fine, every expenditure made by officers of the army, under the war department, is put down as "expenses for military defence." Similar misstatements are made with respect to foreign countries: for example, the new fortifications of Paris are said to have already cost from fifty to seventy-five millions of dollars, and as much more is said to be required to complete them. Indeed, we have seen the whole estimated cost of those works stated at two hundred and forty millions of dollars, or twelve hundred millions of francs! The facts are these: the works, when done, will have cost about twenty-eight millions. We had the pleasure of examining them not long since, in company with several of the engineer officers employed on the works. They were then three-fourths done, and had cost about twenty millions. We were assured by these officers that the fortifications proper would be completed for somewhat less than the original estimate of twenty-eight millions. Had we time to enter into details, other examples of exaggeration and misrepresentation could be given.

But it is not to be denied that wars and the means of military defence have cost vast amounts of money. So also have litigation and the means deemed requisite for maintaining justice between individuals. It has been estimated that we have in this country, at the present time, thirty thousand lawyers,

without including pettifoggers. Allowing each of these to cost the country the average sum of one thousand dollars, and we have the annual cost to the country, for lawyers, thirty millions of dollars. Add to this the cost of legislative halls and legislators for making laws; of court-houses, jails, police offices, judges of the different courts, marshals, sheriffs justices of the peace, constables, clerks, witnesses, &c., employed to apply and enforce the laws when made; the personal loss of time of the different plaintiffs and defendants, the individual anxiety and suffering produced by litigation; add all these together, and I doubt not the result for a single year will somewhat astonish these modern economists. But if all the expenditures of this nature that have been made for the last fifty years, in this individual "war of hate," be added together, we have no doubt a very fruitful text might be obtained for preaching a crusade against law and lawyers! But could any sane man be found to say that, on account of the cost of maintaining them, all laws and lawyers are useless and should be abolished?

If, therefore, these vast sums of money are deemed necessary to secure justice between individuals of the same nation, can we expect that the means of international justice can be maintained without expenditures commensurate with the object in view? If we cannot rely exclusively upon the "law of active benevolence" for maintaining justice between brothers of the same country, can we hope that, in the present state of the world, strangers and foreigners will be more ready to comply with its requisitions?

The length of the preceding remarks admonishes us to greater brevity in the further discussion of this subject.

It is objected to war, that men being rational beings, should contend with one another by argument, and not by force, as do the brutes.

To this it is answered, that force properly begins only where argument ends. If he who has wronged me cannot be persuaded to make restitution, I apply to the court,—that is, to *legal* force,—to compel him to do me justice. So nations ought to resort to *military force* only when all other means fail to prevent aggression and injury.

But war often fails to procure redress of grievances, or to prevent repeated and continued aggression.

So does a resort to civil force; but such a resort is none the less proper and just on that account.

But in war the innocent party is sometimes the sufferer, while the guilty triumph.

So it often is in civil life: God, for some wise purpose, sometimes permits the wicked to triumph for a season.

But in all wars one party must be in the wrong, and frequently the war is unjust on both sides.

So in suits at law, one party is necessarily wrong, and frequently both resort to the civil tribunals in hopes of attaining unrighteous ends.

But nations do not resort to tribunals, like individuals, to settle their differences.

For the reason that it is believed a tribunal of this character—a congress of nations, as it has been called,—would be more productive of evil than of good. By such an arrangement the old and powerful European monarchies would acquire the authority to interfere in the domestic affairs of the weaker powers. We see the effects of establishing such a tribunal in the so-called Holy Alliance, whose influence is regarded by the friends of liberty as little less dangerous than the Holy Inquisition. Moreover, such a tribunal would not prevent war, for military force would still be resorted to to enforce its decisions. For these and other reasons, it is deemed better and safer to rely on the present system of International Law. Under this system, and in this country, a resort to the arbitrament of war is not the result of impulse and passion,—a yielding to the mere "bestial propensities" of our nature; it is a deliberate and solemn act of the legislative power,—of the representatives of the national mind, convened as the high council of the people. It is this power which must determine when all just and honorable means have been resorted to to obtain national justice, and when a resort to military force is requisite and proper. If this decision be necessarily unchristian and barbarous, such, also, should we expect to be the character of other laws passed by the same body, and under the same circumstances. A declaration of war, in this country, is a law of the land, made by a deliberative body, under the high sanction of the constitution. It is true that such a law may be

unjust and wrong, but we can scarcely agree that it will necessarily be so. The distinction between war, as thus duly declared, and "international Lynch-law" is too evident to need comment.

But it is said that the benefits of war are more than counterbalanced by the evils it entails, and that, "most commonly, the very means by which we repel a despotism from abroad, only establishes over us a military despotism at home."

Much has been said and written about *military* despotism; but we think he who studies history thoroughly, will not fail to prefer a military despotism to a despotism of mere politicians. The governments of Alexander and Charlemagne were infinitely preferable to those of the petty civil tyrants who preceded and followed them; and there is no one so blinded by prejudice as to say that the reign of Napoleon was no better than that of Robespierre, Danton, and the other "lawyers" who preceded him, or of the Bourbons, for whom he was dethroned.

"Cæsar," says a distinguished senator of our own country, "was rightfully killed for conspiring against his country; but it was not he that destroyed the liberties of Rome. That work was done by the profligate politicians without him, and before his time; and his death did not restore the republic. There were no more elections: rotten politicians had destroyed them; and the nephew of Cæsar, as heir to his uncle, succeeded to the empire on the principle of hereditary succession."

"And here History appears in her grand and instructive character, as Philosophy teaching by example: and let us not be senseless to her warning voice. Superficial readers believe it was the military men who destroyed the Roman republic! No such thing! It was the politicians who did it!--factious, corrupt, intriguing politicians—destroying public virtue in their mad pursuit after office—destroying their rivals by crime—deceiving and debauching the people for votes—and bringing elections into contempt by the frauds and violence with which they were conducted. From the time of the Gracchi there were no elections that could bear the name. Confederate and rotten politicians bought and sold the consulship. Intrigue and the dagger disposed of rivals. Fraud, violence, bribes, terror, and the plunder of the public treasury commanded votes. The people had no choice; and long before the

time of Cæsar, nothing remained of republican government but the name and the abuse. Read Plutarch. In the 'Life of Cæsar,' and not three pages before the crossing of the Rubicon, he paints the ruined state of the elections,—shows that all elective government was gone,—that the hereditary form had become a necessary relief from the contests of the corrupt,—and that in choosing between Pompey and Cæsar, many preferred Pompey, not because they thought him republican, but because they thought he would make the milder king. Even arms were but a small part of Cæsar's reliance, when he crossed the Rubicon. Gold, still more than the sword, was his dependence; and he sent forward the accumulated treasures of plundered Gaul, to be poured into the laps of rotten politicians. There was no longer a popular government; and in taking all power himself, he only took advantage of the state of things which profligate politicians had produced. In this he was culpable, and paid the forfeit with his life. But in contemplating his fate, let us never forget that the politicians had undermined and destroyed the republic, before he came to seize and to master it."

We could point to numerous instances, where the benefits of war have more than compensated for the evils which attended it; benefits not only to the generations who engaged in it, but also to their descendants for long ages. Had Rome adopted the non-resistance principle when Hannibal was at her gates, we should now be in the night of African ignorance and barbarism, instead of enjoying the benefits of Roman learning and Roman civilization. Had France adopted this principle when the allied armies invaded her territories in 1792, her fate had followed that of Poland. Had our ancestors adopted this principle in 1776, what now had been, think you, the character and condition of our country?

Dr. Lieber's remarks on this point are peculiarly just and apposite. "The continued efforts," says he, "requisite for a nation to protect themselves against the ever-repeated attacks of a predatory foe, may be infinitely greater than the evils entailed by a single and energetic war, which forever secures peace from that side. Nor will it be denied, I suppose, that Niebuhr is right when he observes, that the advantage to Rome of having conquered Sicily, as to power and national vigor, was undeniable. But even if it were not so, are there no other advantages to be secured? No human mind is vast enough to comprehend in one glance, nor is any human life long enough to

follow out consecutively, all the immeasurable blessings and the unspeakable good which have resolved to mankind from the ever-memorable victories of little Greece over the rolling masses of servile Asia, which were nigh sweeping over Europe like the high tides of a swollen sea, carrying its choking sand over all the germs of civilization, liberty, and taste, and nearly all that is good and noble. Think what we should have been had Europe become an Asiatic province, and the Eastern principles of power and stagnation should have become deeply infused into her population, so that no process ever after could have thrown it out again! Has no advantage resulted from the Hebrews declining any longer to be ground in the dust, and ultimately annihilated, at least mentally so, by stifling servitude, and the wars which followed their resolution? The Netherlands war of independence has had a penetrating and decided effect upon modern history, and, in the eye of all who value the most substantial parts and elementary ideas of modern and civil liberty, a highly advantageous one, both directly and through Great Britain. Wars have frequently been, in the hands of Providence, the means of disseminating civilization, if carried on by a civilized people—as in the case of Alexander, whose wars had a most decided effect upon the intercourse of men and extension of civilization—or of rousing and reuniting people who had fallen into lethargy, if attacked by less civilized and numerous hordes. Frequently we find in history that the ruder and victorious tribe is made to recover as it were civilization, already on the wane with a refined nation. Paradoxical as it may seem at first glance, it is, nevertheless, amply proved by history, that the closest contact and consequent exchange of thought and produce and enlargement of knowledge, between two otherwise severed nations, is frequently produced by war. War is a struggle, a state of suffering; but as such, at times, only that struggling process without which—in proportion to the good to be obtained, or, as would be a better expression for many cases, to the good that is to be borne—no great and essential good falls ever to the share of man. Suffering, merely as suffering, is not an evil. Our religion, philosophy, every day's experience, prove it. No maternal rejoicing brightens up a mother's eve without the anxiety of labor."

One word more, and we must leave this subject. It has been said by some that the duties of patriotism are less binding upon us than upon our ancestors; that, whatever may have been the practice in years that are past

the present generation can in no manner bear arms in their country's cause, such a course being not only *dishonorable*, but in the eye of the Christian, *wicked*, and even *infamous*! It is believed, however, that such are not the general opinions and sentiments of the religious people of this country. Our forefathers lighted the fires of Religion and Patriotism at the same altar; it is believed that their descendants have not allowed either to be extinguished, but that both still burn, and will continue to burn, with a purer and brighter flame. Our forefathers were not the less mindful of their duty to their God, because they also faithfully served their country. If we are called upon to excel them in works of charity, of benevolence, and of Christian virtue, let it not be said of us that we have forgotten the virtue of patriotism.[2]

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For further discussion of this subject the reader is referred to Lieber's Political Ethics, Part II., book vii. chap. 3; Paley's Moral and Political Philosophy; Legare's Report of June 13, 1838, in the House of Representatives; Mackintosh's History of the Revolution of 1688, chap. x.; Bynkershock; Vatel; Puffendorf; Clausewitz; and most other writers on international law and the laws of war.

Dr. Wayland's view of the question is advocated with much zeal by Dymond in his Inquiry into the Accordancy of War with the Principles of Christianity; Jay's Peace and War; Judd's Sermon on Peace and War; Peabody's Address, &c.; Coue's Tract on What is the Use of the Navy? Sumner's True Grandeur of Nations.

CHAPTER II.

STRATEGY

War has been defined, "A contest between nations and states carried on by force." But this definition is by some considered defective, inasmuch as it would exclude all civil wars.

When war is commenced by attacking a nation in peace, it is called *offensive*, and when undertaken to repel invasion, or the attacks of an enemy, it is called *defensive*. A war may be essentially defensive even where we begin it, if intended to prevent an attack or invasion which is under preparation. Besides this general division of war, military writers have made numerous others, such as—

Wars of intervention, in which one state interferes in favor of another. This intervention may either have respect to the *internal* or to the *external* affairs of a nation. The interference of Russia in the affairs of Poland, of England in the government of India, Austria and the allied powers in the affairs of France during the Revolution and under the empire, are examples under the first head. The intervention of the Elector Maurice of Saxony against Charles V., of King William against Louis XIV., in 1688, of Russia and France in the seven years' war, of Russia again between France and Austria, in 1805, and between France and Prussia, in 1806, are examples under the second head. Most liberal-publicists consider intervention in the internal affairs of nations as indefensible; but the principle is supported by the advocates of the old monarchies of Europe.

Wars of insurrection to gain or to regain liberty; as was the case with the Americans in 1776, and the modern Greeks in 1821.

Wars of independence from foreign dictation and control as the wars of Poland against Russia, of the Netherlands against Spain, of France against the several coalitions of the allied powers, of the Spanish Peninsula against

France and of China and India against England. The American war of 1812 partook largely of this character, and some judicious historians have denominated it the war of Independence, as distinguished from the war of the Revolution.

Wars of opinion, like those which the Vendeans have sustained in support of the Bourbons, and those France has sustained against the allies, as also those of propagandism, waged against the smaller European states by the republican hordes of the French Revolution. To this class also belong—

Religious wars, like those of Islamism, of the crusades, and of the Reformation.

Wars of conquest, like those of the Romans in Gaul, of the English in India, of the French in Egypt and Africa, and of the Russians in Circassia.

National wars, in which the great body of the people of a state engage, like those of the Swiss against Austria and the Duke of Burgundy, of the Catalans in 1712, of the Americans against England, of the Dutch against Phillip II., and of the Poles and Circassians against Russia.

Civil wars, where one portion of the state fights against the other, as the war of the Roses in England, of the league in France, of the Guelphs and Ghibelines in Italy, and of the factions in Mexico and South America.

It is not the present intention to enter into any discussion of these different kinds of war, but rather to consider the general subject, and to discuss such general principles and rules as may be applicable to all wars.

War in its most extensive sense may be regarded both as a *science* and an *art*. It is a science so far as it investigates general principles and institutes an analysis of military operations; and an art when considered with reference to the practical rules for conducting campaigns, sieges, battles, &c. So is engineering a science so far as it investigates the general principles of fortification, and also artillery, in analyzing the principles of gunnery; but both are arts when considered with reference to the practical rules for the construction, attack, and defence of forts, or for the use of cannon.

This distinction has not always been observed by writers on this subject, and some have asserted that strategy is the *science*, and tactics the *art* of war. This is evidently mistaking the general distinction between science, which investigates principles, and art, which forms practical rules.

In popular language, however, it is usual to speak of *the military art* when we refer to the general subject of war, and of *the military sciences* when we wish to call attention more particularly to the scientific principles upon which the art is founded. We shall here consider the military art in this general sense, as including the entire subject of war.

As thus defined, the military art may be divided into four distinct branches, viz.: 1st. *Strategy*; 2d. Fortification, or *Engineering*; 3d. *Logistics*; 4th. *Tactics*. Several general treatises on this art add another branch, called *The Policy of War*, or the relations of war with the affairs of state.

Strategy is defined to be the art of directing masses on decisive points, or the hostile movements of armies beyond the range of each other's cannon. *Engineering* embraces all dispositions made to enable troops to resist a superior force the longest time possible; and also the means resorted to by the opposing army to overcome these material obstacles. *Logistics* embraces the practical details of moving and supplying armies. *Tactics* is the art of bringing troops into action, or of moving them in the presence of an enemy, that is, within his view, and within the reach of his artillery. All these are most intimately connected. A fault in tactics may occasion the loss of strategic lines; the best combined manœuvres on the field of battle may lead to no decisive results, when the position, or the direction of the operation is not strategic; sometimes not only battles, but entire campaigns, are lost through neglect of the engineer's art, or faults in his dispositions; again, armies would be of little use without the requisite means of locomotion and of subsistence.

1. *Strategy* regards the theatre of war, rather than the field of battle. It selects the important points in this theatre, and the lines of communication by which they may be reached; it forms the plan and arranges the general operations of a campaign; but it leaves it to the engineers to overcome material obstacles and to erect new ones; it leaves to logistics the means of supporting armies and of moving them on the chosen lines; and to tactics,

the particular dispositions for battle, when the armies have reached the destined points. It is well to keep in mind these distinctions, which may be rendered still more obvious by a few illustrations. The point where several lines of communications either intersect or meet, and the centre of an arc which is occupied by the enemy, are strategic points; but tactics would reject a position equally accessible on all sides, especially with its flanks exposed to attack. Sempronius at Trebbia and Varro at Cannæ, so placed their armies that the Carthagenians attacked them, at the same time, in front, on the flanks, and in rear; the Roman consuls were defeated: but the central strategic position of Napoleon at Rivoli was eminently successful. At the battle of Austerlitz the allies had projected a *strategic* movement to their left, in order to cut off Napoleon's right from Vienna; Weyrother afterwards changed his plans, and executed a corresponding *tactical* movement. By the former there had been some chance of success, but the latter exposed him to inevitable destruction. The little fort of Koenigsten, from its advantageous position, was more useful to the French, in 1813, than the vast works of Dresden. The little fort of Bard, with its handful of men, was near defeating the operations of Napoleon in 1800, by holding in check his entire army; whereas, on the other hand, the ill-advised lines of Ticino, in 1706, caused an army of 78,000 French to be defeated by only 40,000 men under Prince Eugene of Savoy.

War, as has already been said, may be either offensive or defensive. If the attacking army be directed against an entire state, it becomes a war of *invasion*. If only a province, or a military position, or an army, be attacked, it is simply regarded as taking the *initiative* in offensive movements.

Offensive war is ordinarily most advantageous in its moral and political influence. It is waged on a foreign soil, and therefore spares the country of the attacking force; it augments its own resources at the same time that it diminishes those of the enemy; it adds to the moral courage of its own army, while it disheartens its opponents. A war of invasion may, however, have also its disadvantages. Its lines of operation may become too *deep*, which is always hazardous in an enemy's country. All the natural and artificial obstacles, such as mountains, rivers, defiles, fortifications, &c., are favorable for defence, but difficult to be overcome by the invader. The local authorities and inhabitants oppose, instead of facilitating his operations; and if patriotism animate the defensive army to fight for the independence of its

threatened country, the war may become long and bloody. But if a political diversion be made in favor of the invading force, and its operations be attended with success, it strikes the enemy at the heart, paralyzes all his military energies, and deprives him of his military resources, thus promptly terminating the contest. Regarded simply as the initiative of movements, the offensive is almost always the preferable one, as it enables the general to choose his lines for moving and concentrating his masses on the decisive point.

The first and most important rule in offensive war is, to keep your forces as much concentrated as possible. This will not only prevent misfortune, but secure victory,—since, by its necessary operation, you possess the power of throwing your whole force upon any exposed point of your enemy's position.

To this general rule some writers have laid down the following exceptions: —

1st. When the food and forage of the neighborhood in which you act have been exhausted and destroyed, and your magazines are, from any cause, unable to supply the deficiency, one of two things must be done; either you must go to places where these articles abound, or you must draw from them your supplies by *detachments*. The former is rarely compatible with your plan, and necessarily retards its execution; and hence the preference which is generally given to the latter.

2d. When reinforcements are about to join you, and this can only be effected by a march through a country actually occupied by hostile corps, or liable to be so occupied, you must again waive the general rule, and risk one party for the security of the other; or, (which may be better,) make such movements with your main body as shall accomplish your object.

3d. When you have complete evidence of the actual, or probable insurrection in your favor, of a town or province of your enemy, or of a division of his army, you must support this inclination by strong *detachments*, or by movements of your main body. Napoleon's operations in Italy, in 1796-7, furnish examples of what is here meant.

4th. When, by dispatching a *detachment*, you may be able to intercept a convoy, or reinforcement, coming to the aid of your enemy.

These are apparent rather than real exceptions to the rule of concentration. This rule does not require that *all the army should occupy the same position*. Far from it. Concentration requires the main body to be in immediate and supporting reach: small detachments, for temporary and important objects, like those mentioned, are perfectly legitimate, and in accordance with correct principles. Napoleon's position in Spain will serve as an illustration. A hand, placed on the map of that country, will represent the position of the invading forces. When opened, the fingers will represent the several detachments, thrown out on important strategic lines, and which could readily be drawn in, as in closing the hand, upon the principal and central mass, preparatory to striking some important blow.

"If, as we have seen, it be the first great rule for an army acting on the offensive principle, to keep its forces *concentrated*, it is, no doubt, the second, *to keep them fully employed.* Is it your intention to seize a particular province of your enemy? to penetrate to his capital? or to cut him off from his supplies? Whatever measure be necessary to open your route to these objects must be *promptly* taken; and if you mean to subsist yourself at his expense, your movements must be more rapid than his. Give him time to *breathe*,—and above all, give him time to *rest*, and your project is blasted; his forages will be completed, and his magazines filled and secured. The roads of approach will be obstructed, bridges destroyed, and strong points everywhere taken and defended. You will, in fact, like Burgoyne, in 1777, reduce yourself to the necessity of bleeding at every step, without equivalent or use."

"Such cannot be the fate of a commander who, knowing all the value of acting on the offensive, shakes, by the vigor and address of his first movements, the moral as well as physical force of his enemy,—who, selecting his own time, and place, and mode of attack, confounds his antagonist by enterprises equally hardy and unexpected,—and who at last leaves to him only the alternative of resistance without hope, or of flying without resistance."

The British army, in the war of the American Revolution, must have been most wretchedly ignorant of these leading maxims for conducting offensive war. Instead of concentrating their forces on some decisive point, and then destroying the main body of our army by repeated and well-directed blows, they scattered their forces over an immense extent of country, and became too weak to act with decision and effect on any one point. On the other hand, this policy enabled us to call out and discipline our scattered and ill-provided forces.

The main object in *defensive* war is, to protect the menaced territory, to retard the enemy's progress, to multiply obstacles in his way, to guard the vital points of the country, and—at the favorable moment, when the enemy becomes enfeebled by detachments, losses, privations, and fatigue—to assume the offensive, and drive him from the country. This combination of the defensive and offensive has many advantages. The enemy, being forced to take the defensive in his turn, loses much of the moral superiority due to successful offensive operations. There are numerous instances of this kind of war, "the defensive-offensive," as it is sometimes called, to be found in history. The last four campaigns of Frederick the Great of Prussia, are examples which may serve as models. Wellington played a similar part in the Spanish peninsula.

To merely remain in a defensive attitude, yielding gradually to the advances of the enemy, without any effort to regain such positions or provinces as may have fallen into his power, or to inflict on him some fatal and decisive blow on the first favorable opportunity; such a system is always within the reach of ignorance, stupidity, and cowardice; but such is far from being the true Fabian system of defensive war.

"Instead of finding security only in flight; instead of habitually refusing to look the enemy in the face; instead of leaving his march undisturbed; instead of abandoning, without contest, points strong by nature or by art;—instead of all this, the true war of defence seeks every occasion to meet the enemy, and loses none by which it can annoy or defeat him; it is always awake; it is constantly in motion, and never unprepared for either attack or defence. When not employed in efforts of courage or address, it incessantly yields itself to those of labor and science. In its front it breaks up roads or breaks down bridges; while it erects or repairs those in its rear: it forms

abbatis, raises batteries, fortifies passes, or intrenches encampments; and to the system of deprivation adds all the activity, stratagem, and boldness of *la petite guerre*. Dividing itself into detachments, it multiplies its own attacks and the alarms of the enemy. Collecting itself at a single point, it obstructs his progress for days, and sometimes for weeks together. Does it even abandon the avenues it is destined to defend? It is but for the purpose of shielding them more securely, by the attack of his hospitals, magazines, convoys, or reinforcements. In a word, by adopting the maxim, that the *enemy must be made to pay for whatever he gains*, it disputes with him every inch of ground, and if at last it yields to him a victory, it is of that kind which calls forth only his sighs."

In discussing the subject of strategy, certain technical terms are employed, such as *theatre of war; theatre of operations; base of operations*, or the line from which operations start; *objective points*, or points to which the operations are directed; *line of operations*, or the line along which an army moves; *key points*, or points which it is important for the defensive army to secure; *line of defence,* or the line which it is important to defend at all hazards: and in general, *strategic points, strategic lines, strategic positions, &c.* As these terms are very generally used in military books, it may be well to make ourselves thoroughly acquainted with their import. After defining these terms and explaining their meaning and application, it is deemed best to illustrate their use by reference to well-known and striking historical examples.

The theatre of a war embraces not only the territory of the two belligerent powers, but also that of their allies, and of such secondary powers as, through fear or interest, may be drawn into the contest. With maritime nations it also embraces the seas, and sometimes crosses to another continent. Some of the wars between France and England embraced the two hemispheres.

The theatre of operations, however, is of a more limited character, and should not be confounded with the theatre of war. In general, it includes only the territory which an army seeks, on the one hand, to defend, and on the other, to invade. If two or more armies be directed towards the same object, though by different lines, their combined operations are included in the same theatre but if each acts independently of the others, and seeks

distinct and separate objects, each must have its own independent theatre of operations.

A war between France and Austria may embrace all Italy and Germany, but the theatre of operations may be limited to only a portion of these countries. Should the Oregon question lead to hostilities between the United States and England, the theatre of war would embrace the greater part of North America and the two oceans, but the theatre of operations would probably be limited to Canada and our northern frontier, with naval descents upon our maritime cities.

The first point to be attended to in a plan of military operation is to select a good *base*. Many circumstances influence this selection, such as mountains, rivers, roads, forests, cities, fortifications, military dépôts, means of subsistence, &c. If the frontier of a state contain strong natural or artificial barriers, it may serve not only as a good base for offensive operations, but also as an excellent line of defence against invasion. A single frontier line may, however, be penetrated by the enemy, and in that case a second or third base further in the interior becomes indispensable for a good defence.

A French army carrying on military operations against Germany would make the Rhine its first base; but if driven from this it would form a second base on the Meuse or Moselle, a third on the Seine, and a fourth on the Loire; or, when driven from the first base, it would take others perpendicular to the front of defence, either to the right, on Béfort and Besançon, or to the left, on Mézières and Sedan. If acting offensively against Prussia and Russia, the Rhine and the Main would form the first base the Elbe and the Oder the second, the Vistula the third, the Nieman the fourth, and the Dwina and the Dnieper the fifth.

A French army operating against Spain would have the Pyrenees for its first base; the line of the Ebro for a second, resting its wings on the gulf of Gascony and the Mediterranean. If from this position it advance its left, possessing itself of the kingdom of Valencia, the line of the Sierra d'Estellas becomes its third base of operations against the centre of Spain.

A base may be parallel, oblique, or perpendicular to our line of operations, or to the enemy's line of defence. Some prefer one plan and some another; the best authorities, however, think the oblique or perpendicular more

advantageous than the parallel; but we are not often at liberty to choose between these, for other considerations usually determine the selection.

In 1806, the French forces first moved perpendicular to their base on the Main, but afterwards effected a change of front, and moved on a line oblique or nearly parallel to this base. They had pursued the same plan of operations in the Seven Years' War. The Russians, in 1812, based perpendicularly on the Oka and the Kalouga, and extended their flank march on Wiozma and Krasnoi; in 1813, the allies, based perpendicularly on Bohemia, succeeded in paralyzing Napoleon's army on the Elbe.

An American army moving by Lake Champlain, would be based perpendicular on the great line of communication between Boston and Buffalo; if moving from the New England states on Quebec and Montreal, the line of operations would be oblique; and if moving from the Niagara frontier by Lake Ontario and the St. Lawrence, the line would be nearly parallel both to our base and to the enemy's line of defence—an operation, under the circumstances, exceedingly objectionable.

Any point in the theatre of operations which gives to the possessor an advantage over his opponent, is regarded as *strategic*. Their geographical position and political and military character, give them a greater or less influence in directing the campaign. These points are occupied by the defensive army, and attacked by the offensive; if on or near the base, they become the *key* points for the former, and the *objective* points for the latter. [3] There are also between these two a greater or less number of strategic points, which have an important though inferior influence upon the result of the war.

[3]

It may be well to remark that a strategic point is not necessarily a geometrical point; an entire province, or a considerable portion of a geographical frontier, is, in military language, sometimes denominated a *point*. In the same way, strategic lines, instead of being mathematical lines, are frequently many miles in width.

The first object of the French in attacking Belgium, is to gain possession of the Meuse, as this position would give them a decided advantage in any

ulterior operations. In attacking southern Germany, the course of the Danube offers a series of points which exercise an important influence on the war. For northern Germany, Leipsic and the country bordering on the Saale and the Elbe, are objects often fiercely contested by the French and other belligerent powers. In a war between this country and England, Montreal and the points on the St. Lawrence between Montreal and Quebec, would become objects of the highest importance, and their possession would probably determine the result of the war.

The capital of a state, from its political importance as well as its military influence, is almost always a decisive strategic point, and its capture is therefore frequently the object of an entire campaign. The possession of Genoa, Turin, Alexandria, Milan, &c., in 1796, both from their political and military importance, had a decided influence upon the results of the war in these several states. In the same way Venice, Rome, and Naples, in 1797, Vienna, in the campaigns of 1805 and 1809, Berlin, in 1806, Madrid, in 1808, and Paris, in 1814 and 1815. If Hannibal had captured the capital immediately after the battle of Cannæ;, he would thus have destroyed the Roman power. The taking of Washington, in 1814, had little or no influence on the war, for the place was then of no importance in itself, and was a mere nominal capital. It, however, greatly influenced our reputation abroad, and required many brilliant successes to wash the blot from our national escutcheon.

Lines of defence in strategy are either permanent or temporary. The great military frontiers of a state, especially when strengthened by natural and artificial obstacles, such as chains of mountains, rivers, lines of fortresses, &c., are regarded as permanent lines of defence. The Alpine range between France and Piedmont, with its fortified passes; the Rhine, the Oder, and the Elbe, with their strongly-fortified places; the Pyrenees, with Bayonne at one extremity and Perpignon at the other; the triple range of fortresses on the Belgian frontier—are all permanent lines of defence. The St. Lawrence river is a permanent line of defence for Canada; and the line of lake Champlain, the upper St. Lawrence, and the lakes, for the United States.

Temporary lines of defence are such as are taken up merely for the campaign. Napoleon's position in Saxony, in 1813; the line of the allies in

Belgium, in 1815; the line of the Marne, in 1814, are examples of temporary lines of defence.

It will be seen from these remarks that lines of defence are not necessarily bases of operation.

Strategic positions are such as are taken up during the operations of a war, either by a *corps d'armée* or grand detachment, for the purpose of checking or observing an opposing force; they are named thus to distinguish them from tactical positions or fields of battle. The positions of Napoleon at Rivoli, Verona, and Legnano, in 1796 and 1797, to watch the Adige; his positions on the Passarge, in 1807, and in Saxony and Silesia in front of his line of defence, in 1813; and Massena's positions on the Albis, along the Limmat and the Aar, in 1799, are examples under this head.

Before proceeding further it may be well to illustrate the strategic relations of lines and positions by the use of diagrams.

(Fig. 1.) The army at A covers the whole of the ground in rear of the line DC perpendicular to the line AB, the position of the enemy being at B.

(Fig. 2.) AJ being equal to BJ, A will still cover every thing in rear of DC.

(Fig. 3.) If the army A is obliged to cover the point *a*, the army B will cover all the space without the circle whose radius is *a*B; and of course A continues to cover the point *a* so long as it remains within this circle *a*B.

A line of operations embraces that portion of the theatre of war which an army or *corps d'armée* passes over in attaining its object; *the front of operations* is the front formed by the army as it advances on this line.

When an army acts as a single mass, without forming independent corps, the line it follows is denominated a *simple line of operations*.

If two or more corps act in an isolated manner, but against the same opposing force, they are said to follow *double* or *multiple lines*.

The lines by which Moreau and Jourdan entered Germany in 1796, were double lines; but Napoleon's advance by Bamberg and Gera, in 1806, although moving in seven distinct *corps d'armée,* formed but a single line of operations.

Interior lines of operations are those followed by an army which operates between the enemy's lines in such a way as to be able to concentrate his forces on one of these lines before the other can be brought to its assistance. For example, Napoleon's line of operations in 1814, between the Marne and the Seine, where he manœuvred with so much skill and success against the immensely superior forces of the allies.

Exterior lines present the opposite results; they are those which an army will form in moving on the extremities of the opposing masses. For example, the lines of the Marne and the Seine, followed by the army of Silesia and the grand Austro-Russian army, in the campaign of 1814. Burgoyne's line of operations, in 1777, was double and exterior.

Concentric lines are such as start from distant points, and are directed towards the same object, either in the rear or in advance of their base.

If a mass leaves a single point and separates into several distinct corps, taking divergent directions, it is said to pursue *eccentric lines*.

Lines are said to be *deep*, when the end to be attained is very distant from the base.

The lines followed by a secondary or auxiliary force are denominated *secondary lines*.

The lines pursued by the army of the Sombre-et-Meuse in 1796, and by Bagration in 1812, were *secondary lines*, as the former were merely secondary to the army of the Rhine, and the latter to that of Barclay.

Accidental lines are those which result from a change in the primitive plan of campaign, which give a new direction to the operations. These are of rare occurrence, but they sometimes lead to important results.

The direction given to a line of operations depends not only on the geographical situation of the country, but also on the positions occupied by the enemy. The general plan of campaign is frequently determined on previous to beginning operations, but the choice of lines and positions must ordinarily result from the ulterior events of the war, and be made by the general as these events occur.

As a general rule, *a line of operations should be directed upon the centre*, or *one of the extremities of the enemy's line of defence*; unless our forces be infinitely superior in number, it would be absurd to act against the front and extremities at the same time.

If the configuration of the theatre of operations be favorable to a movement against the extremity of the enemy's line of defence, this direction maybe best calculated to lead to important results. (Fig.4.)

In 1800 the army of the Rhine was directed against the extreme left of the line of the Black Forest; the army of reserve was directed by the St. Bernard and Milan on the extreme right and rear of Melas's line of defence: both operations were most eminently successful. (Fig. 5.)

It may be well to remark that it is not enough merely to gain the extremity and rear of the enemy, for in that case it may be possible for him to throw himself on our communications and place us in the very dilemma in which we had hoped to involve him. To avoid this danger it is necessary to give such a direction to the line of operations that our army shall preserve its communications and be able to reach its base.

Thus, if Napoleon, in 1800, after crossing the Alps, had marched by Turin on Alexandria and received battle at Marengo, without having first secured Lombardy and the left of the Po, his own line of retreat would have been completely cut off by Melas; whereas, by the direction which he gave to his line of operations he had, in case of reverse, every means for reaching either the Var or the Valois. (Fig. 6.) Again, in 1806, if he had marched directly from Gera to Leipsic, he would have been cut off from his base on the Rhine; whereas, by turning from Gera towards Weimar, he not only cut off the Prussians from the Elbe, but at the same time secured to himself the roads of Saalfield, Schleitz, and Hoff, thus rendering perfectly safe his communications in his rear. (Fig. 7.)

We have said that the configuration of the ground and the position of the hostile forces may *sometimes* render it advisable to direct our line of operations against the extremity of the enemy's line of defence; but, *as a general rule* a central direction will lead to more important results. This severs the enemy's means of resistance, and enables the assailant to strike,

with the mass of his force, upon the dissevered and partially paralyzed members of the hostile body. (Fig. 8.)

Such a plan of operations enabled Napoleon, in the Italian campaigns of 1796 and 1797, to pierce and destroy, with a small force, the large and successive armies which Austria sent against him. In 1805 his operations were both interior and central: in 1808 they were most eminently central: in 1809, by the central operations in the vicinity of Ratisbonne, he defeated the large and almost victorious army of the Archduke Charles: in 1814, from his central position between the Marne and Seine, with only seventy thousand men against a force of more than two hundred thousand, he gained numerous victories, and barely failed of complete success. Again in 1815, with an army of only one hundred and twenty thousand men against an allied force of two hundred and twenty thousand, by his central advance on Charleroi and Ligny, he gained a most decided advantage over the enemy—an advantage lost by the eccentric movement of Grouchy: and even in 1813, his central position at Dresden would have secured him most decisive advantages, had not the faults of his lieutenants lost these advantages in the disasters of Kulm and the Katzbach.

For the same frontier it is objectionable to form more than one army; grand detachments and corps of observation may frequently be used with advantage, but double or multiple lines of operation are far less favorable than one simple line. It may however sometimes occur that the position of the enemy's forces will be such as to make this operation the preferable one. In that case, interior lines should always be adopted, unless we have a vast superiority in number. Double exterior lines, with corps several days' march asunder, must be fatal, if the enemy, whether acting on single or double interior lines, take advantage of his position to concentrate his masses successively against our isolated forces. The Roman armies under the consuls Flaminius and Servilius opposed Hannibal on exterior lines, the one by Florence and Arrezzio, and the other by Modena and Ariminum. Hannibal turned the position of Flaminius and attacked the Roman armies separately, gaining a complete and decisive victory. Such also was the character of the operations of the French in 1795, under Pichegru and Jourdan; they met with a bloody and decisive defeat. Again in 1796, the French armies under Jourdan and Moreau, pursued exterior lines; the Archduke Charles, from his interior position, succeeded in defeating both

the opposing generals, and forcing them to retreat. If the two armies united had pursued a single line, the republican flag had been carried in triumph to Vienna.

Converging lines of operation are preferable, under most circumstances, to diverging lines. Care should be taken, however, that the point of meeting be such that it may not be taken as a strategic position by the enemy, and our own forces be destroyed in detail, before they can effect a junction. In 1797 the main body of the Austrians, under Alvinzi, advanced against Napoleon, on three separate lines, intending to concentrate at Rivoli, and then attack the French in mass; but Napoleon took his strategic position at Rivoli, and overthrew the enemy's corps as they successively appeared. In the same way the Archduke Charles took an interior position, between Moreau and Jourdan, in 1796, and prevented them from concentrating their forces on a single point. Wurmser and Quasdanowich attempted to concentrate their forces on the Mincio, by moving on the opposite shores of Lake Garda; but Napoleon took an interior position and destroyed them. In 1815 Blucher and Wellington, from their interior position, prevented the junction of Napoleon and Grouchy.

Diverging lines may be employed with advantage against an enemy immediately after a successful battle or strategic manœuvre; for by this means we separate the enemy's forces, and disperse them; and if occasion should require it, may again concentrate our forces by converging lines. Such was the manœuvre of Frederick the Great, in 1757, which produced the battles of Rosbach and Leuthen; such also was the manœuvre of Napoleon at Donawert in 1805, at Jena in 1806, and at Ratisbon in 1809.

Interior lines of operations, when properly conducted, have almost invariably led to success: indeed every instance of failure may be clearly traced to great unskilfulness in their execution, or to other extraneous circumstances of the campaign. There may, however, be cases where it will be preferable to direct our forces on the enemy's flank; the geographical character of the theatre of war, the position of other collateral forces, &c., rendering such a direction necessary. But as a general rule, interior and central lines, for an army of moderate forces, will lead to decisive results.

Napoleon's Italian campaigns in 1796 and 1797, the campaign of the Archduke Charles in 1796, Napoleon's campaigns of 1805 and 1809 against Austria, and of 1806 and 1807 against Prussia and Russia, of 1808 in Spain, his manœuvres in 1814, between the battle of Brienne and that of Paris, and his operations previous to the Battle of Ligny in 1815, are all brilliant examples under this head.

To change the line of operations, in the middle of a campaign, and follow *accidental lines*, is always a delicate affair, and can only be resorted to by a general of great skill, and with disciplined troops. In such a case it may be attended with important results. It was one of Napoleon's maxims, that "a line of operations, when once chosen, should never be abandoned." This maxim, however, must sometimes be disregarded by an army of undisciplined troops, in order to avoid entire destruction; but the total abandonment of a line of operations is always attended with great loss, and should be regarded as a mere choice of evils. A regular army can always avoid this result, by changing the direction of its line; thus frequently gaining superior advantages in the new theatre of action. If the plan of this change be the result of a good *coup d'oeil*, and it be skilfully executed, the rear of the operating army will be secure from the enemy; and moreover, he will be left in doubt respecting its weak points. But such is the uncertainty of this manœuvre, that it is very rarely taken by the best troops, unless actually forced upon them. If the army be of incongruous materials, generally a change of direction will be less advantageous than to entirely abandon the line, and save as many as possible of the troops for some new plan of operations. (Maxim 20.) If, however, the undisciplined army be sustained by fortifications, it can take up the *accidental line of operations* in the same manner, and with the same probability of success, as is done by a regular force.

We have examples of accidental lines in the operations of the king of Prussia, after the battle of Hohenkirchen, and of Washington, in New-Jersey, after the action of Princeton. This is one of the finest in military history. Napoleon had projected a change in his line of operations, in case he lost the battle of Austerlitz; but victory rendered its execution unnecessary. Again in 1814 he had planned an entire change of operations; but the want of co-operation of the forces under Mortier and Marmont forced him to abandon a plan which, if properly executed, had probably

defeated the allies. Jomini pronounced it one of the most brilliant of his military career.

Having explained the principal terms used in strategy, let us trace out the successive operations of war in their usual strategic relations.

We will suppose war to be declared, and the army to be just entering upon a campaign. The political and military authorities of the state determine upon the nature of the war, and select the theatre of its enterprises. The chief selects certain points, on or near the borders of the seat of war, where his troops are to be assembled, and his *materiel* collected. These points, together, form his base of operations. He now selects some point, within the theatre of the war, as the first object of his enterprises, and chooses the line of operations most advantageous for reaching this objective point. The temporary positions taken on this line become strategic positions, and the line in his rear, a line of defence. When he arrives in the vicinity of his first object, and the enemy begins to oppose his enterprises, he must force this enemy to retreat, either by an attack or by manœuvres. For this purpose he temporarily adopts certain lines of manœuvre, which may deviate from his general line of operations. The ulterior events of the campaign may possibly cause him to make these new, or accidental lines, his lines of operations. The approach of hostile forces may cause him to detach secondary corps on secondary lines; or to divide his army, and pursue double or multiple lines. The primitive object may also be relinquished, and new ones proposed, with new lines and new plans of operations. As he advances far from his primitive base, he forms new dépôts and lines of magazines. He may encounter natural and artificial obstacles. To cross large rivers in the face of an enemy is a hazardous operation; and he requires all the art of the engineer in constructing bridges, and securing a safe passage for his army. If a fortified place is to be taken, he will detach a siege corps, and either continue his march with the main army, or take a strategic position to cover this siege. Thus Napoleon, in 1796, with an army of only 50,000 combatants, could not venture to penetrate into Austria, with Mantua and its garrison of 25,000 men in his rear, and an Austrian force of 40,000 before him. But in 1806 the great superiority of his army enabled him to detach forces to besiege the principal fortresses of Silesia, and still to continue his operations with his principal forces. The chief of the army may meet the enemy under circumstances such as to induce or compel him to give battle.

If he should be victorious, the enemy must be pursued and harassed to the uttermost. If he should be defeated, he must form the best plan, and provide the best means of retreat. If possible, he must take shelter in some line of fortifications, and prepare to resume the offensive. Lines of intrenchment and temporary works may sometimes serve him as a sufficient protection. Finally, when the unfavorable season compels him to suspend his operations, he will go into winter cantonments, and prepare for a new campaign.

Such are the ordinary operations of war: its relations to strategy must be evident, even to the most superficial reader.

Not unfrequently the results of a campaign depend more upon the strategic operations of an army, than upon its victories gained in actual combat. Tactics, or movements within the range of the enemy's cannon, is therefore subordinate to the *choice of positions*: if the field of battle be properly chosen, success will be decisive, and the loss of the battle not disastrous; whereas, if selected without reference to the principles of the science, the victory, if gained, might be barren, and defeat, if suffered, totally fatal: thus demonstrating the truth of Napoleon's maxim, that success is oftener due to the genius of the general, and to the nature of the theatre of war, than to the number and bravery of the soldiers. (Maxim 17, 18.)

We have a striking illustration of this in the French army of the Danube, which, from the left wing of General Kray, marched rapidly through Switzerland to the right extremity of the Austrian line, "and by this movement alone conquered all the country between the Rhine and Danube without pulling a trigger."

Again, in 1805, the army of Mack was completely paralyzed, and the main body forced to surrender, at Ulm, without a single important battle. In 1806, the Prussians were essentially defeated even before the battle of Jena. The operations about Heilesberg, in 1807, the advance upon Madrid, in 1808, the manœuvres about Ratisbon, in 1809, the operations of the French in 1814, and the first part of the campaign of 1815, against vastly superior numbers, are all familiar proofs of the truth of the maxim.

Strategy may therefore be regarded as the most important, though least understood, of all the branches of the military art.[4]

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Strategy may be learned from didactic works or from general military histories. There are very few good elementary works on this branch of the military art. The general treatises of the Archduke Charles, and of General Wagner, in German, (the former has been translated into French,) are considered as the best. The discussions of Jomini on this subject in his great work on the military art, are exceedingly valuable; also the writings of Rocquancourt, Jacquinot de Presle, and Gay de Vernon. The last of these has been translated into English, but the translation is exceedingly inaccurate. The military histories of Lloyd, Templehoff, Jomini, the Archduke Charles, Grimoard, Gravert, Souchet, St. Cyr, Beauvais, Laverne, Stutterheim, Wagner, Kausler, Gourgaud and Montholon, Foy, Mathieu Dumas, Ségur, Pelet, Koch, Clausewitz, and Thiers, may be read with great advantage. Napier's History of the Peninsular War is the only English History that is of any value as a *military* work: it is a most excellent book. Alison's great History of Europe is utterly worthless to the military man; the author is ignorant of the first principles of the military art, and nearly every page is filled with the grossest blunders.

We subjoin the titles of a few of the best works that treat of strategy, either directly or in connection with military history.

Principes de la Stratégie, &c., par le Prince Charles, traduit de l'Allemand, 3 vols. in 8vo. This is a work of great merit. The technical terms, however, are very loosely employed.

Précis de l'Art de la Guerre, par le Baron Jomini. His chapter on strategy embodies the principles of this branch of the art.

Grundsätze der Strategic, Von Wagner.

Cours Elémentaire d'Art et d'Histoire Militaire, par Rocquancourt. This work contains much valuable information connected with the history of the art of war; but it is far too diffuse and ill-arranged for an elementary book.

Cours d'Art et d'Histoire Militaire, par Jacquinot de Presle. This work is especially designed for cavalry officers, and the other branches of military service are but very briefly discussed.

De Vernon's Treatise on the Science of War and Fortification contains much valuable information; but, as an elementary book, it has the same objections as that of Rocquancourt.

History of the Seven Years' War, by Lloyd and Templehoff. The military writings of Lloyd and Templehoff are valuable as connected with the history of strategy; but many of the principles laid down by these writers are now regarded as erroneous.

Mémoires de Napoléon. The Memoirs of Napoleon, as dictated by himself to Gourgaud and Montholon, have been translated into English. It is hardly necessary to remark that they contain all the general principles of military art and science. No military man should fail to study them thoroughly. The matter is so condensed, and important principles are embodied in so few words, that they are not easily understood by the ordinary reader, and probably will never be popular with the multitude.

Essai général de Tactique, par Guibert. A work very popular in its day, but now far less valuable than the writings already mentioned.

Ausführliche Beschreibung der Schlacht des Pirmasens, von Gravert. Regarded by military men as a valuable historical fragment.

Mémoires sur les Campagnes en Espagne. Souchet.

Mémoires de Gouvion St. Cyr.

Statistique de la Guerre, par Reveroni St. Cyr.

Première Campagnes de la Revolution, par Grimoard.

Victoires et Conquêtes. Beauvais.

Campagnes de Suwarrow. Laverne.

Histoire de la Guerre de la Péninsule. Foy.

Précis des Evénements Militaires. Mathieu Dumas.

Histoire de Napoléon et de la Grande Armée en 1812. Ségur

Mémoires sur la Guerre de 1809. Pelet.

La Campagne de 1814. Koch.

Vom Kriege—Die Feldzügge, &c. Clausewitz.

La Révolution, le Consulat et l'Empire. Thiers.

Mémoires sur la Guerre de 1812—sur la Campagne du Vice roi en Italie, en 1813 et 1814; Histoire de la Guerre en Allemagne en 1814; Histoire des Campagnes de 1814 et 1815, en France. Vaudoncourt.

Essai sur l'Art Militaire, &c. Carion-Nisas.

Histoire de l'Expédition en Russie en 1812. Chambray.

War in Spain, Portugal, and the South of France. John Jones.

Peninsular War. Napier.

Notices of the War of 1812. Armstrong

All the above are works of merit; but none are more valuable to the military man than the military histories of Jomini and Kausler, with their splendid diagrams and maps.

CHAPTER III.

FORTIFICATIONS.

Fortifications, or engineering, may be considered with reference to the defence of states and the grand operation of armies; or with reference to the details of the construction, and attack, and defence of forts, and the influence of field-works on the tactical manœuvres of armies. It is proposed to speak here only of its general character, as a branch of the military art, without entering into any professional discussion of details.

The connection of fortification and strategy may be considered under two distinct heads: 1st, the choice of sites for constructing fortresses for defence; 2d, their influence in offensive operations, and the determination of the question whether they can be passed with safety, or whether the attacking force will be under the necessity of besieging them.

The centre and extremities of *a base of operations* should always be secured either by natural or artificial obstacles. This base is generally chosen so that fortifications will be necessary for strengthening only a part of the line. But if a frontier, like the side of France towards Belgium, be destitute of natural obstacles, the artificial means of defence must be proportionally increased. Great care should be taken that permanent fortifications be made only on such places as may favor military operations. If otherwise, the troops detached from the active army for garrisoning them, will only tend to weaken this force without any corresponding advantages. In this way, fortifications may become actually injurious to defence. A number of the European fortresses which were built before the subject of strategy was properly understood, are now regarded as utterly useless, from their ill-advised positions.

Whether a fortress may be safely passed with merely blockading or observing it, depends very much upon the nature of the war, and the numbers and position of the defensive army. The allies, in 1814, invading

France with a million of soldiers, assisted by the political diversion of factions and Bourbonists within the kingdom, and treason in the frontier fortresses, and even in the ranks of Napoleon's army, could conduct their military operations on a very different plan from that which would be adopted by either Austria, Prussia, Russia, England, Spain, Portugal, Holland, Italy, and the German powers, if singly waging war with the French. Napoleon sometimes detached a corps to observe a fortress which threatened his line of operations or of manœuvre; at others, he delayed his advance till the place could be reduced.

"An army," says Jomini, "may sometimes penetrate between places on an open frontier, to attack the enemy's forces in the field, taking care at the same time to *observe* these places; but no invading army can cross a great river, like the Danube, the Rhine, or the Elbe, without reducing at least one of the fortresses on that river, so as to secure a line of retreat; but being in possession of such a place, it can continue the offensive, while its *matériel de siège* successively reduces the other places."

In case the main army is obliged to remain and cover the besieging corps, it should take some central position, where it can command all the avenues of approach, and fall with vigor on the enemy, should he attempt to raise the siege. Napoleon's operations before Mantua, in 1796, offer the finest model for imitation.

The old system of intrenched camps and lines of contravallation is unsuited to the spirit of modern warfare. In ancient times, and more particularly in the middle ages, too much importance was attached to tactical positions, and not enough to strategic points and lines. This gave to fortifications a character that never properly belonged to them. From the middle ages down to the period of the French Revolution, wars were carried on mainly by the system of positions—one party confining their operations to the security of certain important places, while the other directed their whole attention to the siege and capture of these places. But Carnot and Napoleon changed this system, at the same time with the system of tactics, or rather, returned from it to the old and true system of strategic operations. Some men, looking merely at the fact that a *change* was made, but without examining the *character* of that change, have rushed headlong to the conclusion that

fortified places are now utterly useless in war, military success depending entirely upon a good system of marches.

On this subject, General Jomini, the great military historian of the wars of the French Revolution, remarks that "we should depend entirely upon neither organized masses, nor upon material obstacles, whether natural or artificial. To follow exclusively either of these systems would be equally absurd. The true science of war consists in choosing a just medium between the two extremes. The wars of Napoleon demonstrated the great truth, that distance can protect no country from invasion, but that a state, to be secure, must have a good system of fortresses, and a good system of military reserves and military institutions."

In all military operations *time* is of vast importance. If a single division of an army can be retarded for a few hours only, it not unfrequently decides the fate of the campaign. Had the approach of Blucher been delayed for a few hours, Napoleon must have been victorious at the battle of Waterloo. An equilibrium can seldom be sustained for more than six or seven hours between forces on the field of battle; but in this instance, the state of the ground rendered the movements so slow as to prolong the battle for about twelve hours; thus enabling the allies to effect a concentration in time to save Wellington.

Many of Napoleon's brilliant victories resulted from merely bringing troops to bear suddenly upon some decisive point. Rivoli in 1796-7, Marengo in 1800, Ulm in 1805, Jena in 1806, Ratisbon in 1809, Brienne in 1814, and Ligny in 1815, are familiar examples. But this concentration of forces, even with a regular army, cannot be calculated on by the general with any degree of certainty, unless his communications are perfectly secure. And this difficulty is very much increased where the troops are new and undisciplined. When a country like ours is invaded, large numbers of such troops must suddenly be called into the field. Not knowing the designs of the invaders, much time will be lost in marches and countermarches; and if there be no safe places of resort the operations must be indecisive and insecure.

To a defensive army fortifications are valuable as points of repose, upon which the troops, if beaten, may fall back, and shelter their sick and

wounded, collect their scattered forces, repair their materials, and draw together a new supply of stores and provisions; and as rallying points, where new troops may be assembled with safety, and the army, in a few days, be prepared to again meet the enemy in the open field. Without these defences, undisciplined and inexperienced armies, when once routed, can seldom be rallied again, except with great losses. But when supported by forts, they can select their opportunity for fighting, and offer or refuse battle according to the probability of success; and, having a safe place of retreat, they are far less influenced by fear in the actual conflict.

The enemy, on the other hand, being compelled either to besiege or *observe* these works, his army will be separated from its magazines, its strength and efficiency diminished by detachments, and his whole force exposed to the horrors of partisan warfare. It has therefore been estimated by the best military writers, that an army supported by a judicious system of fortifications, can repel a land force *six* times as large as itself.

Every government should prepare, in time of peace, its most prominent and durable means of defence. By securing in a permanent manner its important points, it will enable a small force to retain possession of these places against a greatly superior army, for a considerable length of time. This serves the same purpose as a battle gained; for, in the beginning of a war of invasion, the economy of time is of the utmost importance to the defensive party, enabling it to organize and prepare the great military resources of the state.

In all mountainous frontiers, or sides of states bordering on large rivers, or chains of lakes, there will necessarily be but few points by which an invader can penetrate into the interior of the country. Let us suppose that, for a frontier of moderate extent, there are *five* passes, or avenues through which the enemy may approach the interior. To effectually defend these approaches against the invading army will require, for each, an army of ten thousand men. Not being able to decide positively on the plans of the enemy, all these communications must be defended at the same time. This requires a defending army of fifty thousand men. Let us now suppose each of these passes to be fortified in such a way, that one thousand men will be able to hold the enemy in check, and force him to resort to the operations of a siege; or, at least, to retard his advance till an active army can be

organized in the interior, and prepared to meet him in the field. We here see that five thousand men, by means of fortifications, can accomplish the same defensive object as fifty thousand men without these artificial means of security.

But let us enter a little more into the details of frontier defences, and examine the character of the several systems which have been successively proposed or adopted. Frontiers are divided into four distinct classes, according as the state may be open on one or more sides, or bounded by mountains, large rivers and lakes, or by the sea.

An open frontier is the most difficult of defence; and while there exists a perfect uniformity among military men upon the vast importance of fortifying such a frontier, there is an equal diversity of opinion respecting the best manner of arranging these works. We shall here mention three general systems of arranging forts for the defence of an open country, each of which has been advocated at different times, and afterwards received various modifications and additions. These three systems comprise the main features of all others worthy of much consideration. They are:—

1st. The system of continuous lines, proposed by Montalembert.

2d. A system of three lines of detached works, strongly recommended by D'Arçon and others.

3d. A system proposed by Vauban, and advocated by Rogniat, consisting of lines of very strong works, placed at considerable distances from each other and covering large *intrenched camps*.

The first of these systems was proposed in 1790, and for a time attracted considerable notice in France, but has long since been discarded, as being utterly incompatible with the principles of the military art. A writer, however, of some pretensions in this country, recommends its adoption for the defence of Baltimore and the shores of the Chesapeake. The same author would dispense entirely with our present system of fortifications on the sea-coast, and substitute in their place wooden Martello towers! This

would be very much like building 120 gun ships at Pittsburg and Memphis, for the defence of the Ohio and the Mississippi rivers, and sending out duck-boats to meet the enemy on the Atlantic!

In the second system, the works on the extreme frontier are to be placed about thirty or forty miles apart, and those of the second and third lines respectively thirty or forty miles in rear of the first and second lines, and opposite the intervals.

In the third system, first recommended by Vauban and more recently by Rogniat, the works are to be arranged in the same manner as in that of D'Arçon, but the distance between them is to be from seventy to one hundred miles, and each fort arranged for covering a large intrenched camp.

Either of these last two systems is well suited to the defence of an open frontier. The former is applied to the side of France towards Belgium, and the latter, with certain modifications, to the defence of Western Germany. The first line of fortifications on the northern frontier of France consists of Dunkirk, Lille, Valenciennes, Condé, Quesnoy, Rocroi, Charlemont, Mézières, and Sedan; the second line, of Calais, Andres, St. Omer, Béthune, Arras, Douai, Chambrai, Landrecies, and Avesnes; the third line, of Boulogne, Montreuil, Hesdin, Abbeville, Amiens, Bapaume, Peronne, Ham, and Laon.

For mountainous frontiers it is deemed necessary to secure all the important passes with small redoubts or military works, and to defend with strong forts the grand interior strategic points on which these communications are directed. For a frontier of moderate extent there may be some six or eight gorges in the mountains by which an army might penetrate; but it will always be found that these roads concentrate on two or three points in the great valleys below. Take, for example, the frontier of France towards Switzerland and Italy. The passes of the mountains are secured by the little works of Fort L'Ecluse, Fort Pierre-châtel, Fort Barraux, Briançon, Mont Dauphin, Colmars, Entrevaux, and Antibes; while Besançon, Grenoble, and Toulon, form a second line; and Lyons a grand central dépôt.

Where a great river or chain of lakes forms the boundary of a state, the system of defence will be much the same as that of an open land frontier, the works of the first line being made to secure the great bridges or ferries

by which the enemy might effect a passage; those of the second line, to cover the passes of the highlands that generally approach more or less near the great watercourse; and those of the third line, far enough in rear to protect the great internal communications of the country. Let us take, for example, the side of France bordering on the Rhine. Wissembourg and Lauterbourg, Fort Louis, Haguenau, Strasbourg, Schelstadt, Neuf-Brisach, and Huneguen, cover the several passages of the river; while Bitche, Phalsbourg, and Béfort form a second line; Thionville, Metz, and Toul, a third line; and Verdun a grand central dépôt.

The following are the principal objects proposed to be accomplished by fortifications on a sea-coast.

1st. To close all important harbors to an enemy, and secure them to the navy of the country.

2d. To prevent the enemy from forming an establishment on our shores, from which, by his naval superiority, he might destroy our commerce and keep the whole frontier in continual alarm.

3d. To cover our great cities against a maritime attack and bombardment.

4th. To cover our ship-yards and great naval dépôts.

5th. To prevent, as much as possible, the great avenues of interior navigation from being blockaded by naval means at their entrance into the ocean.

6th. To give to our navy facilities for protecting our coast trade from the enemy's ships of war, and our internal communications, which lie near the coast, from maritime descents.

Let us notice how France has attempted to accomplish this object. The Mediterranean frontier has Fort Quarré, Fort St. Marguérite, St. Tropez, Brigançon, the forts of Point Man, of l'Ertissac, and of Langoustier, Toulon, St. Nicholas, Castle of If, Marseilles, Tour de Boue, Aigues-Montes, Fort St. Louis, Fort Brescou, Narbonne, Château de Salces, Perpignan, Collioure, Fort St. Elme, and Port Vendre. Toulon is the great naval dépôt

for this frontier, and Marseilles the great commercial port. Both are well secured by strong fortifications. The Atlantic frontier has Bayonne; the forts of Royan, Grave, Medoc, Paté, &c., on the Gironde; Rochefort, with the forts of Chapus, Lapin, Aix, Oleron, &c., to cover the roadstead; La Rochelle, with the forts of the Isle of Ré; Sables, with the forts of St. Nicholas, and Des Moulines, Isle Dieu, Belle Isle, Fort du Pilier, Mindin, Ville Martin; Quiberon, with Fort Penthièvre; L'Orient, with its harbor defences; Fort Cigogne; Brest, with its harbor defences; St. Malo, with Forts Cézembre, La Canchée, L'Anse du Verger, and Des Rimains; Cherbourg, with its defensive forts and batteries; Havre, Dieppe, Boulogne, Calais, and Dunkirk. Cherbourg, Brest, and Rochefort, are great naval dépôts; and Havre, Nantes, and Bordeaux, the principal commercial ports. Many of the works above enumerated are small in extent and antiquated in their construction, and some of them quite old and dilapidated nevertheless, they have heretofore been found sufficient for the defence of the naval dépôts and commercial seaports of France against the superior naval forces of her neighbor.

Omitting for the present all discussion of sea-coast defences, let us examine more particularly the character and influence of fortifications on land frontiers.

All military writers agree that fortifications have heretofore exerted a great, and frequently a decisive, influence on the operations of a war. Those of France are frequently referred to as proofs of this influence. But, while all are disposed to allow that these works contributed much in former times to the defence of states, yet some have said that modern improvements in the mode of attack have rendered forts far less valuable than formerly.

Such, however, is not the case. Improvements in the mode of attack have not kept pace with the facilities of locomotion; and, although fortifications do not now usually sustain a siege of as *many days* as in former times, still, as compared with the relative lengths of campaigns in ancient and modern wars, the *proportional* length of sieges is now even *greater* than formerly. When the same is accomplished in a campaign of seven weeks as was formerly done in a war of seven years, it is not necessary that fortified places should hold out a very long time. A place that can sustain a siege of a month is now deemed sufficiently strong for ordinary campaigns; for by the

end of that time the defensive army will either be destroyed, or be able to come to its succor. In either case a longer defence would not be required.

A reference to the most important sieges of the last century or two will show that forts are, on an average, capable of sustaining a siege for more than that length of time. Lille, in 1708, held the allies in check for a whole year; and again, in 1792, compelled the Austrians to raise the siege after an unsuccessful attack of fifteen days.

Antwerp, in 1585, sustained a siege of fourteen months against greatly superior forces; in 1814 Carnot defended the citadel of this place for four months, and until an armistice had been concluded between the contending parties; in 1832, it sustained, with a garrison of only 4,500 men and 145 pieces of ordnance, a siege of twenty-five days, against a force of 55,000 men and 223 cannon.

Namur, near the end of the seventeenth century, sustained a siege of ten weeks.

Ismaïl, in 1790, sustained a siege of more than two months against the Russians.

Maestricht, in 1793, sustained a siege of nearly two weeks; and again, in 1794, sustained a blockade and siege of nearly two months.

Magdeburg, in the thirty years' war, resisted the army of Wallenstein for seven months; and in 1813-14, although garrisoned by only 4,000 men, it for a long time resisted the overwhelming forces of the allies.

Dantzic, at the same time, sustained a siege against superior forces for more than nine months.

Landau, in 1793, sustained a siege of nine months.

Valenciennes and Mayence, in 1793, each sustained a siege of about three months.

Charleroi, Fort Vauban, and L'Ecluse, in 1794, each sustained a siege of about thirty days.

Quesnoy, in 1794, sustained a siege of about three weeks.

Rosas, in 1795, sustained a siege of some seventy days.

Mantua, in 1796-7, protected from invasion, for eight months, the Tyrol and the heart of the Austrian monarchy.

Kehl and Huninguen, in 1796, sheltered Moreau for three months against all the efforts of the Archduke Charles.

St. Jean d'Acre, in 1799, sustained a siege of sixty days of open trench.

Ulm, in 1800, held Moreau in check for more than a month.

Genoa, in 1800, sustained a blockade of sixty and a siege of forty days.

Saragossa in 1808 sustained a close siege of near two months; and in 1809 it was again besieged for two months.

Rosas in 1808 sustained a siege of thirty days.

Gerona in 1809 sustained a siege and blockade of seven months, nearly four of them being of open trench.

Mequinenza (a very small work) in 1810 sustained a siege of more than two weeks.

Astorga in 1810 sustained a siege of thirty days; twenty-four being of open trench.

Lerida in 1810 sustained a siege of thirty days, two weeks being of open trench.

Ciudad Rodrigo in 1810 sustained a siege of two months.

Almeida in 1810 sustained a siege of more than a month.

Tortosa in 1810 sustained a siege of six months.

Tarragona in 1811 sustained a siege of nearly two months.

Badajos in 1811 sustained a siege of more than forty days open trench.

Lerida in 1811 sustained a siege of two weeks open trench.

Saguntum in 1811 sustained a siege of a month.

Valencia in 1811-12 sustained a siege of two months

Ciudad Rodrigo in 1812 sustained a blockade of several months, and a close siege of two weeks.

Badajos in 1812 sustained twenty-one days of open trenches.

Burgos in 1812 sustained thirty-three days of open trenches.

St. Sebastian in 1813 sustained a siege and blockade of nearly three months, with fifty-nine days of open trenches.

Pampeluna in 1813 sustained a siege of more than four months.

Monzon in 1813-14 also sustained a siege of more than four months.

This list might be increased with numerous other examples, to show that even poorly fortified towns are capable of defending themselves, on an average, for more than a month. These examples, be it remembered, are nearly all taken from a period of history since any material improvements have been made in the art of attack. Since the time of Vauban the improvements in attack have not kept pace with the increased means of defence. Moreover, these examples are taken from the sieges of towns defended mainly by old and antiquated works, and entirely incapable of offering the same resistance as detached fortifications, with all the modern improvements.

The value of fortifications, as land defences, is sufficiently proved by showing their general capability of resisting an invader, even for a limited period; thus affording us time and opportunity to provide other means of security. But it must not be inferred that forts besieged *en règle* will necessarily fall after so many days. Such is far from being the case. The besieged have usually great advantages over the besiegers; and unless the latter are vastly superior in number, or the work is of a very inferior character, or the garrison is destitute of the requisite means and energy to resist an attack, they will not be taken.

Mezieres was not taken in 1520; nor Marseilles in 1524; nor Peronne in 1536; nor Landrecies in 1543; nor Metz in 1552; nor Montauban in 1621;

nor Lerida in 1647; nor Maestricht in 1676; nor Vienna in 1529, and again in 1683; nor Turin in 1706; nor Conde in 1744; nor Lille in 1792; nor Landau in 1793; nor Ulm in 1800; nor Saragossa in 1808; nor Burgos in 1812. This list might be extended almost indefinitely with the names of places that could be reduced neither by force nor by starvation.

But, as has already been noticed, some have asserted that fortifications have become of little comparative importance, under the new system of warfare introduced during the wars of the French Revolution. On this subject let us consult the opinions of the best military judges of the present century.

Napoleon says of fortifications, "they are an excellent means of retarding, fettering, enfeebling, and disquieting a conquering foe."

"The possession of strategic points," says the Archduke Charles, "is decisive in military operations; and the most efficacious means should, therefore, be employed to defend points whose preservation is the country's safeguard. This object is accomplished by fortifications, inasmuch as they can resist, for a given time, with a small number of troops, every effort of a much larger force; fortifications should, therefore, be regarded as the basis of a good system of defence." "It should be a maxim of state policy in every country, to fortify, in time of peace, all such points, and to arrange them with great care, so that they can be defended by a small number of troops. For the enemy, knowing the difficulty of getting possession of these works, will look twice before he involves himself in a war." "Establishments which can secure strategic advantages are not the works of a moment; they require time and labor. He who has the direction of the military forces of a state, should, in time of peace, prepare for war." "The proper application or neglect of these principles will decide the safety or the ruin of the state." "Fortifications arrest the enemy in the pursuit of his object, and direct his movements on less important points;—he must either force these fortified lines, or else hazard enterprises upon lines which offer only disadvantages. In fine, a country secured by a system of defences truly strategic, has no cause to fear either the invasion or the yoke of the enemy; for he can advance to the interior of the country only through great trouble and ruinous efforts. Of course, lines of fortifications thus arranged cannot shelter a state against all reverses; but these reverses will not, in this case, be attended by total ruin; for they cannot take from the state the means nor the time for

collecting new forces; nor can they ever reduce it to the cruel alternative of submission or destruction."

"Fortifications," says Jomini, "fulfil two objects of capital importance,—1st. The protection of the frontiers; and 2d. Assisting the operations of the army in the field." "Every part of the frontiers of a state should be secured by one or two great places of refuge, secondary places, and even small posts for facilitating the active operations of the armies. Cities girt with walls and slight ditches may often be of great utility in the interior of a country, as places of deposit, where stores, magazines, hospitals, &c., may be sheltered from the incursions of the enemy's light troops. These works are more especially valuable where such stores, in order not to weaken the regular army by detachments, are intrusted to the care of raw and militia forces." It is not supposed that any system of fortifications can hermetically close a frontier; "but, although they of themselves can rarely present an absolute obstacle to the advance of the hostile army, yet it is indisputable that they straiten its movements, change the direction of its marches, and force it into detachments; while, on the contrary, they afford all the opposite advantages to the defensive army; they protect its marches, favor its debouches, cover its magazines, its flanks, and its movements, and finally furnish it with a place of refuge in time of need."

These opinions were uttered, be it remembered, long since the period at which modern military quacks date the downfall of fortifications as inland defences, by men, too, who were not engineers, and consequently had no professional predilections in favor of fortifications. The Archduke Charles, as a general, knew no rival but Napoleon, and General Jomini is universally regarded as the first military historian of the age. The truth of their remarks on fortifications is most fully confirmed by the military histories of Germany and France.

For a long period previous to the Thirty Years' War, its strong castles and fortified cities secured the German empire from attacks from abroad, except on its extensive frontier, which was frequently assailed, but no enemy was able to penetrate to the interior till a want of union among its own princes opened its strongholds to the Swedish conqueror; nor then, did the cautious Gustavus Adolphus venture far into its territories till he had obtained possession of all the military works that might endanger his retreat.

Again, in the Seven Years' War, when the French neglected to secure their foothold in Germany, by placing in a state of defence the fortifications that fell into their power, the first defeat rendered their ground untenable, and threw them from the Elbe back upon the Rhine and the Mayne. They afterwards took the precaution to fortify their positions, and to secure their magazines under shelter of strong places, and, consequently, were enabled to maintain themselves in the hostile country till the end of the war, notwithstanding the inefficiency of their generals, the great reverses they sustained in the field, the skill and perseverance of the enemy they were contending with, and the weak and vacillating character of the cabinet that directed them.

But this system of defence was not so carefully maintained in the latter part of the eighteenth century, for at the beginning of the French Revolution, says Jomini, "Germany had too few fortifications; they were generally of a poor character, and improperly located." France, on the contrary, was well fortified: and although without armies, and torn in pieces by domestic factions, (we here use the language of the Archduke,) "she sustained herself against all Europe; *and this was because her government, since the reign of Louis XIII*., *had continually labored to put her frontiers into a defensive condition agreeably to the principles of strategy*; starting from such a system for a basis, she subdued every country on the continent that was not thus fortified; and this reason alone will explain how her generals sometimes succeeded in destroying an army, and even an entire state, merely by a strategic success."

This may be illustrated by reference to particular campaigns. In 1792, when the Duke of Brunswick invaded France, she had no armies competent to her defence. Their numbers upon paper were somewhat formidable, it is true, but the license of the Revolution had so loosened the bonds of discipline as to effect an almost complete disorganization. "It seemed, at this period," says the historian, "as if the operations of the French generals were dependent upon the absence of their enemies: the moment they appeared, the operations were precipitately abandoned." But France had on her eastern frontier a triple line of good fortresses, although her miserable soldiery were incapable of properly defending them. The several works of the first and second lines fell, one after another, before the slow operations of a Prussian siege, and the Duke of Brunswick was already advancing upon the

third, when Dumourier, with only twenty-five thousand men, threw himself into this line, and by a well-conducted war of positions, placing his raw and unsteady forces behind unassailable intrenchments, succeeded in repelling a disciplined army nearly four times as numerous as his own. Had no other obstacle than the French troops been interposed between Paris and the Prussians, all agree that France must have fallen.

In the campaign, of 1793, the French army in Flanders were beaten in almost every engagement, and their forces reduced to less than one half the number of the allies. The French general turned traitor to his country, and the National Guards deserted their colors and returned to France. The only hope of the Republicans, at this crisis, was Vauban's line of Flemish fortresses. These alone saved France. The strongholds of Lille, Condé, Valenciennes, Quesnoy, Landrecies, &c., held the Austrians in check till the French could raise new forces and reorganize their army. "The important breathing-time which the sieges of these fortresses," says an English historian, "afforded to the French, and the immense advantage which they derived from the new levies which they received, and fresh organization which they acquired during that important period, is a signal proof of the vital importance of fortresses in contributing to national defence. Napoleon has not hesitated to ascribe to the three months thus gained the salvation of France. It is to be constantly recollected that the Republican armies were then totally unable to keep the field; that behind the frontier fortresses there was neither a defensive position, nor a corps to reinforce them; and that if driven from their vicinity, the capital was taken and the war concluded."

In the following year, 1794, when France had completed her vast armaments, and, in her turn, had become the invading power, the enemy had no fortified towns to check the progress of the Republican armies; which, based on strong works of defence, in a few weeks overran Flanders, and drove the allies beyond the Rhine.

In the campaign of 1796, when the army of Moreau had been forced into a precipitate retreat by the admirable strategic operations of the Archduke Charles, the French forces owed their safety to the fortifications on the Rhine. These works arrested the enemy's pursuit and obliged him to resort to the tedious operations of sieges; and the reduction of the French advanced posts alone, Kehl and Huninguen, poorly as they were defended,

employed all the resources of the Austrian army, and the skill of their engineers, from early in October till late in February. Kehl was at first assaulted by a force *four* times as numerous as the garrison; if the enemy had succeeded, he would have cut off Moreau's retreat, and destroyed his army. Fortunately the place was strong enough to resist all assaults; and Moreau, basing himself on the fortresses of Alsace, his right covered by Huninguen, Neuf-Brisach, and Béfort, and his left by the iron barrier of the Netherlands, effectually checked the waves of Austrian success.

Let us now turn to the campaigns of Napoleon. In his first campaign in Italy, 1796, the general was directed "to seize the forts of Savona, compel the senate to furnish him with pecuniary supplies, and to surrender the keys of Gavi, a fortress perched on the rocky height commanding the pass of the Bocchetta." Setting out from Savona, he crossed the mountains at a weak point between the Alps and the Apennines, and succeeded in piercing the enemy's line of defence. The king of Sardinia, jealous of Austrian influence, had refused to permit the Austrian army to garrison his line of fortifications. Napoleon, profiting by his victorious attitude, the mutual jealousy of Austria and Sardinia, and the intrigues of his diplomatists, soon gained possession of these important works. "*These Sardinian fortresses*," he wrote to the Directory, "*at once put the Republicans in possession of the keys of the Peninsula*." Basing himself on Coni, Mondovi, Ceva, Gavi, and Alessandria, with Tortosa as his dépôt of magazines, he advanced against Lombardy. Now basing himself on the Adda and Po, with the fortress of Pizzighettone as the dépôt of his magazines, he advanced upon the line of the Adige. Pechiera became his next dépôt, and he now had four fortresses in echelon between him and his first dépôt of magazines; and, after the fall of Mantua, basing himself on the Po, he advanced against the States of the Church, making Ferrara and then Ancona, his places of dépôt.

From the solid basis of the fortresses of Piedmont and Lombardy, "he was enabled to turn his undivided attention to the destruction of the Austrians, and thus commence, with some security, that great career of conquest which he already meditated in the imperial dominions." In this campaign of 1797, after scouring his base, he fortified Palma-Nuova, Osapo, &c., repaired the old fortifications of Klagenfurth, and, as he advanced, established, to use his own words, "a good *point d'appui* at every five or six marches."

Afterwards, when the Austrians had nearly wrested Italy from the weak grasp of Napoleon's successors, the French saved their army in the fortress of Genoa and behind the line of the Var, which had been fortified with care in 1794-5. Numerous attempts were made to force this line, the advanced post of Fort Montauban being several times assaulted by numerous forces. But the Austrian columns recoiled from its murderous fire of grape and musketry, which swept off great numbers at every discharge. Again the assault was renewed with a vast superiority of numbers, and again "the brave men who headed the column almost perished at the foot of the intrenchment; and, after sustaining a heavy loss, they were compelled to abandon the enterprise."

While the forces on the Var thus stayed the waves of Austrian success, Massena, in the fortifications of Genoa, sustained a blockade of sixty, and a siege of forty days, against an army five times as large as his own; and when forced to yield to the stern demands of famine, he almost dictated to the enemy the terms of the treaty. These two defences held in check the *élite* of the Austrian forces, while the French reserve crossed the Alps, seized the important points of the country, and cut off the Austrian line of retreat. "But even after the victory of Marengo," says Napoleon, "I did not consider the whole of Italy reconquered, until all the fortified places between me and the Mincio should be occupied by my troops. I gave Melas permission to return to Mantua, on condition of his surrendering all these fortresses."

He now directed Chasseloup de Laubat and his engineers to repair and remodel the fortifications of Verona, Legnano, Pechiera, Mantua, the line of the Adda, Milan, Alessandria,[5] Roco d'Aufo, Genoa, and several smaller works; thus forming a quadruple line of defence against Austrian aggression in Italy. These works were of great service to the French in 1805, enabling Massena with fifty thousand men to hold in check the Archduke Charles with more than ninety thousand, while Napoleon's grand army, starting from the solid base of the Rhine, traversed Germany and seized upon the capital of Austria.

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More than twenty millions of money were appropriated for this place alone.

The neglect of the Prussians to place their country in a state of military defence, previous to declaring war against Napoleon in 1806, had a most disastrous influence upon the campaign. Napoleon, on the other hand, occupied and secured all the important military positions which he had captured in the preceding campaign. "The Prussians," said he, "made no preparations for putting into a state of defence the fortifications on their first line, not even those within a few marches of our cantonments. While I was piling up bastion upon bastion at Kehl, Cassel, and Wesel, they did not plant a single palisade at Magdeburg, nor put in battery a single cannon at Spandau." The works on the three great lines of the Oder, the Elbe, and the Weser, had they been properly repaired, garrisoned, and defended, were sufficient to have held in check the French, even after the great victory of Jena, till the newly-organized forces, acting in concert with the Russian army, could re-establish the Prussian monarchy in its ancient greatness. Profiting by the neglect of the Prussians, Napoleon seized upon the great defensive works of the country, which, to his great joy, were readily surrendered into his hands by the old and inefficient generals who commanded them; and French garrisons were almost immediately established in the fortresses of Stettin, Custrin, Glogau, Magdeburg, Spandau, Hameln, Nieubourg, &c. "Spandau," said he in the 19th Bulletin, "is an inestimable acquisition. In our hands it could sustain two months of operations. But such was the general confusion, that the Prussians had not even armed its batteries." The possession of these fortifications inclined the scale at Eylau. All the historians of the war notice their influence on the campaigns of Friedland and Tilsit.

These Prussian fortresses were retained by Napoleon at the treaty of Tilsit. The campaign of 1809 proved the wisdom of this policy, as they effectually prevented Prussia from joining Austria in rekindling the flames of war. And again in 1813, these works might have produced a decided influence on the campaign, had not the political perfidy of Austria, and the treason of the French generals, prevented Napoleon from profiting by the advantages of his position.

The influence of the fortifications of Spain upon the Peninsular campaigns has often been alluded to by historians. Those works which had been given up to Napoleon previous to the opening of hostilities, contributed very much to the success of his arms; while those which had been retained by Spain and her allies contributed in an equal degree to fetter and embarrass his operations. Some of these, like Saragossa, Tarragona, Gerona, Tortosa, &c. &c., with their broken walls and defective armaments, kept the enemy in check for months; and, by compelling the French to resort to the tedious operations of sieges, did much to weaken the French power in the Peninsula.

The influence of the fortifications of the French frontiers in furnishing a secure basis for the successful operations of Napoleon into the enemy's territory, has already been noticed. If these fortresses of France, after the disasters of 1812 and '13, failed to save the nation, the cause must be sought for in the peculiar features of the invasion itself, rather than any lack of military influence in the French defences. As has been already remarked, a million of disciplined men, under consummate leaders, were here assailing a single state, impoverished by the fatal war in Russia,—torn in pieces by political factions,—deserted by its sworn allies,—its fortresses basely betrayed into the enemy's hands, and its military power paralyzed by the treason of generals with their entire armies. Its only hope was in the fortresses which had remained faithful; and Napoleon said at St. Helena, that if he had collected together the garrisons of these few fortresses and retired to the Rhine, he could have crushed the allies even after their entrance into Paris. But political considerations prevented the operation.

Again in 1815, Napoleon, even after the defeat of Waterloo, possessed lines of defence sufficiently strong to resist all attempts at invasion. But again the want of co-operation on the part of the government at Paris, and the treason of his own generals, forced his second abdication. If he had retained the command of the army, and the nation had seconded his efforts, the allies would never have reached Paris. But the new government presented the disgraceful spectacle of opening the way for the enemies of their country. "France," said Napoleon, "will eternally reproach the ministry with having forced her whole people to pass under the Caudine-forks, by ordering the disbanding of an army that had for twenty-five years been its country's glory, *and by giving up to our astonished enemies our still invincible fortresses*."

History fully supports Napoleon's opinion of the great danger of penetrating far into a hostile country to attack the capital, even when that capital is without fortifications. The fatal effects of such an advance, without properly securing the means of retreat, is exemplified by his own campaign of 1812, in Russia. If, after the fall of Smolensk, he had fortified that place and Vitepsk, which by their position closed the narrow passage comprised between the Dnieper and the Dwina, he might in all probability, on the following spring, have been able to seize upon Moscow and St. Petersburg. But leaving the hostile army of Tschkokoff in his rear, he pushed on to Moscow, and when the conflagration of that city cut off his hopes of winter quarters there, and the premature rigor of the season destroyed the horses of his artillery and provision-trains, retreat became impossible, and the awful fate of his immense army was closed by scenes of horror to which there is scarcely a parallel in history. This point might be still further illustrated by the Russian campaign of Charles XII., in 1708-9, the fatal advance of the French army on Lisbon, in the Peninsular war, and other examples of the same character.

Even single works sometimes effect the object of lines of fortifications, and frustrate the operations of an entire army. Thus, Lille suspended for a whole year the operations

of Prince Eugene and Marlborough; the siege of Landrecies gave Villars an opportunity of changing the fortunes of the war; Pavia, in 1525, lost France her monarch, the flower of her nobility, and her Italian conquests; Metz, in 1552, arrested the entire power of Charles V., and saved France from destruction; Prague, in 1757, brought the greatest warrior of his age to the brink of ruin; St. Jean d'Acre, in 1799, stopped the successful career of Napoleon; Burgos, in 1812, saved the beaten army of Portugal, enabled them to collect their scattered forces, and regain the ascendancy; Strasburg has often been, the bulwark of the French against Germany, saving France from invasion, and perhaps subjugation.

In nearly the language of Napoleon, (Memoirs, vol. IX.,) If Vienna had been fortified in 1805, the battle of Ulm would not have decided the fate of the war. Again, in 1809, if this capital had been fortified, it would have enabled the Archduke Charles, after the disaster of Eckmuhl, by a forced retreat on the left of the Danube, to form a junction with the forces of General Hiller and the Archduke John.

If Berlin had been fortified in 1806, the army routed at Jena would have rallied there and been joined by the Russians. If Madrid had been strongly fortified in 1808, the French army, after the victories of Espinosa, Tudela, Burgos, and Sommo-Sierra, would not have marched towards that capital, leaving in rear of Salamanca and Valladolid, both the English army of General Moore and the Spanish army of Romana. If Moscow had been fortified in 1812, its conflagration would have been avoided, for, with strong defensive works, and the army of Kutusoff encamped on its ramparts, its capture would have been impossible.

Had not Constantinople been well fortified, the empire of Constantine must have terminated in the year 700, whereas the standard of the Prophet was not planted there until 1440. This capital was therefore indebted to its walls for eight hundred years of existence. During this period it was besieged fifty-three times, but only one of these sieges was successful. The French and Venetians took it, but not without a very severe contest.

Paris has often owed its safety to its walls. In 885 the Normans besieged it for two years without effect. In 1358 the Dauphin besieged it in vain. In 1359 Edward, king of England, encamped at Montrouge, devastated the country to its walls, but recoiled from before it, and retired to Chartres. In 1429 it repulsed the attack of Charles VII. In 1464 the Count of Charlerois surrounded the city, but was unsuccessful in his attacks. In 1472 it repulsed the army of the Duke of Bourgone, who had already ravaged its precincts. In 1536, when attacked by Charles V., it again owed its safety to its walls. In 1588 and 1589 it repulsed the armies of Henry III. and Henry IV. In 1636 and several succeeding years the inhabitants of Paris owed their safety to its walls. If this capital had been strongly fortified in 1814 and 1815, the allied armies would not have dared to attempt its investment.

But it is deemed unnecessary to further specify examples; the whole history of modern warfare is one continued proof of the importance of fortifications as a means of national defence, and as an auxiliary in offensive military operations. Our illustrations have been mostly drawn from European wars, but our own brief history, as will be shown hereafter, is not without its proofs.

The use and importance of field-fortifications, intrenched camps, &c., as well as the class of military works called coast-defences, will be discussed hereafter.[6]

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The use of fortifications in the defence of states is discussed by Ternay, Vauban, Cormontaigne, Napoleon, the Archduke Charles, Jomini, Fallot, and, incidentally, by most of the military historians of the wars of the French Revolution. The names of such standard works as give the detailed arrangements of fortifications will be mentioned hereafter.

CHAPTER IV.

LOGISTICS.

III. We have defined *logistics* to be that branch of the military art which embraces all the practical details of moving and supplying armies. The term is derived from the title of a French general officer, *(major-général des logis,)* who was formerly charged with directing the marches, encampments, and lodging of the troops. It has been still further extended by recent military writers, and many of them now regard logistics as a distinct and important branch of the art.

We shall here consider logistics as including the military duties ordinarily attributed to the pay, subsistence, clothing, medical, hospital, and transportation departments; in fine, of all the civil and civico-military corps of the army. We shall therefore discuss under this head, the preparation of all the necessary materials for fitting out troops for a campaign and for putting them in motion; the regulating of marches, convoys, the means of transport for provisions, hospitals, munitions, and supplies of all kinds; the preparation and protection of magazines; the laying out of camps and cantonments; in fine, every thing connected with preparing, moving, and guarding the *impedimenta* of an army.

The officers connected with this branch of service must consult with the engineers in every thing relating to the defence of their dépôts, magazines, camps, cantonments, communications, and the passage of rivers, and in all that relates to their connection with the attack and defence of places: but in all that relates to strategy and tactics they must receive instructions directly from the chief of the staff of the army, who will have the general direction of every thing connected with logistics. Before commencing the operations of the campaign, or beginning the execution of the plans decided upon at head-quarters, this officer should satisfy himself respecting the condition of the various materials belonging to the different departments of the army; —the horses and horse equipments, carriages, caissons, ponton and artillery equipages, siege equipages, moveable hospitals, engineer and artillery utensils, clothing, and munitions of all kinds; he must supply whatever may be wanting, and provide means for the transportation of every thing.

Subsistence.—The art of subsisting troops during active operations in a hostile country, is one of the most difficult subjects connected with war; and it is a question well worthy of study, both for the statesman and the warrior, how Darius and Xerxes, Philip and Alexander, in ancient times—and the Greek emperors and the barbarians—

and, later still, the crusaders of the middle ages, contrived to support the immense masses of men which they led to war.

Cæsar has said that war should be made to support war; and some modern generals have acted upon this principle to the extreme of supporting their armies entirely at the expense of the country passed over. Others have adopted either in part or entirely the principle of regular magazines.

Louis XIV. and Frederick II. fought mostly on their own frontiers, and followed the system of regular dépôts and supplies. But the revolutionary armies of France made war without magazines, subsisting, sometimes on the inhabitants, sometimes by requisitions levied on the country passed over, and at others by pillage and marauding. Napoleon found little difficulty in supporting an army of a hundred or a hundred and twenty thousand men in Italy, Suabia, and on the rich borders of the Rhine and the Danube; but in Spain, Poland, and Russia, the subject of subsistence became one of extreme embarrassment.

All dépôts of provisions and other supplies for an army are denominated *magazines*; these are divided into *principal, secondary,* and *provisional*. The first are usually on the base of operations; the second, on the line of operations; and the last in the immediate vicinity of the troops, and contain supplies for a few days only.

The system of *magazines* is objected to by some, because it fetters the movements of an army, and makes its military operations subordinate to the means of supply. Moreover, as the movements of an army must be so arranged as to cover these magazines, their establishment at given points reveals to the enemy our plan of campaign.

On the other hand, the system of *requisitions*, either for immediate supplies or for secondary magazines, gives far greater velocity and impetuosity to an active army; and if it be so regulated as to repress pillage, and be levied with uniformity and moderation, it may be relied on with safety in well-cultivated countries; but in more barren and less populous districts, an army without magazines, especially in case of a prolonged stay or a forced retreat, will be exposed to great suffering and loss, if not to total destruction.

Before commencing a campaign the general should make himself acquainted with all the resources of the country to be passed over—determine the amount of supplies which it may be necessary to take with him, and the amount that can be obtained by requisitions; these requisitions being levied in a uniform and legal manner, and through the existing local authorities.

In great wars of invasion it is sometimes impracticable, at least for a time, to provide for the immense forces placed on foot, by any regular system of magazines or of ordinary requisitions: in such cases their subsistence is entirely intrusted to the troops

themselves, who levy contributions wherever they pass. The inevitable consequences of this system are universal pillage and a total relaxation of discipline; the loss of private property and the violation of individual rights, are followed by the massacre of all straggling parties, and the ordinary peaceful and non-combatant inhabitants are converted into bitter and implacable enemies.

In this connection the war in the Spanish peninsula is well worthy of study. At the beginning of this war Napoleon had to choose between methodical operations, with provisions carried in the train of his army, or purchased of the inhabitants and regularly paid for; and irregular warfare, with forced requisitions—war being made to support war. The question was thoroughly discussed.

On the one hand, by sacrificing three or four millions of francs from the French treasury, he would have been able to support his troops without requisitions, would have maintained good order and discipline in his armies, and by the distribution of this money among a people poor and interested, he would have made many partisans. He could then have offered them, with a firm and just hand, the olive or the sword. But then the drafts upon the French treasury, had the war been a protracted one, would have been enormous for the support of an army of 200,000 men in Spain. Moreover, the hostile and insurrectionary state of the local authorities rendered regular and legal requisitions almost impossible; and the want of navigable rivers, good roads, and suitable transport, rendered problematical the possibility of moving a sufficient quantity of stores in an insurrectionary country. Besides, no great detachments could have been made to regulate the administration of the provinces, or to pursue the insurgent corps into the fastnesses of the mountains. In fine, by this system, he would have effected a military occupation of Spain without its subjugation.

On the other hand, by marching rapidly against all organized masses, living from day to day upon the local resources of the country, as he had done in Italy, sparing his reserves for the occupation and pacification of the conquered provinces; this mode promised more prompt and decisive results than the other. Napoleon, therefore, determined to adopt it for his active masses, employing the system of magazines and regular requisitions so far as practicable. In favorable parts of the country, Soult and Souchet, with smaller armies, succeeded in obtaining in this way regular supplies for a considerable length of time, but the others lived mainly by forced requisitions levied as necessity required. This sometimes gave place to great excesses, but these were principally the faults of subordinate officers who tolerated them, rather than of Napoleon, who punished such breaches of discipline, when they were known to him, with great severity. He afterwards declared that, "had he succeeded he would have indemnified the great mass of the Spanish people for their losses, by the sale of the hoarded wealth of the clergy, which would have rendered the church less powerful, and caused a more just division of property; thus the evil of the war would have been

forgotten in the happy triumph of public and private interest over the interest of an ambitious and exclusive clergy."

The following maxims on subsistence have the sanction of the best military writers:

1st. Regular magazines should be formed, so far as practicable, for the supplies of an army; the levying of requisitions being resorted to only where the nature of the war, and the requisite rapidity of marches, render these absolutely necessary to success.

2d. Dépôts should be formed in places strengthened by nature or art, defended by small corps, or garrisons, and situated in positions least liable to attack.

3d. All great dépôts should be placed on navigable rivers, canals, railways, or practical roads, *communicating with the line of operations*, so that they may be transported with ease and rapidity, as the army advances on this line.

4th. An army should never be without a supply for ten or fifteen days, otherwise the best chances of war may be lost, and the army exposed to great inconveniences. Templehoff says that the great Frederick, in the campaign of 1757, always carried in the Prussian provision-train *bread* for *six*, and *flour* for *nine days*, and was therefore never at a loss for means to subsist his forces, in undertaking any sudden and decisive operation. The Roman soldier usually carried with him provisions for fifteen days. Napoleon says, "Experience has proved that an army ought to carry with it a month's provisions, ten days' food being carried by the men and baggage-horses and a supply for twenty days by the train of wagons; so that at least four hundred and eighty wagons would be required for an army of forty thousand men; two hundred and forty being regularly organized, and two hundred and forty being obtained by requisition. For this purpose there would be a battalion of three companies for the military stores of each division, each company having its establishment for forty wagons, twenty being furnished by the commissariat, and twenty obtained by requisition. This gives for each division one hundred and twenty wagons, and for each army, four hundred and eighty. Each battalion for a provision-train should have two hundred and ten men."

5th. An army, while actually in motion, can find temporary resources, unless in a sterile country, or one already ravaged by war, or at the season of the year when the old crops are nearly exhausted and the new ones not ready for harvest; but, even supposing the army may in this way be partially or wholly supplied, while in motion, it nevertheless frequently happens that it may remain for some days in position, (as the French at Austerlitz and Ulm;) a supply of hard bread for some ten days will therefore be important to subsist the army till a regular commissariat can be established.

6th. "Supplies of bread and biscuit," says Napoleon, "are no more essential to modern armies than to the Romans; flour, rice, and pulse, may be substituted in marches

without the troops suffering any harm. It is an error to suppose that the generals of antiquity did not pay great attention to their magazines; it may be seen in Cæsar's Commentaries, how much he was occupied with this care in his several campaigns. The ancients knew how to avoid being slaves to any system of supplies, or to being obliged to depend on the purveyors; but all the great captains well understood the art of subsistence."

Forage is a military term applied to food of any kind for horses or cattle,—as grass, hay, corn, oats, &c.; and also to the operation of collecting such food. Forage is of two kinds, *green* and *dry*; the former being collected directly from the meadows and harvest-fields, and the latter from the barns and granaries of the farmers, or the storehouses of the dealers.

The animals connected with an army may be subsisted by regular magazines, by forced requisitions, or by authorized *foraging* [7] As has already been remarked, it is not always politic, or even possible, to provide regular magazines for the entire supplies of an army during the active operations of a campaign. On account of the great expense and difficulty of transporting forage, the general of an army is more frequently under the necessity of resorting to requisitions, or forced contributions as they are called, and to foraging, for the subsistence of his animals, than to provide food for his men. Nor are requisitions and foragings for this object so objectionable as in the other case, being far less likely to produce general want and distress among the non-combatant inhabitants.

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This term is sometimes, though improperly, applied to the operation of forcibly collecting food for the troops.

The commanding officer of troops should always use his best endeavors to obtain his forage by purchase of the inhabitants, or by requisitions on the local authorities; and even where these means are impracticable, the foraging parties should be strictly directed to make their levies with uniformity and due moderation. Accurate accounts should be kept of the kinds and quantities of all produce and other property taken, so that it may be regularly distributed and accounted for. Under no circumstances should individuals be permitted to appropriate to themselves more than their *pro rata* allowance. Foraging parties may sometimes attain their object in a peaceful manner, by representing to the inhabitants the nature of their instructions and the necessity of obtaining immediate supplies. Even where no recompense is proposed, it may be well to offer certificates to the effect that such articles have been taken for the use of the army. These certificates, even when of no value in themselves, frequently tend to appease excited passions and allay insurrections. In defensive war, carried on in one's own country, it is often necessary to seize upon private property and appropriate it to

the public service: in all such cases the certificates of the foraging officers become proofs of individual claims against the government.

No foraging party should ever be sent out till after the country has been properly reconnoitred. A good military escort and vanguard should always accompany and precede the foragers, for protection against the enemy's light cavalry and an insurgent militia. Trustworthy troops must be placed in the villages and hamlets of the country to be foraged, in order to prevent the foragers from engaging in irregular and unauthorized pillage. Officers of the staff and administrative corps are sent with the party to see to the proper execution of the orders, and to report any irregularities on the part of the troops. In case any corps engage in unauthorized pillage, due restitution should be made to the inhabitants, and the expense of such restitution deducted from the pay and allowances of the corps by whom such excess is committed. A few examples of this kind of justice will soon restore discipline to the army, and pacify the inhabitants of the country occupied.

Experience is the best guide in estimating the amount of hay or grain that may be taken from a given field: the produce of an acre is, of course, very different for different soils and climates. In distributing the burdens to the several pack-horses and wagons employed in conveying the forage to the army, it is important for the foraging officers to know the relative weight and bulk of each article.

Ordinary pressed hay in this country will average about		12lbs	per cubic foot
Wheat	weighs	60lbs	per bushel
Rye	weighs	56lbs	per bushel
Maize or Indian corn	weighs	56lbs	per bushel
Barley	weighs	50lbs	per bushel
Oats	weighs	35lbs	per bushel
Meal, flour and ground feed of all kinds,are purchased by the pound.			

As it would be exceedingly dangerous to send forward the regular train of the army for the conveyance of forage collected by these foraging parties, the country wagons and pack-horses are usually pressed into service for this purpose.

Troops of horse are sometimes sent into the vicinity of meadows and grain-fields for temporary subsistence: in such cases the horses and cattle may be farmed in the neighborhood, and the grass and grain issued in regular rations, immediately as taken from the field; but in no case should the animals be turned out to pasture.

In a country like ours, where large bodies of new and irregular forces are to be suddenly called into the field in case of war, it is important to establish very rigid rules in relation to forage and subsistence; otherwise the operations of such troops must be attended with great waste of public and private property, the want of means of subsistence, the consequent pillage of the inhabitants, and a general relaxation of discipline. Regular troops are far less liable to such excesses than inexperienced and undisciplined forces.

Marches.—Marches are of two kinds: 1st. Route marches,—2d. Marches within reach of the enemy. The former belong to the domain of strategy; the latter to that of tactics; both, however, are connected with logistics in every thing that concerns the means of their execution.

When an army is moving on a line of operations, it should be in as many columns as the facility of subsistence, celerity of movement, the nature of the roads, &c., may require. Large columns cannot move with the same rapidity as smaller ones, nor can they be so readily subsisted. But when an army is within striking distance of the enemy, concentration becomes more important than celerity, and the forces must be kept in mass, or at least within supporting distances of each other. We find only two instances in the Seven Years' War, in which Frederick attempted attacks by several columns at considerable distances from each other; and in both these instances (at Torgau and at Namiest, against Laudon, during the siege of Olmutz) he was unsuccessful. His usual mode was to bring his columns near together as he approached the enemy, and to form his troops into line at the moment of attack. Such was his order of march at Prague, Kollin, Rosbach, Leuthen, Zornsdorf, and Kunersdorf. The following is one of Frederick's orders respecting marches, (October 2d, 1760.)

"The army will, as usual, march in three columns by lines. The first column will consist of the first line; the second, of the second line; and the third, of the reserve. The wagons, and hospital wagons, of regiments, will follow their corps. The batteries of heavy calibre will follow the infantry brigades to which they are assigned. On passing woods, the regiments of cavalry will march between two infantry corps."

"Each column will have a vanguard of one light battalion and ten squadrons of hussars or dragoons. They will be preceded by three wagons carrying plank-bridges. The rear-guard is charged with taking up these bridges after the army has defiled over them."

"The parks will be divided among the columns, to avoid the embarrassment resulting from a great many wagons being together in a body."

"If any thing should happen to the second and third columns, the king will be instantly apprized of it; he will be found at the head of the first column. Should any thing occur to the rear-guard, the same will be instantly communicated to Lieutenant-general Zeithen, who will be with the rear-guard of the first column."

"The officers will take care that the soldiers march with equal step, and that they do not stray to the right or left, and thus uselessly fatigue themselves and lose their distances."

"When orders are given to form the line, the wagons will file out of the columns to the left, and will march to be parked," &c.

The position of the baggage, when near the enemy, will depend on the nature of the march. If the march be to the front, it will be in rear of the column; if the march be by the flank, and the enemy be on the outer flank, the baggage will be on the inner one, most remote from danger; if the march be in retreat, the baggage will be in advance of the army. In either case it should be strongly guarded.

It was in direct violation of this rule that General Hull, in the campaign of 1812, on reaching the Miami of the Lake, (Maumee,) embarked his baggage, stores, sick, convalescent, and "even the instructions of his government and the returns of his army," on board the Cuyahoga packet, and dispatched them for Detroit, while the army, with the same destination, resumed its march by land. The result of thus sending his baggage, stores, official papers, &c., *without a guard, and on the flank nearest the enemy,* was just what might have been anticipated:—in attempting to pass the British post of Malden the whole detachment was attacked and captured, "by a subaltern and six men, in a small and open boat."

To prevent a surprise, detachments of light troops should be always thrown out in front, on the flanks, and in rear of the column, denominated from their position, *Advanced-Guard, Flankers,* and *Rear-Guard.* These scan the country which is to be passed over by the column, watch the enemy's motions, and give notice of his approach in time to allow the main force to choose a suitable field of battle, and to pass from the order of march to that of combat. The strength and composition of these detachments depend upon the nature of the ground, and the character and position of the enemy. In case of an attack they retire slowly, and on joining the main body, take their assigned position in the line of battle.

In an open country the order of march presents but little difficulty; but in a broken country, and especially in the vicinity of the enemy, a march cannot be conducted with too many precautions. Before engaging in a *defile* it should be thoroughly examined, and sufficient detachments sent out to cover the main body from attack while effecting

the passage. A neglect of these precautions has sometimes led to the most terrible disasters.

In military operations very much depends upon the rapidity of marches. The Roman infantry, in Scipio's campaigns in Africa, frequently marched a distance of twenty miles in five hours, each soldier carrying from fifty to eighty pounds of baggage. Septimius Severus, Gibbon states, marched from Vienna to Rome, a distance of eight hundred miles, in forty days. Cæsar marched from Rome to the Sierra-Morena, in Spain, a distance of four hundred and fifty leagues, in twenty-three days!

Napoleon excelled all modern generals in the celerity of his movements. Others have made for a single day as extraordinary marches as the French, but for general activity during a campaign they have no rivals in modern history. A few examples of the rapidity of their movements may not be without interest.

In 1797 a part of Napoleon's army left Verona after having fought the battle of St. Michaels, on the 13th of January, then marched all night upon Rivoli, fought in the mountains on the 14th, returned to Mantua on the 15th, and defeated the army of Provera on the morning of the 16th,—thus, in less than four days, having marched near fifty leagues, fought three battles, and captured more than twenty thousand prisoners! Well might he write to the Directory that his soldiers had surpassed the much vaunted rapidity of Cæsar's legions.

In the campaign of 1800, Macdonald, wishing to prevent the escape of Loudon, in a single day marched forty miles, crossing rivers, and climbing mountains and glaciers.

In 1805 the grand French army broke up their camp at Boulogne, in the early part of September, and in two weeks reached their allotted posts on the Rhine, averaging daily from twenty-five to thirty miles.

During the same campaign the French infantry, pursuing the Archduke Ferdinand in his retreat from Ulm, marched thirty miles a day in dreadful weather, and over roads almost impassable for artillery.

Again, in the campaign of 1806, the French infantry pursued the Prussians at the rate of from twenty-five to thirty miles per day.

In 1808 the advanced posts of Napoleon's army pursued Sir John Moore's army at the rate of twenty-five miles a day, in the midst of winter. Napoleon transported an army of fifty thousand men from Madrid to Astorga with nearly the same rapidity, marching through deep snows, across high mountains, and rivers swollen by the winter rains. The activity, perseverance, and endurance of his troops, during these ten days' march, are scarcely equalled in history.

In 1812, the activity of the French forces under Clausel was truly extraordinary. After almost unheard-of efforts at the battle of Salamanca, he retreated forty miles in a little more than twelve hours!

In 1814, Napoleon's army marched at the rate of ten leagues a day, besides fighting a battle every twenty-four hours. Wishing to form a junction with other troops, for the succor of Paris, he marched his army the distance of seventy-five miles in thirty-six hours; the cavalry marching night and day, and the infantry travelling *en poste*.

On his return from Elba, in 1815, his guards marched fifty miles the first day after landing; reached Grenoble through a rough and mountainous country, a distance of two hundred miles, in six days, and reached-Paris, a distance of six hundred miles, in less than twenty days!

The marches of the allied powers, during the wars of the French Revolution, were much less rapid than those of the armies of Napoleon. Nevertheless, for a single day the English and Spaniards have made some of the most extraordinary marches on record.

In 1809, on the day of the battle of Talavera, General Crawford, fearing that Wellington was hard pressed, made a forced march with three thousand men the distance of sixty-two miles in twenty-six hours!

The Spanish regiment of Romana, in their march from Jutland to Spain, marched the extraordinary distance of fifty miles in twenty-one hours.

Cavalry, for a single day, will march a greater distance than infantry; but for a campaign of several months the infantry will march over the most ground. In the Russian campaign of Napoleon, his cavalry failed to keep pace with the infantry in his forced march on Moskwa. But in the short campaigns of 1805 and 1806, the cavalry of Murat displayed the most wonderful activity, and effected more extraordinary results than any mounted troops of modern ages.

The English cavalry, however, have made one or two short marches with a rapidity truly extraordinary.

In 1803 Wellington's cavalry in India marched the distance of sixty miles in thirty-two hours.

But the march of the English cavalry under Lord Lake, before the battle of Furruckabad, is, if we can trust the English accounts, still more extraordinary than any thing recorded of the Romans or the French—it is said that he marched *seventy miles in twenty-four hours!!!*

As a general rule, troops marching for many days in succession will move at the rate of from fifteen to twenty miles per day. In forced marches, or in pursuit of a flying

enemy, they will average from twenty to twenty-five miles per day. And for only two or three days in succession, with favorable roads, thirty miles per day may be calculated on. Marches beyond this are unusual, and, when they do occur, are the result of extraordinary circumstances.

Convoy.—A convoy consists of provisions, military munitions, &c., sent from one point to another, under the charge of a detachment of troops, called an *escort*. When regular dépôts and magazines are established, with proper relations to the line of operations, convoys requiring particular escorts are seldom necessary, because the position of the army will cover the space over which the magazines are to be moved. But in the immediate vicinity of the enemy, or in a country whose inhabitants are hostile or insurrectionary, precautions of this kind should always be resorted to.

The size and composition of the escort must depend upon the nature of the country and the imminence of the danger. The ground to be passed over should be previously reconnoitred, and the line of march be taken up only after the most satisfactory reports. When once put in motion, the convoy should be thoroughly hemmed in by flankers, to give warning to the escort of the approach of the enemy. Small parties of cavalry are detached on all sides, but particularly in advance. The main body of the escort is concentrated on the most exposed point of the convoy while the other sides are guarded by subdivisions. In case of an attack by a large party, the baggage wagons may be formed into a kind of defensive field-work, which, with one or two pieces of light artillery, can in this way resist a pretty strong effort to destroy or carry away the convoy.

As a general rule, it is better to supply the wants of an army by small successive convoys than by periodical and large ones. Even should some of the former be captured their loss would not be materially felt; but a large periodical convoy offers so great a temptation to the enterprise of the enemy, and is so difficult to escort, that he will venture much to destroy it, and its loss may frustrate our plans of a siege or of an important military operation. If the Prussian army, when besieging Olmutz, had observed this rule, the capture of a convoy would not have forced them to raise the siege and to retreat.

Napoleon estimates that an army of 100,000 men in position will require the daily arrival of from four to five hundred wagon loads of provisions.

The difficulty of moving provisions, baggage, &c., in a retreat, is always very great, and the very best generals have frequently failed on this point. Indeed, the best concerted measures will sometimes fail, amid the confusion and disorder consequent upon a retreat with an able and active enemy in pursuit. In such a case, the loss of the provision-trains in a sterile or unfriendly country may lead to the most terrible disasters. We will allude to two examples of this kind: the retreat of the English from Spain in 1809, and that of the French from Russia in 1812.

When Sir John Moore saw that a retreat had become necessary to save his army from entire destruction, he directed all the baggage and stores to be taken to the rear, and every possible arrangement to be made for their preservation and for the regular supplies of the army. But the want of discipline in his troops, and more especially the want of a proper engineer organization to prepare the requisite means for facilitating his own marches, and impeding the enemy's pursuit, prevented his plans from being fully carried into execution. Much suffering and great losses were consequently inflicted upon his troops; a large portion of his baggage and military stores was captured, and even the treasure of his army, amounting to some 200,000 dollars, was abandoned through the ignorance and carelessness of the escorting officer.

In Napoleon's march into Russia, his plans had been so admirably combined, that from Mentz to Moscow not a single estafette or convoy, it is said, was carried off in this campaign; nor was there a day passed without his receiving intelligence from France. When the retreat was begun, (after the burning of Moscow,) he had six lines of magazines in his rear; the 1st, at Smolensk, ten days' march from Moscow; those of the 2d line at Minsk and Wilna, eight marches from Smolensk; those of the 3d line at Kowno, Grodno, and Bialystok; those of the 4th line at Elbing, Marienwerder, Thorn, Plock, Modlin, and Warsaw; those of the 5th line at Dantzic, Bamberg, and Posen; those of the 6th line at Stettin, Custrin, and Glogau. When the army left Moscow it carried with it provisions sufficient for twenty days, and an abundance of ammunition, each piece of artillery being supplied with three hundred and fifty rounds; but the premature cold weather destroyed thirty thousand horses in less than three days, thus leaving the trains without the means of transportation or suitable escorts for their protection: the horrible sufferings of the returning army now surpassed all description.

The officer selected to escort convoys should be a man of great prudence, activity, and energy, for frequently very much depends upon the safe and timely arrival of the provisions and military stores which he may have in charge.

Castrametation.—Castrametation is, strictly speaking, the art of laying out and disposing to advantage the several parts of the camp of an army. The term is sometimes more extensively used to include all the means for lodging and sheltering the soldiers during a campaign, and all the arrangements for cooking, &c., either in the field or in winter quarters. A camp, whether composed of tents or barracks, or merely places assigned for bivouacking, must be divided and arranged in such a way that the several divisions shall be disposed as they are intended to be drawn up in order of battle; so that, on any sudden alarm, the troops can pass from it promptly, and form their line of battle without confusion. Suitable places must also be assigned for cooking, for baggage, and for provisions, military stores, and ammunitions.

The extent of the color front of a camp depends much on the character of the ground and the means of defence, but as a general rule, it should never exceed the position

which the army would occupy in the line of battle. The different arms should be encamped in the same order as that of battle; this order of course depending on the nature of the battle-ground. A *corps d'armée* is composed of battalions of infantry, squadrons of cavalry, batteries of artillery, and companies of engineer troops, and the art of encampments consists in arranging each of these elements so as to satisfy the prescribed conditions.

The choice of ground for a camp must be governed, 1st, by the general rules respecting military positions, and, 2d, by other rules peculiar to themselves, for they may be variously arranged in a manner more or less suitable on the same position.

That the ground be suitable for defence, is the first and highest consideration.

It should also be commodious and dry: moist ground in the vicinity of swamps and stagnant waters, would endanger the health of the army: for the same reason it should not be subject to overflow or to become marshy by heavy rains, and the melting of snow.

The proximity of good roads, canals, or navigable streams, is important for furnishing the soldiers with all the necessaries of life.

The proximity of woods is also desirable for furnishing firewood, materials for huts, for repairs of military equipments, for works of defence, &c.

Good water within a convenient distance, is also an essential element in the choice of ground for a camp; without this the soldiers' health is soon undermined. The proximity of running streams is also important for the purposes of washing and bathing, and for carrying off the filth of the camp.

The camp should not be so placed as to be enfiladed or commanded by any point within long cannon range; if bordering on a river or smaller stream, there should be space enough between them to form in order of battle; the communications in rear should offer the means of retreating in case of necessity, but should not afford facilities to the enemy to make his attack on that side.

If the camp is to be occupied for a considerable length of time, as for *cantonments* or *winter-quarters*, the greater must be the care in selecting its position and in the arrangement for the health and comfort of the soldiers. In the latter case, (of winter-quarters,) the engineer's art should always be called in play to form intrenchments, lines of abattis, inundations, &c., to render the position as difficult of access to the enemy as possible.

A *bivouac* is the most simple kind of camp. It consists merely of lines of fires, and huts for the officers and soldiers. These huts may be made of straw, of wood obtained from the forest, or by dismantling houses and other buildings in the vicinity of the

camp, and stripping them of their timbers, doors, floors, &c. Troops may be kept in bivouac for a few days, when in the vicinity of the enemy, but the exposure of the soldier in ordinary bivouacs, especially in the rainy seasons or in a rigorous climate, is exceedingly destructive of human life, and moreover leads to much distress to the inhabitants of the country occupied, in the destruction of their dwellings and the most common necessaries of life. If the position is to be occupied for any length of time, the huts should be arranged like tents, according to a regular system, and made comfortable for the troops. Such should always be the system adopted in camps of practice or manœuvre, in cantonments, winter-quarters, or in intrenched positions.

We have adopted in our service the system of encamping in tents. These may do very well under the ordinary circumstances; but in the active operations of a campaign they are exceedingly objectionable, as greatly encumbering the baggage-trains. It would seem preferable to resort to bivouacs for the temporary camp of a single night, and to construct a regular system of huts where a position is to be occupied for any length of time. This may be regarded as a general rule, but in certain countries and climates, the tent becomes almost indispensable.

Napoleon's views on this subject are certainly interesting, if not decisive of the question: "Tents," says he, "are not wholesome. It is better for the soldier to bivouac, because he can sleep with his feet towards the fire; he may shelter himself from the wind with a few boards or a little straw. The ground upon which he lies will be rapidly dried in the vicinity of the fire. Tents are necessary for the superior officers, who have occasion to read and consult maps, and who ought to be ordered never to sleep in a house—a fatal abuse, which has given rise to so many disasters. All the European nations have so far followed the example of the French as to discard their tents; and if they be still used in camps of mere parade, it is because they are economical, sparing woods, thatched roofs, and villages. The shade of a tree, against the heat of the sun, and any sorry shelter whatever, against the rain, are preferable to tents. The carriage of the tents for each battalion would load five horses, who would be much better employed in carrying provisions. Tents are a subject of observation for the enemies' spies and officers of the staff: they give them an insight into your numbers, and the position that you occupy; and this inconvenience occurs every day, and every instant in the day. An army ranged in two or three lines of bivouac is only to be perceived at a distance by the smoke, which the enemy may mistake for the vapor of the atmosphere. It is impossible to count the number of fires; it is easy, however, to count the number of tents, and to trace out the position that they occupy."

The guarding of camps is a very important matter, and requires much attention.

The *camp-guard* consists of one or two rows of sentinels placed around the camp, and relieved at regular intervals. The number of rows of sentinels, and the distance

between each man, will depend upon the character of the ground and the degree of danger apprehended.

Detachments of infantry and cavalry, denominated picquets, are also thrown out in front and on the flanks, which, in connection with the camp-guards, serve to keep good order and discipline in and around the camp, to prevent desertions, intercept reconnoitering parties, and to give timely notice of the enemy's approach.

Still larger detachments, denominated *grand-guards*, are posted in the surrounding villages, farm-houses, or small field-works, which they occupy as outposts, and from which they can watch the movements of the enemy, and prevent any attempts to surprise the camp. They detach patrols, videttes, and sentries, to furnish timely notice of danger. They should never be so far from the camp as to be beyond succor in case of sudden attack. Outposts, when too far advanced, are sometimes destroyed without being able to give notice of the enemy's approach.

In encamping troops in winter-quarters, it is sometimes necessary to scatter them over a considerable extent of ground, in order to facilitate their subsistence. In such a case, the arrangement of guards requires the utmost care. A chain of advanced posts should be placed several miles' distance from the line of camp; these posts should be supported by other and larger detachments in their rear, and concentrated on fewer points; and the whole country around should be continually reconnoitered by patrols of cavalry.

The manner in which Napoleon quartered and wintered his army on the Passarge, in 1806-7, furnishes a useful lesson to military men, both in the matters of encampment and subsistence. An immense army of men were here quartered and subsisted, in a most rigorous climate, with a not over fertile soil, in the midst of hostile nations, and in the very face of a most powerful enemy.

A Roman army invariably encamped in the same order, its troops being always drawn up in the same battle array. A Roman staff-officer who marked out an encampment, performed nothing more than a mechanical operation; he had no occasion for much genius or experience. The form of the camps was a square. In later times, they sometimes, in imitation of the Greeks, made them circular, or adapted them to the ground. The camp was always surrounded with a ditch and rampart, and divided into two parts by a broad street, and into subdivisions by cross-streets and alleys. Each tent was calculated to hold ten privates and a petty officer.

In the middle ages, the form of the camp did not differ very essentially from that of the Romans, the variation consisting principally in the interior arrangements, these arrangements being made to correspond to the existing mode of forming a line of battle. The details of this system may be found in the military work of Machiavelli.

The art of fixing a camp in modern times is the same as taking up a line of battle on the same position. Of all the projectile machines must be in play and favorably placed. The position must neither be commanded, out-fronted, nor surrounded; but on the contrary ought, as far as possible, to command and out-front the enemy's position. But even in the same position there are numerous modes of arranging an encampment, or of forming a line of battle, and to select the best of these modes requires great experience, *coup d'oeil*, and genius. In relation to this point Napoleon makes the following remarks:—

"Ought an army to be confined to one single encampment, or ought it to form as many as it has corps or divisions? At what distance ought the vanguard and the flankers to be encamped? What frontage and what depth ought to be given to the camp? Where should the cavalry, the artillery, and the carriages be distributed? Should the army be ranged in battle array, in several lines? And if it should, what space should there be between those lines? Should the cavalry be in reserve behind the infantry, or should it be placed upon the wings? As every piece has sufficient ammunition for keeping up its fire twenty-four hours, should all the artillery be brought into action at the beginning of the engagement, or should half of it be kept in reserve?"

"The solution of these questions depends on the following circumstances:—1st. On the number of troops, and the numbers of infantry, artillery, and cavalry, of which the army is composed. 2d. On the relation subsisting between the two armies. 3d. On the quality of the troops. 4th. On the end in view. 5th. On the nature of the field. And 6th. On the position occupied by the enemy, and on the character of the general who commands them. Nothing absolute either can or ought to be prescribed on this head. In modern warfare there is no natural order of battle."

"The duty to be performed by the commander of an army is more difficult in modern armies, than it was in those of the ancients. It is also certain that his influence is more efficacious in deciding battles. In the ancient armies the general-in-chief, at a distance of eighty or a hundred toises from the enemy, was in no danger; and yet he was conveniently placed, so as to have an opportunity of directing to advantage all the movements of his forces. In modern armies, a general-in-chief, though removed four or five hundred toises, finds himself in the midst of the fire of the enemy's batteries, and is very much exposed; and still he is so distant that several movements of the enemy escape him. In every engagement he is occasionally obliged to approach within reach of small-arms. The effect of modern arms is much influenced by the situation in which they are placed. A battery of guns, with a great range and a commanding position that takes the enemy obliquely, may be decisive of a victory. Modern fields of battle are much more extended than those of the ancients, whence it becomes necessary to study operations on a large scale. A much greater degree of experience and military genius is requisite for the direction of a modern army than was necessary for an ancient one."

Figure 9 represents a camp (on favorable ground) of a grand-division of an army, composed of two brigades or twelve battalions of infantry, twelve squadrons of cavalry, five batteries of artillery, and three companies of engineers.

Figure 10 represents the details of a camp of a battalion of infantry composed of eight companies.

Figure 11 is the camp of a squadron of cavalry.

Figure 12 is the camp of two batteries of foot artillery, or two companies of foot engineers.

Figure 13 is the camp of two batteries of mounted artillery, or two companies of mounted sappers and pontoniers.

On undulating or broken ground the arrangement and order of the general camp, as well as the details of the encampment of each arm, would admit of much variation.[8]

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There are many valuable remarks on the various subjects comprised under the head of logistics, in the works of Jomini, Grimoard, Thiebault, Boutourlin, Guibert, Laroche Amyon, Bousmard, Ternay, Vauchelle, Odier, Audouin, Bardin, Chemevrieres, Daznan, Ballyet, Dremaux, Dupre d'Aulnay, Morin, and in the published regulations and orders of the English army.

CHAPTER V.

TACTICS.

IV. Tactics.—We have defined tactics to be the art of bringing troops into action, or of moving them in the presence of the enemy;—that is, within his view, and within the reach of his artillery. This branch of the military art has usually been divided into two parts: 1st. Grand Tactics, or the tactics of battles; and 2d. Elementary Tactics, or tactics of instruction.[9]

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"It does not come within the view of this work to say any thing of the merely mechanical part of the art; because it must be taken for granted, that every man who accepts the command of an army knows at least the alphabet of his trade. If he does not, (unless his enemy be as ignorant as himself,) defeat and infamy await him. Without understanding perfectly what are called *the evolutions*, how is it possible that a general can give to his own army that order of battle which shall be most provident and skilful in each particular case in which he may be placed? How know which of these evolutions the enemy employs against him? and, of course, how decide on a counter-movement which may be necessary to secure victory or avoid defeat? The man who shall take the command of an army without perfectly understanding this elementary branch, is no less presumptuous than he who should pretend to teach Greek without knowing even his letters. If we have such generals, let them, for their own sakes, if not for their country's, put themselves immediately to school."

A *battle* is a general action between armies. If only a small portion of the forces are engaged it is usually denominated a *combat*, an *affair*, an *action*, a *skirmish*, &c., according to the character of the conflict. The art of combining and conducting battles of all descriptions has been designated by the name of Grand Tactics.

Battles may be arranged into three classes; 1st. *Defensive* battles, or those given in a chosen position by an army waiting the attack of the enemy. 2d. *Offensive* battles, or those made by an army which attacks the enemy in position. 3d. The *mixed* or *unforeseen* battles, given by two armies meeting while on the march.

I. When an army awaits the attack, it takes its position and forms its line of battle according to the nature of the ground and the supposed character and strength of the enemy's forces. Such is usually the case when an army wishes to cover a siege, protect

a capital, guard dépôts of provisions and military stores, or some important strategic point. The general relations of positions with strategy and engineering have already been considered; we will now discuss merely their relations to battles.

The first condition to be satisfied by a tactical position is, that its debouches shall be more favorable for falling on the enemy when he has approached to the desired point, than those which the enemy can have for attacking our line of battle. 2d. The artillery should have its full effect upon all the avenues of approach. 3d. We should have good ground for manœuvring our own troops unseen, if possible, by the enemy. 4th. We should have a full view of the enemy's manœuvres as he advances to the attack. 5th. We should have the flanks of our line well protected by natural or artificial obstacles. 6th. We should have some means of effecting a retreat without exposing our army to destruction.

It is very seldom that all these conditions can be satisfied at the same time; and sometimes the very means of satisfying one, may be in direct violation of another. A river, a forest, or a mountain, which secures a flank of a line of battle, may become an obstacle to a retreat, should the defensive forces be thrown back upon that wing. Again, the position may be difficult of attack in front or on the wings, and at the same time unfavorable for retreat. Such was Wellington's position at Waterloo. The park of Hougomont, the hamlet of Haye Sainte, and the marshy rivulet of Papelotte, were serious obstacles against the attacking force; but the marshy forest of Soignies in rear, with but a single road, cut off all hope of retreat.

II. According to the strategic relations of the contending forces in a campaign, will it be determined whether we are to await the enemy, or to seek him out and attack him wherever he may be found. We may sometimes be obliged to make the attack at all hazards, for the purpose of preventing the junction of two corps, or to cut off forces that may be separated from the main body by a river, &c. As a general rule the attacking force has a moral superiority over the defensive, but this advantage is frequently more than counterbalanced by other conditions.

The main thing in an *offensive* battle is to seize upon the decisive point of the field. This point is determined by the configuration of the ground, the position of the contending forces, the strategic object of the battle; or, by a combination of these. For example, when one wing of the enemy rests on a height that commands the remainder of his line, this would seem the decisive point to be attacked, for its occupation would secure the greatest advantages; but this point may be so very difficult of access, or be so related to the strategic object as to render its attack out of the question. Thus it was at the battle of Bautzen: the left of the allies rested on the mountains of Bohemia, which were difficult of attack, but favorable for defence; moreover, their only line of retreat was on the right, which thus became the point of attack for the French, although the topographical and tactical key of the field was on the left.

III. It frequently happens in modern warfare that battles result from the meeting of armies in motion, both parties acting on the offensive. Indeed, an army that is occupying a defensive position may, on the approach of the enemy, advance to meet him while on the march. Battles of this kind may partake of the mixed character of offensive and defensive actions, or they may be of the nature of a surprise to both armies. To this class belong the battles of Rosbach, Eylau, Lutzen, Luzzara, Abensberg, &c.

Surprises were much more common in ancient than in modern times, for the noise of musketry and the roar of artillery, belonging to the posts or wings assailed, will prevent any general surprise of an army. Moreover, the division into separate masses, or *corps d'armée,* will necessarily confine the surprise to a part, at most, of the forces employed. Nevertheless, in the change given to military terms, a surprise may now mean only an unexpected combination of manœuvres for an attack, rather than an actual falling upon troops unguarded or asleep. In this sense Marengo, Lutzen, Eylau, &c. are numbered with surprises. Benningsen's attack on Murat at Zarantin in 1812 was a true surprise, resulting from the gross negligence and carelessness of the king of Naples.

An *order of battle* is the particular disposition given to the troops for a determined manœuvre on the field of battle. A *line of battle* is the general name applied to troops drawn up in their usual order of exercise, without any determined manœuvre; it may apply to defensive positions, or to offensive operations, where no definitive object has been decided on. Military writers lay down twelve orders of battle, viz.: 1st. The simple parallel order; 2d. The parallel order with a crotchet; 3d. The parallel order reinforced on one or both wings; 4th. The parallel order reinforced on the centre; 5th. The simple oblique order; 6th. The oblique order reinforced on the assailing wing; 7th. The perpendicular order on one or both wings; 8th. The concave order; 9th. The convex order; 10th. The order by echelon on one or both wings; 11th. The order by echelon on the centre; 12th. The combined orders of attack on the centre and one wing at the same time.

(Figure 14.)[10] The simple parallel order is the worst possible disposition for a battle, for the two parties here fight with equal chances, and the combat must continue till accident, superior numbers, or mere physical strength decides the day; skill can have little or no influence in such a contest.

[10]

In the plans, B is the army in position, and A the attacking force arranged according to the different orders of battle. To simplify the drawings, a single line represents the position of an army, whereas, in practice, troops are usually drawn up in three lines. Each figure represents a grand division of twelve battalions.

(Figure 15.) The parallel order with a crotchet on the flank, is sometimes used in a defensive position, and also in the offensive with the crotchet thrown forward. Malplaquet, Nordlingen, Prague, and Kolin, are examples of this order. Wellington, at Waterloo, formed the parallel order with the retired crotchet on the right flank.

(Figure 16.) A line of battle parallel to the enemy's, if strongly reinforced on one point, is according to correct principles, and may in certain cases secure the victory; but it has many inconveniences. The weak part of the line being too near the enemy, may, notwithstanding its efforts to the contrary, become engaged, and run the risk of a defeat, and thereby counterbalance the advantages gained by the strong point. Moreover, the reinforced part of the line will not be able to profit by its success by taking the enemy's line in flank and rear, without endangering its connection with the rest of the line.

(Figure 17) represents the parallel order reinforced on the centre. The same remarks are applicable to this as to the preceding.

These two orders were frequently used by the ancients: as at the battle of Zama, for example; and sometimes by modern generals. Turenne employed one of them at Ensheim.

(Figure 18) is the simple oblique order.

(Figure 19) is the oblique order, with the attacking wing reinforced. This last is better suited for an inferior army in attacking a superior, for it enables it to carry the mass of its force on a single point of the enemy's line, while the weak wing is not only out of reach of immediate attack, but also holds the remainder of the enemy's line in check by acting as a reserve ready to be concentrated on the favorable point as occasion may require.

The most distinguished examples under this order are the battles of Leuctra and Mantinea, under the celebrated Epaminondas; Leuthen, under Frederick; the Pyramids, Marengo, and Jena, under Napoleon.

(Figure 20.) An army may be perpendicular upon a flank at the beginning of a battle, as was the army of Frederick at Rosbach, and the Russian army at Kunersdorff; but this order must soon change to the oblique. An attack upon both wings can only be made when the attacking force is vastly superior. At Eylau, Napoleon made a perpendicular attack on one wing at the same time that he sought to pierce the enemy's centre.

(Figure 21.) The concave order may be used with advantage in certain cases, and in particular localities. Hannibal employed it at the battle of Cannæ, the English at Crecy and Agincourt, and the Austrians at Essling, in 1809.

(Figure 22.) The convex order is sometimes formed to cover a defile, to attack a concave line, or to oppose an attack before or after the passage of a river. The Romans formed this order at the battle of Cosilinum; the French at Ramilies in 1706, at Fleurus in 1794, at Essling in 1809, and at the second and third days of Leipsic in 1813, and at Brienne in 1814.

(Figure 23.) The order by echelon on one wing may be frequently employed with advantage; but if the echelon be made on both wings, there is the same objection to its use as to the perpendicular order on both wings. At Dresden, Napoleon attacked both wings at the same time; this is the only instance in his whole history of a similar attack, and this was owing to peculiar circumstances in the ground and in the position of his troops.

(Figure 24.) The echelon order on the centre alone may be employed with success against an army formed in a thin or too extended line of battle, for it would be pretty certain to penetrate and break the line.

The echelon order possesses in general very great advantages. The several corps composing the army may manœuvre separately, and consequently with greater ease. Each echelon covers the flank of that which precedes it; and all may be combined towards a single object, and extended with the necessary *ensemble*. At the battle of the Pyramids, Napoleon formed the oblique order in echelon by squares. Portions of his forces were arranged in echelon in some of his other battles.

(Figure 25.) The combined order in columns on the centre and one extremity at the same time, is better suited than either of the preceding for attacking a strong contiguous line. Napoleon employed this order at Wagram, Ligny, Bautzen, Borodino, and Waterloo.

It is impossible to lay down, as a general rule, which of these orders of battle should be employed, or that either should be exclusively followed throughout the whole battle. The question must be decided by the general himself on the ground, where all the circumstances may be duly weighed. An order well suited to one position might be the worst possible in another. Tactics is in this respect the very reverse of strategy—the latter being subject to more rigid and invariable rules.

But whatever the plan adopted by the attacking force, it should seek to dislodge the enemy, either by piercing or turning his line. If it can conceal its real intentions, and deceive him respecting the true point of attack, success will be more certain and decisive. A turning manœuvre may frequently be employed with advantage at the same time with the main attack on the line. The operations of Davoust at Wagram, and Richepanse at Hohenlinden, are good examples under this head. The manœuvre is, however, a difficult one, and unless executed with skill, may lead to disasters like the

turning manœuvres of the Austrians at Rivoli and Austerlitz, and of the French under Jourdan at Stackach, and under Marmont at Salamanca.

We will now discuss the particular manner of arranging the troops on the line of battle, or the manner of employing each arm, without entering, however, much into the detailed tactics of formation and instruction.

We shall begin with *infantry*, as the most important arm on the battle-field.

There are four different ways of forming infantry for battle: 1st, as tirailleurs, or light troops; 2d, in deployed lines; 3d, in lines of battalions, ployed on the central division of each battalion, or formed in squares; 4th, in deep masses.

These different modes of formation are reduced to four separate systems: 1st, the thin formation of two deployed lines; 2d, a line of battalions in columns of attack on the centre, or in squares by battalions; 3d, a combination of these two, or the first line deployed, and the second in columns of attack; and 4th, the deep formation of heavy columns of several battalions. The tirailleurs are merely accessories to the main forces, and are employed to fill up intervals, to protect the march of the columns, to annoy the enemy, and to manœuvre on the flanks.

1st. Formerly the line of battle for infantry was very generally that of two deployed lines of troops, as shown in Fig. 26. But reason and experience have demonstrated that infantry in this thin or light order, can only move very slowly; that in attempting rapid movements it breaks and exhibits great and dangerous undulations, and would be easily pierced through by troops of a deeper order. Hence it is that the light formation is only proper when the infantry is to make use of its fire, and to remain almost stationary.

2d. If the formation of a line of battalions in columns of attack be employed, the depth and mobility will depend upon the organization or habitual formation of this arm.

In our service a battalion is supposed to be composed of ten companies, each formed in three ranks. The two flank companies are designed for tirailleurs. This would give a column of four divisions, and consequently twelve files deep; and as only two of these files could employ their fire, there would be much too large a portion of non-combatants exposed to the enemy's artillery. In practice, however, we employ the two-rank formation, which, if the flank companies be detached, would give a column of attack eight files in depth, which is not objectionable. If however, the flank companies should be present in the battalion, the depth of the column would still be ten files.

In the French service, each battalion is composed of four divisions, formed in either two or three ranks. The two-rank formation is the one habitually employed. If all the companies be present, and the formation in three ranks, the depth of column will be twelve files; if in two ranks the depth will be eight, files. If the flank companies be

detached, the depth of column will be, for three ranks nine files, and for two ranks six files. (Figs. 27 and 28.)

In the Russian service each, battalion has four divisions of three ranks each. But the third rank is employed as tirailleurs, which gives a depth of column of eight files. The employment of the third rank for tirailleurs is deemed objectionable on account of the difficulty of rallying them on the column. For this reason, the best authorities prefer detaching an entire division of two companies.

The formation of squares is exceedingly effective in an open country, and against an enemy who is superior in cavalry. Formerly very large squares were employed, but they are now formed either by regiment or by battalion. The former are deemed best for the defensive, and the latter for offensive movements. The manner of arranging these is shown in Figure 29.

3d. The mixed system, or the combination of the two preceding, has sometimes been employed with success. Napoleon used this formation at Tagliamento, and the Russians at Eylau. Each regiment was composed of three battalions, the first being deployed in line, and the other two formed in columns of attack by division in rear of the two extremities, as shown in Fig. 30. It may in some cases be better to place the second and third battalions in line with the first, and on the two extremities of this battalion, in order to prolong the line of fire. The centre of the line of each regiment would be less strong, however, than when the two battalions by column are placed in rear of the other which is deployed. This mixed system of formation has many advocates, and in certain situations may be employed with great advantage.

4th. The deep order of heavy columns of several battalions is objectionable as an habitual formation for battle, inasmuch as it exposes large masses of men to the ravages of artillery, and diminishes the mobility and impulsion of an attack without adding greatly to its force. Macdonald led a column of this kind at the battle of Wagram with complete success, although he experienced enormous losses. But Ney's heavy columns of attack at Waterloo failed of success, and suffered terribly from the concentric fire of the enemy's batteries.

Whenever deep columns are employed, Jomini recommends that the grand-division of twelve battalions should have one battalion on each flank, (Fig. 31,) marching by files, in order to protect its flanks from the enemy's attacks. Without this defence a column of twelve battalions deep becomes an inert mass, greatly exposed to be thrown into disorder or broken, as was the column of Fontenoy, and the Macedonian phalanx by Paulus Emillus. A grand-division is sometimes arranged in two columns by brigade, as is represented in Figure 32. These are less heavy than a single column of grand-division by battalion, but are subject to nearly the same objections.

All offensive operations on the field of battle require *mobility, solidity*, and *impulsion*; while, on the other hand, all defensive operations should combine *solidity* with *the greatest possible amount of fire*.

Troops in motion can make but little use of their fire-arms, whatever may be their formation. If in very large masses, they move slower and are more exposed; but the moral effect of these large moveable columns is such, that they frequently carry positions without ever employing their fire. The French columns usually succeeded against the Austrian and Prussian infantry, but the English infantry could not so easily be driven from their ground; hey also employed their fire to greater advantage, as was shown at Talavera, Busaco, Fuente de Honore, Albuera and Waterloo. The smaller columns and the mixed formation were always most successful against such troops.

From these remarks we must conclude—1st. That the very thin as well as the very deep formation is objectionable under ordinary circumstances, and can seldom be employed with safety.

2d. That the attack by battalions in columns by division is the best for carrying a position; the column should, however, be diminished in depth as much as possible, in order both to increase its own fire and to diminish its exposure to the fire of the enemy; moreover, it should be well covered by tirailleurs and supported by cavalry.

3d. That the mixed formation of the first line deployed and the second in columns of battalion by division is the best for defence.

4th. That either of the last two may be employed in the offensive or defensive, according to the nature of the ground, the character of the general, and the character and position of the troops. Squares are always good against cavalry.

Troops should be habituated to all these formations, and accustomed to pass rapidly from one to another in the daytime or at night. None, however, but disciplined troops can do this: hence the great superiority of regulars on the field of battle, where skilful manœuvres frequently effect more than the most undaunted courage.

The arm next in importance on the battle-field is *cavalry*. The principal merit of this arm consists in its *velocity* and *mobility*. Cavalry has little solidity, and cannot of itself defend any position against infantry; but in connection with the other arms, it is indispensable for beginning a battle, for completing a victory, and for reaping its full advantage by pursuing and destroying the beaten foe.

There are four different modes of forming cavalry, the same as for infantry: 1st in deployed lines; 2d, a line of regiments in column of attack on the centre; 3d, the mixed formation; and 4th, the deep formation of several columns.

1st. The thin formation was deemed objectionable for infantry, on account of its liability to be penetrated by cavalry. The same objection does not hold so forcibly with respect to this latter arm; but full lines are deemed less advantageous than lines deployed checker-wise or in echelon. In either case the distance between the lines should be sufficient to prevent the second line from coming in contact with the first, in case the latter receives a slight check. This distance need not be so great in lines deployed checker-wise, as when they are full, or in echelon.

2d. The second system of formation, that is, a line of columns of attack on the central division for infantry, is by battalion, but for cavalry, by regiment. If the regiment is composed of eight squadrons, the column will contain four lines, two squadrons forming a division; but if composed of only six squadrons, the column will contain only three lines, and consequently will be six files in depth. In either case the distance between the lines should be that of a demi-squadron, when the troops are drawn up in battle array; but when charging, the divisions may close to a less distance.

3d. In forming a grand division of two brigades, by the third or mixed system, two regiments may be deployed in the first line, and three formed in columns of attack in rear of the flanks and centre, as is shown in Fig. 33, the sixth being held in reserve. This formation is deemed a good one.

4th. The fourth system, of deep columns of cavalry, is entirely unsuited for the charge, and this formation can only be employed for troops drawn up in reserve.

The flanks of lines or columns of cavalry are always much exposed, and squadrons should therefore be formed in echelon on the right and left, and a little in rear of the main body, in order to protect the flanks from the attacks of the enemy's horse. Irregular cavalry is usually employed for this purpose.

In the formation of a grand division in line of battle, care should be taken not to give too great an extent to the command of the generals of brigade. If the formation be in two lines, neither brigade should form an entire line, but each should form a wing of the division, two regiments of the same brigade being placed in rear of each other. This rule is an important one, and should never be neglected.

It may also be laid down as a maxim, in the formation of cavalry on the battle-field, that the first line after the charge, even if most successful, may require reforming in rear of the second line, and that this last should be prepared to act in the front line after the first onset. The success of the battle frequently depends upon the charge of the final reserve of cavalry on the flanks of lines already engaged.

It is on account of this frequent manœuvring of the cavalry on the battle-field, its reforming for repeated charges, that great bodies deployed in full lines are principally objected to. They cannot be handled with the facility and rapidity of columns of regiments by divisions. The attack of Nansouty's cavalry, formed in this way, on the

Prussian cavalry, deployed in advance of Chateau-Thierry, in 1814, is a good proof of this.

Cavalry may be brought to a charge—1st, in columns; 2d, in line; and 3d, in route, or at random, *(à la déban-dade.)* These may also be varied by charging either at a trot or a gallop. All these modes have been employed with success. In a regular charge in line the lance offers great advantages; in the mêlée the sabre is the best weapon; hence some military writers have proposed arming the front rank with lances, and the second with sabres, The pistol and the carabine are useless in the charge, but may sometimes be employed with advantage against convoys, outposts, and light cavalry; to fire the carabine with any effect, the troop must be at a halt. In all charges in line, especially against cavalry, the fast trot is deemed preferable to the gallop, on account of the difficulty of keeping up the alignment when the speed is increased. Lances are utterly useless in a mêée, and in employing troops armed in this way, it is of the greatest importance to keep them in order and in line. In charging with the sabre against artillery the gallop may sometimes be employed, for velocity here may be more important than force.

We will now consider the formation and use of *artillery* on the field of battle. It may be laid down as a fundamental principle, that the fire of artillery should be directed on that part of the enemy's line which we design to pierce; for this fire will not only weaken this point, but will also aid the attack of the cavalry and infantry when the principal efforts are directed towards the intended point.

In the defence, the artillery is usually distributed throughout the whole line, on ground favorable for its fire; but the reserve should be so placed that it can easily be brought to bear on the point where the enemy will be most likely to direct his principal attack.

Artillery placed on a plain, or with ground slightly inclined in front, and using the point-blank or ricochet fire, is the most effective; very high points are unfavorable If possible, the concentric fire should be employed against the enemy's columns of attack. The position of the English artillery on the field of Waterloo, and the use of the concentric fire, furnishes one of the best examples for the disposition of this arm to be found in modern military history.

The proper use of artillery on the battle-field is against the enemy's infantry and cavalry, consequently only a small part of it should be employed to respond to the fire of the enemy's batteries; not more than one third at most can be spared for this object.

If possible, batteries should be established so as to take the enemy's line in flank, either by an oblique or enfilading fire. A direct fire against columns of attack, with a few light pieces thrown out to take it in flank at the same time, will always be advantageous. A direct and flank fire was employed with success by Kleist against the

column of Ney at the battle of Bautzen; the French marshal was forced to change his direction.

Batteries should always be well secured on the flanks, and constantly sustained by infantry or cavalry. If attacked by cavalry, the artillery should keep up its fire as long as possible, first with ball, and then with grape when the enemy arrives within a suitable distance. The same rule will apply to attacks of infantry, except that the fire of solid shot at a great distance is much less effective than against mounted troops.

The *engineer troops* are employed on the field of battle principally by detachments, acting as auxiliaries to the other arms. Each regiment of infantry should have a detachment of sappers armed with axes to act as pioneers, for the removal of obstacles that may impede its advance. These sappers are of the utmost importance, for without them an entire column might be checked and thrown into confusion by impediments which a few sappers with their axes would remove in a very short time. Detachments of engineer troops must also act in concert with the cavalry and artillery for the same purpose as above. In establishing the batteries of artillery, in opening roads for their manœuvres, and in arranging material obstacles for their defence, the axes, picks, and shovels of the sappers are of infinite value. Field-works, bridges, and bridge-defences, frequently have a decisive influence upon the result of a battle, but as these are usually arranged previous to the action, they will be discussed in another place. In the attack and defence of these field-works, the engineer troops play a distinguished part. The consideration of this part of the subject, though perhaps properly belonging to the tactics of battles, will also be postponed to another occasion.

We will now discuss the employment of the combined arms on the field of battle.

Before the French Revolution, all the infantry, formed by regiments and brigades, was united in a single body and drawn up in two lines. The cavalry was placed on the two flanks, and the artillery distributed along the entire line. In moving by wings, they formed four columns, two of cavalry and two of infantry: in moving by a flank, they formed only two very long columns; the cavalry, however, sometimes formed a third and separate column in flank movements, but this disposition was rarely made.

The French Revolution introduced the system of grand divisions composed of the four arms combined; each division moved separately and independently of the other. In the wars of the Empire, Napoleon united two or more of these divisions into a *corps d'armée,* which formed a wing, the centre, or reserve of his grand army. In addition to these divisions and *corps d'armée,* he had large reserves of cavalry and artillery, which were employed as distinct and separate arms.

If the forces be sufficiently numerous to fight by *corps d'armée,* each corps should have its own reserve, independent of the general reserve of the army. Again, if the

forces be so small as to act by grand divisions only, each division should then have *its* separate reserve.

An army, whether composed of separate corps or of grand divisions, usually forms, on the field of battle, a centre, two wings, and a reserve. Each corps or division acts by itself, with its infantry, cavalry, artillery, and engineer troops. The reserve of cavalry may be formed in rear of the centre or one of the wings. In small forces of fifty or sixty thousand men, the cavalry may act with advantage on the wings, in the manner of the ancients. If the reserve of this arm be large enough to form three separate bodies, it may *itself* very properly be formed into a centre and wings. If it be formed into two columns only, they may be placed in rear of the openings between the centre and the wings of the main force. The reserve of artillery is employed either to reinforce the centre or a wing, and in the defensive is frequently distributed throughout the whole line of battle. In offensive operations, it may be well to concentrate as much fire as possible on the intended point of attack. The mounted artillery either acts in concert with the cavalry, of is used to reinforce that arm; the light-foot acts with the infantry, and the batteries of heavy calibre are distributed along the line, or concentrated on some important point where their fire may be most effectual. They reach the enemy's forces at a distance, and arrest the impulsion of his attack. They may also be employed to draw the fire of his artillery; but their movements are too slow and difficult for a reserve.

The order of succession in which the different arms are engaged in a battle, depends upon the nature of the ground and other accidental circumstances, and cannot be determined by any fixed rules. The following, however, is most frequently employed, and in ordinary cases may be deemed good.

The attack is first opened by a cannonade; light troops are sent forward to annoy the enemy, and, if possible, to pick off his artillerists. The main body then advances in two lines: the first displays itself in line as it arrives nearly within the range of grape-shot; the second line remains in columns of attack formed of battalions by division, at a distance from the first sufficient to be beyond the reach of the enemy's musketry, but near enough to support the first line, or to cover it, if driven back. The artillery, in the mean time, concentrates its fire on some weak point to open a way for the reserve, which rushes into the opening and takes the enemy in flank and rear. The cavalry charges at the opportune moment on the flank of the enemy's columns or penetrates an opening in his line, and cutting to pieces his staggered troops, forces them into retreat, and completes the victory. During this time the whole line of the enemy should be kept occupied, so as to prevent fresh troops from being concentrated on the threatened point.

The following maxims on battles may be studied with advantage:—1st. *General battles* are not to be fought but under the occurrence of one of the following

circumstances: when you are, from any cause, decidedly superior to the enemy; when he is on the point of receiving reinforcements, which will materially effect your relative strength; when, if not beaten or checked, he will deprive you of supplies or reinforcements, necessary to the continuance or success of your operations; and, generally, when the advantage of winning the battle will be greater than the disadvantage of losing it.

2d. Whatever may be your reason for risking a general battle, you ought to regard as indispensable preliminaries,—a thorough knowledge of the ground on which you are to act; an ample supply of ammunition; the most perfect order in your fire-arms; hospital dépôts regularly established, with surgeons, nurses, dressings, &c., sufficient for the accommodation of the wounded; points of rendezvous established and known to the commanders of corps; and an entire possession of the passes in your own rear.

3d. The battle being fought and *won*, the victory must be followed up with as much alacrity and vigor, as though nothing had been gained,—a maxim very difficult of observance, (from the momentary disobedience which pervades all troops flushed with conquest,) but with which an able general will never dispense. No one knew better the use of this maxim than Napoleon, and no one was a more strict and habitual observer of it.

4th. The battle being fought and *lost*, it is your first duty to do away the *moral* effect of defeat,—the want of that self-respect and self-confidence, which are its immediate followers, and which, so long as they last, are the most powerful auxiliaries of your enemy. It is scarcely necessary to remark that, to effect this object,—to reinspire a beaten army with hope, and to reassure it of victory,—we must not turn our backs on an enemy, without sometimes presenting to him our front also;—we must not confide our safety to mere flight, but adopt such measures as shall convince him that though wounded and overpowered, we are neither disabled nor dismayed; and that we still possess enough both of strength and spirit to punish his faults, should he commit any. Do you operate in a covered or mountainous country?—avail yourself of its ridges and woods; for by doing so you will best evade the pressure of his cavalry. Have you defiles or villages to pass?—seize the heads of these, defend them obstinately, and make a show of fighting another battle. In a word, let no error of your enemy, nor any favorable incident of the ground, escape your notice or your use. It is by these means that your enemy is checked, and your troops inspirited; and it was by these that Frederick balanced his surprise at Hohenkirchen, and the defeat of his plans before Olmutz. The movement of our own Washington, after losing the battle of Brandywine, was of this character. He hastily recrossed the Schuylkill with the professed intention of seeking the enemy and renewing the combat, which was *apparently* prevented only by a heavy and incessant fall of rain. A rumor was now raised that the enemy, while refusing his left wing, was rapidly advancing upon his right, to intercept our passage of the river, and thus gain possession of Philadelphia. This report justified a retreat,

which drew from the General repeated assurances, that in quitting his present position and giving to his march a retrograde direction, it was not his object to avoid, but to follow and to fight the enemy. This movement, though no battle ensued, had the effect of restoring the confidence as well of the people as of the army.[11]

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There are innumerable works in almost every language on elementary tactics; very few persons, however, care to read any thing further than the manuals used in our own service. Our system of infantry, cavalry, and artillery tactics is generally taken from the French; and also the course of engineer instruction, so far as matured, for sappers, miners, and pontoniers, is based on the French manuals for the varied duties of this arm.

On Grand Tactics, or Tactics of Battles, the military and historical writings of General Jomini abound in most valuable instructions. Napoleon's memoirs, and the writings of Rocquancourt, Hoyer, Decker, Okouneff, Roguiat, Jocquinot-de-Presle, Guibert, Duhesme, Gassendi, Warnery, Baron Bohan, Lindneau, Maiseroy, Miller, and Ternay, are considered as being among the best authorities.

CHAPTER VI.

MILITARY POLITY AND THE MEANS OF NATIONAL DEFENCE.

Military Polity.—In deciding upon a resort to arms, statesmen are guided by certain general rules which have been tacitly adopted in the intercourse of nations: so also both statesmen and generals are bound by rules similarly adopted for the conduct of hostile forces while actually engaged in military operations.

In all differences between nations, each state has a right to decide for itself upon the nature of its means of redress for injuries received. Previous to declaring open and public war, it may resort to some other forcible means of redress, short of actual war. These are:—

1st. Laying an embargo upon the property of the offending nation.

2d. Taking forcible possession of the territory or property in dispute.

3d. Resorting to some direct measure of retaliation.

4th. Making reprisals upon the persons and things of the offending nation.

It is not the present purpose to discuss these several means of redress, nor even to enter into any examination of the rights and laws of public war, when actually declared; it is intended to consider here merely such military combinations as are resorted to by the state in preparation for defence, or in carrying on the actual operations of a war.

In commencing hostilities against any other power, we must evidently take into consideration all the political and physical circumstances of the people with whom we are to contend: we must regard their general character for courage and love of country; their attachment to their government and political institutions; the character of their rulers and their generals; the numbers, organization, and discipline of their armies; and particularly the relations between the civil and military authorities in the state, for if the latter be made entirely subordinate, we may very safely calculate on erroneous combinations. We must also regard their passive means of resistance, such as their system of fortifications, their military materials and munitions, their statistics of agriculture, commerce, and manufactures, and especially the geographical position and physical features of their country. No government can neglect, with impunity,

these considerations in its preparations for war, or in its manner of conducting military operations.

Napoleon's system of carrying on war against the weak, effeminate, and disorganized Italians required many modifications when directed against the great military power of Russia. Moreover, the combinations of Eylau and Friedland were inapplicable to the contest with the maddened guerrillas of Minos, animated by the combined passions of hatred, patriotism, and religious enthusiasm.

Military power may be regarded either as absolute or relative: the absolute force of a state depending on the number of its inhabitants and the extent of its revenues; the relative force, on its geographical and political position, the character of its people, and the nature of its government. Its military preparations should evidently be in proportion to its resources. Wealth constitutes both the apprehension and the incentive to invasion. Where two or more states have equal means of war, with incentives very unequal, an equilibrium cannot exist; for danger and temptation are no longer opposed to each other. The preparation of states may, therefore, be equal without being equivalent, and the smaller of the two may be most liable to be drawn into a war without the means of sustaining it.

The numerical relation between the entire population of a state, and the armed forces which it can maintain, must evidently vary with the wealth and pursuits of the people. Adam Smith thinks that a country purely agricultural may, at certain seasons, furnish for war one-fifth, or even in case of necessity one-fourth, of its entire population. A commercial or manufacturing country would be unable to furnish any thing like so numerous a military force. On this account small agricultural states are sometimes able to bring into the field much larger armies than their more powerful neighbors. During the Seven Years' War, Frederick supported an army equal to one-twentieth of the entire Prussian population, and at the close of this memorable contest one-sixth of the males capable of bearing arms had actually perished on the field of battle.

But the number of troops that may be brought into the field in times of great emergency is, of course, much greater than can be supported during a long war, or as a part of a permanent military establishment. Montesquieu estimates that modern nations are capable of supporting, without endangering their power, a permanent military force of about one-hundredth part of their population. This ratio differs but little from that of the present military establishments of the great European powers.

Great Britain, with a population of about twenty-five millions, and a general budget of $250,000,000, supports a military and naval force of about 150,000 effective and 100,000 non-effective men, 250,000 in all, at an annual expense of from seventy to eighty millions of dollars.

Russia, with a population of about seventy millions, supports an active army of 632,000 men, with an immense reserve, at an expense of about $65,000,000, out of a general budget of $90,000,000; that is, the expense of her military establishment is to her whole budget as 7 to 10.

Austria, with a population of thirty-five millions, has an organized peace establishment of 370,000, (about 250,000 in active service,) and a reserve of 260,000, at an expense of $36,000,000, out of a general budget of $100,000,000.

Prussia, with a population of about fifteen millions, has from 100,000 to 120,000 men in arms, with a reserve of 200,000, at an annual expense of more than $18,000,000, out of a general budget of about $38,000,000.

France, with a population of near thirty-five millions, supports a permanent establishment of about 350,000 men, at an expense of seventy or eighty millions of dollars, out of a total budget of $280,000,000. France has long supported a permanent military force of from one-hundredth to one hundred-and-tenth of her population, at an expense of from one-fourth to one-fifth of her whole budget. The following table, copied from the "Spectateur Militaire," shows the state of the army at six different periods between 1788 and 1842. It omits, of course, the extraordinary levies of the wars of the Revolution and of the Empire.

Table.

Dates.	Population.	Budget of State.	Budget of Army.	Army, Peace Establisment. Men	Army, War establishment. Men	Remarks
1788	24,000,000	livres 500,000,000	livres 100,000,000	180,000	300,000	
1814	28,000,000	francs 800,000,000	francs 180,000,000	255,000	340,000	Ordinance of 1814
1823	31,000,000	900,000,000	200,000,000	280,000	390,000	Report of Minister of War
1830	32,000,000	1,000,000,000	220,000,000	312,000	500,000	Report of Minister of War
1840	34,000,000	1,170,000,000	242,000,000	312,000	not shown	Budget of 1840.
1842	35,000,000	1,200,000,000	285,000,000	370,000	520,000	Estimated expences of 1842

From these data we see that the great European powers at the present day maintain, in time of peace, military establishments equal to about one-hundredth part of their entire population.

The geographical position of a country also greatly influences the degree and character of its military preparation. It may be bordered on one or more sides by mountains and other obstacles calculated to diminish the probability of invasion; or the whole frontier may be wide open to an attack: the interior may be of such a nature as to furnish security to its own army, and yet be fatal to the enemy should he occupy it; or it may furnish him advantages far superior to his own country. It may be an island in the sea, and consequently exposed only to maritime descents—events of rare occurrence in modern times.

Again, a nation may be placed between others who are interested in its security, their mutual jealousy preventing the molestation of the weaker neighbor. On the other hand, its political institutions may be such as to compel the others to unite in attacking it in order to secure themselves. The republics of Switzerland could remain unmolested in the midst of powerful monarchies; but revolutionary France brought upon herself the armies of all Europe.

Climate has also some influence upon military character, but this influence is far less than that of education and discipline. Northern nations are said to be naturally more phlegmatic and sluggish than those of warmer climates; and yet the armies of Gustavus Adolphus, Charles XII., and Suwarrow, have shown themselves sufficiently active and impetuous, while the Greeks, Romans, and Spaniards, in the times of their glory, were patient, disciplined, and indefatigable, notwithstanding the reputed fickleness of ardent temperaments.

For any nation to postpone the making of military preparations till such time as they are actually required in defence, is to waste the public money, and endanger the public safety. The closing of an avenue of approach, the security of a single road or river, or even the strategic movement of a small body of troops, often effects, in the beginning, what afterwards cannot be accomplished by large fortifications, and the most formidable armies. Had a small army in 1812, with a well-fortified dépôt on Lake Champlain, penetrated into Canada, and cut off all reinforcements and supplies by way of Quebec, that country would inevitably have fallen into our possession. In the winter of 1806-7, Napoleon crossed the Vistula, and advanced even to the walls of Königsberg, with the Austrians in his rear, and the whole power of Russia before him. If Austria had pushed forward one hundred thousand men from Bohemia, on the Oder, she would, in all probability, says the best of military judges, Jomini, have struck a fatal blow to the operations of Napoleon, and his army must have been exceedingly fortunate even to regain the Rhine. But Austria preferred remaining neutral till she could increase her army to four hundred thousand men. She then took the offensive,

and was beaten; whereas, with one hundred thousand men brought into action at the favorable moment, she might, most probably, have decided the fate of Europe.

"Defensive war," says Napoleon, "does not preclude attack, any more than offensive war is exclusive of defence," for frequently the best way to counteract the enemy's operations, and prevent his conquests, is, at the very outset of the war, to invade and cripple him. But this can never be attempted with raw troops, ill supplied with the munitions of war, and unsupported by fortifications. Such invasions must necessarily fail. Experience in the wars of the French revolution has demonstrated this; and even our own short history is not without its proof. In 1812, the conquest of Canada was determined on some time before the declaration of war; an undisciplined army, without preparation or apparent plan, was actually put in motion, eighteen days previous to this declaration, for the Canadian peninsula. With a disciplined army of the same numbers, with an efficient and skilful leader, directed against the vital point of the British possessions at a time when the whole military force of the provinces did not exceed three thousand men, how different had been the result!

While, therefore, the permanent defences of a nation must be subordinate to its resources, position, and character, they can in no case be dispensed with. No matter how extensive or important the temporary means that may be developed as necessity requires, there must be some force kept in a constant state of efficiency, in order to impart life and stability to the system. The one can never properly replace the other; for while the former constitutes the basis, the latter must form the main body of the military edifice, which, by its strength and durability, will offer shelter and protection to the nation; or, if the architecture and materials be defective, crush and destroy it in its fall.

The permanent means of military defence employed by modern nations, are—

1st. An army; 2d. A navy; 3d. Fortifications.

The first two of these could hardly be called permanent, if we were, to regard their *personnel*; but looking upon them as institutions or organizations, they present all the characteristics of durability. They are sometimes subjected to very great and radical changes; by the hot-house nursing of designing ambition or rash legislation, they may become overgrown and dangerous, or the storms of popular delusion may overthrow and apparently sweep them away. But they will immediately spring up again in some form or other, so deeply are they rooted in the organization of political institutions.

Its army and navy should always be kept within the limits of a nation's wants; but pity for the country which reduces them in number or support so as to degrade their character or endanger their organization. "A government," says one of the best historians of the age, "which neglects its army, under whatever pretext, is a

government culpable in the eyes of posterity, for it is preparing humiliations for its flag and its country, instead of laying the foundation for its glory."

One of our own distinguished cabinet ministers remarks, that the history of our relations with the Indian tribes from the beginning to the present hour, is one continued proof of the necessity of maintaining an efficient military force in time of peace, and that the treatment we received for a long series of years from European powers, was a most humiliating illustration of the folly of attempting to dispense with these means of defence.

"Twice," says he, "we were compelled to maintain, by open war, our quarrel with the principal aggressors. After many years of forbearance and negotiation, our claims in other cases were at length amicably settled; but in one of the most noted of these cases, it was not without much delay and imminent hazard of war that the execution of the treaty was finally enforced. No one acquainted with these portions of our history, can hesitate to ascribe much of the wantonness and duration of the wrongs we endured, to a knowledge on the part of our assailants of the scantiness and inefficiency of our military and naval force."

"If," said Mr. Calhoun, "disregarding the sound dictates of reason and experience, we, in peace, neglect our military establishment, we must, with a powerful and skilful enemy, be exposed to the most distressing calamities."

These remarks were made in opposition to the reduction of our military establishment, in 1821, below the standard of thirteen thousand. Nevertheless, the force was reduced to about six or seven thousand; and we were soon made to feel the consequences. It is stated, in a report of high authority, that if there had been two regiments available near St. Louis, in 1832, the war with Black Hawk would have been easily avoided; and that it cannot be doubted that the scenes of devastation and savage warfare which overspread the Floridas for nearly seven years would also have been avoided, and some thirty millions have been saved the country, if two regiments had been available at the beginning of that conflict.[12]

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We may now add to these remarks, that if our government had occupied the country between the Nueces and the Rio Grande with a well-organized army of twelve thousand men, war with Mexico might have been avoided; but to push forward upon Matamoras a small force of only two thousand, in the very face of a large Mexican army was holding out to them the strongest inducements to attack us. The temporary economy of a few thousands in reducing our military establishment to a mere handful of men, again results in a necessary expenditure of many millions of dollars and a large sacrifice of human life.

We must, in this country, if we heed either the dictates of reason or experience, maintain in time of peace a skeleton military and naval force, capable of being greatly expanded, in the event of danger, by the addition of new troops.

Much energy and enterprise will always be imparted to an army or navy by the addition of new forces. The strength thus acquired is sometimes in even a far greater ratio than the increase of numbers. But it must be remembered that these new elements are, of themselves, far inferior to the old ones in discipline, steady courage, and perseverance. No general can rely on the accuracy of their movements in the operations of a campaign, and they are exceedingly apt to fail him at the critical moment on the field of battle. The same holds true with respect to sailors inexperienced in the discipline and duties of a man-of-war. There is this difference, however: an army usually obtains its recruits from men totally unacquainted with military life, while a navy, in case of sudden increase, is mainly supplied from the merchant marine with professional sailors, who, though unacquainted with the use of artillery, &c., on ship-board, are familiar with all the other duties of sea life, and not unused to discipline. Moreover, raw seamen and marines, from being under the immediate eye of their officers in time of action, and without the possibility of escape, fight much better than troops of the same character on land. If years are requisite to make a good sailor, surely an equal length of time is necessary to perfect the soldier; and no less skill, practice, and professional study are required for the proper direction of armies than for the management of fleets.

But some have said that even these skeletons of military and naval forces are entirely superfluous, and that a brave and patriotic people will make as good a defence against invasion as the most disciplined and experienced. Such views are frequently urged in the halls of congress, and some have even attempted to confirm them by historical examples.

There are instances, it is true, where disorganized and frantic masses, animated by patriotic enthusiasm, have gained the most brilliant victories. Here, however, extraordinary circumstances supplied the place of order, and produced an equilibrium between forces that otherwise would have been very unequal; but in almost every instance of this kind, the loss of the undisciplined army has been unnecessarily great, human life being substituted for skill and order. But victory, even with such a drawback, cannot often attend the banners of newly raised and disorderly forces. If the captain and crew of a steamship knew nothing of navigation, and had never been at sea, and the engineer was totally unacquainted with his profession, could we expect the ship to cross the Atlantic in safety, and reach her destined port? Would we trust our lives and the honor of our country to their care? Would we not say to them, "First make yourselves acquainted with the principles of your profession, the use of the compass, and the means of determining whether you direct your course upon a ledge of rocks or into a safe harbor?" War is not, as some seem to suppose, a mere game of

chance. Its principles constitute one of the most intricate of modern sciences; and the general who understands the art of rightly applying its rules, and possesses the means of carrying out its precepts, may be morally certain of success.

History furnishes abundant proofs of the impolicy of relying upon undisciplined forces in the open field. Almost every page of Napier's classic History of the Peninsular War contains striking examples of the useless waste of human life and property by the Spanish militia; while, with one quarter as many regulars, at a small fractional part of the actual expense, the French might have been expelled at the outset, or have been driven, at any time afterwards, from the Peninsula.

At the beginning of the French Revolution the regular army was abolished, and the citizen-soldiery, who were established on the 14th of July, 1789, relied on exclusively for the national defence. "But these three millions of national guards," says Jomini, "though good supporters of the decrees of the assembly, were nevertheless useless for reinforcing the army beyond the frontiers, and utterly incapable of defending their own firesides." Yet no one can question their individual bravery and patriotism; for, when reorganized, disciplined, and properly directed, they put to flight the best troops in Europe. At the first outbreak of this revolution, the privileged classes of other countries, upholding crumbling institutions and rotten dynasties, rushed forth against the maddened hordes of French democracy. The popular power, springing upward by its own elasticity when the weight of political oppression was removed, soon became too wild and reckless to establish itself on any sure basis, or even to provide for its own protection. If the attacks of the enervated enemies of France were weak, so also were her own efforts feeble to resist these attacks. The republican armies repelled the ill-planned and ill-conducted invasion by the Duke of Brunswick; but it was by the substitution of human life for preparation, system, and skill; enthusiasm supplied the place of discipline; robbery produced military stores; and the dead bodies of her citizens formed *épaulements* against the enemy. Yet this was but the strength of weakness; the aimless struggle of a broken and disjointed government; and the new revolutionary power was fast sinking away before the combined opposition of Europe, when the great genius of Napoleon, with a strong arm and iron rule, seizing upon the scattered fragments, and binding them together into one consolidated mass, made France victorious, and seated himself on the throne of empire.

No people in the world ever exhibited a more general and enthusiastic patriotism than the Americans during the war of our own Revolution. And yet our army received, even at that time, but little support from irregular and militia forces in the open field. Washington's opinions on this subject furnish so striking a contrast to the congressional speeches of modern political demagogues, who, with boastful swaggers, would fain persuade us that we require no organization or discipline to meet the veteran troops of Europe in the open field, and who would hurry us, without preparation, into war with the strongest military powers of the world—so striking is

the contrast between the assertions of these men and the letters and reports of Washington, that it may be well for the cool and dispassionate lover of truth to occasionally refresh his memory by reference to the writings of Washington. The following brief extracts are from his letters to the President of Congress, December, 1776:

"The saving in the article of clothing, provisions, and a thousand other things, by having nothing to do with the militia, unless in cases of extraordinary exigency, and such as could not be expected in the common course of events, would amply support a large army, which, well officered, would be daily improving, instead of continuing a destructive, expensive, and disorderly mob. In my opinion, if any dependence is placed on the militia another year, Congress will be deceived. When danger is a little removed from them they will not turn out at all. When it comes home to them, the well-affected, instead of flying to arms to defend themselves, are busily employed in removing their families and effects; while the disaffected are concerting measures to make their submission, and spread terror and dismay all around, to induce others to follow their example. Daily experience and abundant proofs warrant this information. Short enlistments, and a mistaken dependence upon our militia, have been the origin of all our misfortunes, and the great accumulation of our debt. The militia come in, you cannot tell how; go, you cannot tell when; and act, you cannot tell where; consume your provisions, exhaust your stores, and leave you at last, at a critical moment."

These remarks of Washington will not be found too severe if we remember the conduct of our militia in the open field at Princeton, Savannah River, Camden, Guilford Court-House, &c., in the war of the Revolution; the great cost of the war of 1812 as compared with its military results; the refusal of the New England militia to march beyond the lines of their own states, and of the New-York militia to cross the Niagara and secure a victory already won; or the disgraceful flight of the Southern militia from the field of Bladensburg.

But there is another side to this picture. If our militia have frequently failed to maintain their ground *when drawn up in the open field*, we can point with pride to their brave and successful defence of Charleston, Mobile, New Orleans, Fort McHenry, Stonington, Niagara, Plattsburg, in proof of what may be accomplished by militia in connection with fortifications.

These examples from our history must fully demonstrate the great value of a militia when properly employed as a defence against invasion, and ought to silence the sneers of those who would abolish this arm of defence as utterly useless. In the open field militia cannot in general be manœuvred to advantage; whereas, in the defence of fortified places their superior intelligence and activity not unfrequently render them even more valuable than regulars. And in reading the severe strictures of Washington,

Greene, Morgan, and others, upon our militia, it must be remembered that they were at that time entirely destitute of important works of defence; and the experience of all other nations, as well as our own, has abundantly shown that a newly-raised force cannot cope, *in the open field*, with one subordinate and disciplined. Here *science* must determine the contest. Habits of strict obedience, and of simultaneous and united action, are indispensable to carry out what the higher principles of the military profession require. New and undisciplined forces are often confounded at the evolutions, and strategic and tactical combinations of a regular army, and lose all confidence in their leaders and in themselves. But, when placed behind a breastwork, they even overrate their security. They can then coolly look upon the approaching columns, and, unmoved by glittering armor and bristling bayonets, will exert all their skill in the use of their weapons. The superior accuracy of aim which the American has obtained by practice from his early youth, has enabled our militia to gain, under the protection of military works, victories as brilliant as the most veteran troops. The moral courage necessary to await an attack behind a parapet, is at least equal to that exerted in the open field, where *movements* generally determine the victory. To watch the approach of an enemy, to see him move up and display his massive columns, his long array of military equipments, his fascines and scaling-ladders, his instruments of attack, and the professional skill with which he wields them, to hear the thunder of his batteries, spreading death all around, and to repel, hand to hand, those tremendous assaults, which stand out in all their horrible relief upon the canvass of modern warfare, requires a heart at least as brave as the professional warrior exhibits in the pitched battle.

But we must not forget that to call this force into the open field,—to take the mechanic from his shop, the merchant from his counter, the farmer from his plough,—will necessarily be attended with an immense sacrifice of human life. The lives lost on the battle-field are not the only ones; militia, being unaccustomed to exposure, and unable to supply their own wants with certainty and regularity, contract diseases which occasion in every campaign a most frightful mortality.

There is also a vast difference in the cost of supporting regulars and militia forces. The cost of a regular army of twenty thousand men for a campaign of six months, in this country, has been estimated, from data in the War-office, at a hundred and fifty dollars per man; while the cost of a militia force, under the same circumstances, making allowance for the difference in the expenses from sickness, waste of camp-furniture, equipments, &c., will be two hundred and fifty dollars per man. But in short campaigns, and in irregular warfare, like the expedition against Black Hawk and his Indians in the Northwest, and during the hostilities in Florida, "the expenses of the militia," says Mr. Secretary Spencer, in a report to congress in 1842, "invariably exceed those of regulars by *at least three hundred per cent*." It is further stated that "*fifty-five thousand militia* were called into service during the Black Hawk and Florida wars, and that *thirty millions of dollars have been expended in these conflicts*!" When

it is remembered that during these border wars our whole regular army did not exceed twelve or thirteen thousand men, it will not be difficult to perceive why our military establishment was so enormously expensive. Large sums were paid to sedentary militia who never rendered the slightest service. Again, during our late war with Great Britain, of less than three years' duration, *two hundred and eighty thousand muskets were lost,*—the average cost of which is stated at twelve dollars,—making an aggregate loss, in muskets alone, *of three millions and three hundred and sixty thousand dollars*, during a service of about two years and a half;—resulting mainly from that neglect and waste of public property which almost invariably attends the movements of newly-raised and inexperienced forces. Facts like these should awaken us to the necessity of reorganizing and disciplining our militia. General Knox, when Secretary of War, General Harrison while in the senate, and Mr. Poinsett in 1841, each furnished plans for effecting this purpose, but the whole subject has been passed by with neglect.

Permanent fortifications differ in many of their features from either of the two preceding elements of national defence. They are passive in their nature, yet possess all the conservative properties of an army or navy, and through these two contribute largely to the active operations of a campaign. When once constructed they require but very little expenditure for their support. In time of peace they withdraw no valuable citizens from the useful occupations of life. Of themselves they can never exert an influence corrupting to public morals, or dangerous to public liberty; but as the means of preserving peace, and as obstacles to an invader, their influence and power are immense. While contributing to the economical support of a peace establishment, by furnishing drill-grounds, parades, quarters, &c.; and to its efficiency still more, by affording facilities both to the regulars and militia for that species of artillery practice so necessary in the defence of water frontiers; they also serve as safe dépôts of arms and the immense quantity of materials and military munitions so indispensable in modern warfare. These munitions usually require much time, skill, and expense in their construction, and it is of vast importance that they should be preserved with the utmost care.

Maritime arsenals and dépôts of naval and military stores on the sea-coast are more particularly exposed to capture and destruction. Here an enemy can approach by stealth, striking some sudden and fatal blow before any effectual resistance can be organized. But in addition to the security afforded by harbor fortifications to public property of the highest military value, they also serve to protect the merchant shipping, and the vast amount of private wealth which a commercial people always collect at these points. They furnish safe retreats, and the means of repair for public vessels injured in battle, or by storms, and to merchantmen a refuge from the dangers of sea, or the threats of hostile fleets. Moreover, they greatly facilitate our naval attacks upon the enemy's shipping; and if he attempt a descent, their well-directed fire

will repel his squadrons from our harbors, and force his troops to land at some distant and unfavorable position.

The three means of permanent defence which have been mentioned, are, of course, intended to accomplish the same general object; but each has its distinct and proper sphere of action, and neither can be regarded as antagonistical to the others. Any undue increase of one, at the expense of the other two, must necessarily be followed by a corresponding diminution of national strength. We must not infer, however, that all must be maintained upon the same footing. The position of the country and the character of the people must determine this.

England, from her insular position and the extent of her commerce, must maintain a large navy; a large army is also necessary for the defence of her own coasts and the protection of her colonial possessions. Her men-of-war secure a safe passage for her merchant-vessels, and transport her troops in safety through all seas, and thus contribute much to the acquisition and security of colonial territory. The military forces of the British empire amount to about one hundred and fifty thousand men, and the naval forces to about seven hundred vessels of war,[13] carrying in all some fifteen thousand guns and forty thousand men. France has less commerce, and but few colonial possessions. She has a great extent of sea-coast, but her fortifications secure it from maritime descents; her only accessible points are on the land frontiers. Her army and navy, therefore, constitute *her* principal means of defence. Her army numbers some three hundred and fifty thousand men, and her navy about three hundred and fifty vessels,[13] carrying about nine thousand guns and thirty thousand men. Russia, Austria, Prussia, Sweden, and other continental powers, have but little commerce to be protected, while their extensive frontiers are greatly exposed to land attacks: their fortifications and armies, therefore, constitute their principal means of defence. But for the protection of their own seas from the inroads of their powerful maritime neighbor, Russia and Austria support naval establishments of a limited extent. Russia has, in all, some one hundred and eighty vessels of war, and Austria not quite half that number.[13]

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These numbers include *all* vessels of war, whether in commission, building, or in ordinary.

The United States possess no colonies; but they have a sea-coast of more than three thousand miles, with numerous bays, estuaries, and navigable rivers, which expose our most populous cities to maritime attacks. The northern land frontier is two thousand miles in extent, and in the west our territory borders upon the British and Mexican possessions for many thousand miles more. Within these limits there are numerous tribes of Indians, who require the watchful care of armed forces to keep them at peace among themselves as well as with us. Our authorized military establishment amounts to 7,590 men, and our naval establishment consists of seventy-seven vessels of all classes, carrying 2,345 guns, and 8,724 men. [14] This is certainly a very small military and naval force for the defence of so extended and populous a country, especially one whose political institutions and rapidly-increasing power expose it to the distrust and jealousy of most other nations.

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Since these pages were put in the hands of the printer, the above numbers have been nearly doubled, this increase having been made with special reference to the present war with Mexico.

The fortifications for the defence of our sea-coast and land frontiers will be discussed hereafter.[15]

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Jomini's work on the Military Art contains many valuable remarks on this subject of Military Polity: also the writings of Clausewitz, Dupin, Lloyd, Chambray, Tranchant de Laverne, and Rudtorfer. Several of these questions are also discussed in Rocquancourt, Carion-Nisas, De Vernon, and other writers on military history. The several European Annuaires Militaires, or Army Registers, and the French and German military periodicals, contain much valuable matter connected with military statistics.

CHAPTER VII.

SEA-COAST DEFENCES.

The principal attacks which we have had to sustain, either as colonies or states, from civilized foes, have come from Canada. As colonies we were continually encountering difficulties and dangers from the French possessions. In the war of the Revolution, it being one of national emancipation, the military operations were more general throughout the several states; but in the war of 1812 the attacks were confined to the northern frontier and a few exposed points along the coast. In these two contests with Great Britain, Boston, New York, Philadelphia, Baltimore, Washington, Charleston, Savannah, Mobile, and New Orleans, being within reach of the British naval power, and offering the dazzling attraction of rich booty, have each been subjected to powerful assaults.

Similar attacks will undoubtedly be made in any future war with England. An attempt at permanent lodgment would be based either on Canada or a servile insurrection in the southern states. The former project, in a military point of view, offers the greatest advantages, but most probably the latter would also be resorted to for effecting a diversion, if nothing more. But for inflicting upon us a sudden and severe injury by the destruction of large amounts of public and private property, our seaport towns offer inducements not likely to be disregarded. This mode of warfare, barbarous though it be, will certainly attend a conflict with any great maritime power. How can we best prepare in time of peace to repel these attacks?

Immediately after the war of 1812 a joint commission of our most distinguished military and naval officers was formed, to devise a system of defensive works, to be erected in time of peace for the security of the most important and the most exposed points on our sea-coast. It may be well here to point out, in very general terms, the positions and character of these works, mentioning only such as have been completed, or are now in course of construction, and such as are intended to be built as soon as Congress

shall grant the requisite funds. There are other works projected for some future period, but as they do not belong to the class required for immediate, use, they will not be referred to.

MAINE.

Beginning at the northeastern extremity of our coast, we have, for Eastport and Wiscasset, projected works estimated to carry about fifty guns. Nothing has yet been done to these works.

Next Portland, with works carrying about forty or fifty guns, and Fort Penobscot and batteries, carrying about one hundred and fifty guns. These are only partly built.

NEW HAMPSHIRE.

Defences of Portsmouth and the vicinity, about two hundred guns. These works are also only partly built.

MASSACHUSETTS.

Projected works east of Boston, carrying about sixty guns. These are not yet commenced.

Works for defence of Boston Harbor carry about five hundred guns. These are nearly three-quarters completed. Those of New Bedford harbor carry fifty guns: not yet begun.

RHODE ISLAND.

Newport harbor,—works carry about five hundred guns, nearly completed.

CONNECTICUT.

New London harbor, New Haven, and the Connecticut river. The first of these nearly completed; the two latter not yet begun.

NEW YORK.

The works projected for the defence of New York harbor are estimated to carry about one thousand guns. These works are not yet one-half constructed.

PENNSYLVANIA.

The works projected for the defence of the Delaware Bay and Philadelphia will carry about one hundred and fifty guns. They are not one-quarter built.

MARYLAND AND VIRGINIA.

Baltimore and Annapolis—these works will carry some two hundred and fifty guns. The works for the Chesapeake Bay will carry about six hundred guns; and those for the Potomac river about eighty guns. These are more than one-half completed.

NORTH CAROLINA.

The works at Beaufort and Smithville carry about one hundred and fifty guns. They are essentially completed.

SOUTH CAROLINA.

The works for the defence of Charleston carry some two hundred guns. They are one-half constructed.

GEORGIA.

The defences of Savannah carry about two hundred guns and are nearly three-quarters finished.

FLORIDA.

The works projected for the defence of St. Augustine, Key West, Tortugas, and Pensacola will carry some eight or nine hundred guns. Those at St. Augustine and Pensacola are essentially completed, but those at Key West and Tortugas are barely begun.

ALABAMA.

The works for the defence of Mobile will carry about one hundred and sixty guns. These are nearly constructed.

LOUISIANA.

The works for the defence of New Orleans will carry some two hundred and fifty or three hundred guns; they are nearly completed.

The works north of the Chesapeake cost about three thousand dollars per gun; those south of that point about six thousand dollars per gun. This difference in cost is due in part to the character of the soil on which the fortifications are built, and in part to the high prices paid in the south for materials and workmanship.

Having pointed out the character and condition of our system of sea-coast defences, let us briefly examine how far these works may be relied on as a means of security against a maritime descent.

To come to a proper conclusion on this subject, let us first examine the three or four great maritime descents attempted by the English during the wars of the French Revolution; a period at which the great naval superiority of England over other nations, gave her the title of *mistress of the seas*. Let us notice what have been the results of the several attempts made by this power at maritime invasions, and the means by which such attacks have been repelled.

In 1795, a maritime expedition was fitted out against Quiberon, at an expense of eight millions of dollars. This port of the French coast had then a naval defence of near thirty sail, carrying about sixteen hundred guns. Lord Bridport attacked it with fourteen sail of the line, five frigates, and some smaller vessels, about fifteen hundred guns in all, captured a portion of the fleet, and forced the remainder to take shelter under the guns of the fortifications of L'Orient. The French naval defence being destroyed, the British now entered Quiberon without opposition. This bay is said by Brenton, in his British Naval History, to be "the finest on the coast of France, or perhaps in the world, for landing an army." Besides these natural advantages in favor of the English, the inhabitants of the surrounding country were in open insurrection, ready to receive the invaders with open arms. A body of ten thousand troops were landed, and clothing, arms, &c., furnished to as many more royalist troops; but the combined forces failed in their attack upon St. Barbe, and General Hoche, from his intrenchments, with seven thousand men, held in check a body of eighteen thousand,

penned up, without defences, in the narrow peninsula. Reinforced by a new debarkation, the allies again attempted to advance, but were soon defeated, and ultimately almost entirely destroyed.

In 1799, the English and Russians made a descent upon Holland with fourteen ships of the line and ten frigates, carrying about eleven hundred guns and a great number of transports, with an army of thirty-six thousand men. The Dutch naval defences consisted of eight ships of the line, three fifty-four gun ships, eight forty-eight gun ships and eight smaller frigates, carrying in all about twelve hundred guns; but this force contributed little or nothing to the defence, and was soon forced to hoist the hostile flag. The defensive army was at first only twelve thousand, but the Republicans afterwards increased it to twenty-two thousand, and finally to twenty-eight thousand men. But notwithstanding this immense naval and military superiority, and the co-operation of the Orange party in assisting the landing of their troops, the allies failed to get possession of a single strong place; and after a loss of six thousand men, were compelled to capitulate. "Such," says Alison, "was the disastrous issue of the greatest expedition which had yet sailed from the British harbors during the war."

In 1801, Nelson, with three ships of the line, two frigates, and thirty-five smaller vessels, made a desperate attack upon the harbor of Boulogne, but was repulsed with severe loss.

Passing over some unimportant attacks, we come to the descent upon the Scheldt, or as it is commonly called, the Walcheren expedition, in 1809. This expedition, though a failure, has often been referred to as proving the expediency of maritime descents. The following is a brief narrative of this expedition:—

Napoleon had projected vast fortifications, dock-yards, and naval arsenals at Flushing and Antwerp for the protection of a maritime force in the Scheldt. But no sooner was the execution of this project begun, than the English fitted out an expedition to seize upon the defences of the Scheldt, and capture or destroy the naval force. Flushing, at the mouth of the river, was but ill-secured, and Antwerp, some sixty or seventy miles further up the river, was entirely defenceless; the rampart was unarmed with cannon, dilapidated, and tottering, and its garrison consisted of only about two

hundred invalids and recruits. Napoleon's regular army was employed on the Danube and in the Peninsula. The British attacking force consisted of thirty-seven ships of the line, twenty-three frigates, thirty-three sloops of war, twenty-eight gun, mortar, and bomb vessels, thirty-six smaller vessels, eighty-two gunboats, innumerable transports, with over forty thousand troops, and an immense artillery train; making in all, says the English historian, "an hundred thousand combatants." A landing was made upon the island of Walcheren, and siege laid to Flushing, which place was not reduced till eighteen days after the landing; the attack upon the water was made by seven or eight ships of the line, and a large flotilla of bomb vessels, but produced no effect. The channel at the mouth of the river was too broad to be defended by the works of Flushing, and the main portion of the fleet passed out of reach of the guns, and ascended the Scheldt part way up to Antwerp. But in the mean time, the fortifications of that place had been repaired, and, after a fruitless operation of a whole month in the river, the English were gradually forced to retreat to Walcheren, and finally to evacuate their entire conquest.

The cost of the expedition was immense, both in treasure and in life. It was certainly very poorly managed. But we cannot help noticing the superior value of fortifications as a defence against such descents. They did much to retard the operations of the enemy till a defensive army could be raised. The works of Flushing were never intended to close up the Scheldt, and of course could not intercept the passage of shipping; but they were not reduced by the English naval force, as has sometimes been alleged. Col. Mitchel, of the English service, says that the fleet "kept up so tremendous a fire upon the batteries, that the French officers who had been present at Austerlitz and Jena declared that the cannonade in these battles had been a mere *jeu d'enfans* in comparison. Yet what was the effect produced on the defences of the place by this fire, so formidable, to judge by the sound alone? The writer can answer the question with some accuracy, for he went along the entire sea-line the very day after the capitulation, and found no part of the parapet injured so as to be of the slightest consequence, and only one solitary gun dismounted, evidently by the bursting of a shell, and which could not, of course, have been thrown from the line of battle ships, but must have been thrown from the land batteries."[16]

[16]

The batteries constructed in the siege of this place were armed with fifty-two heavy guns and mortars.

But it may be said that although great naval descents on a hostile coast are almost always unsuccessful, nevertheless a direct naval attack upon a single fortified position will be attended with more favorable results; and that our seaport towns, however fortified, will be exposed to bombardment and destruction by the enemy's fleets. In other words, that in a direct contest between ships and forts the former will have at least an equal chance of success.

Let us suppose a fair trial of this relative strength. The fort is to be properly constructed and in good repair; its guns in a position to be used with effect; its garrison skilful and efficient; its commander capable and brave. The ship is of the very best character, and in perfect order; the crew disciplined and courageous; its commander skilful and adroit; the wind, and tide, and sea—all as could be desired.[17] The numbers of the garrison and crew are to be no more than requisite, with no unnecessary exposure of human life to swell the lists of the slain. The issue of this contest, unless attended with extraordinary and easily distinguishable circumstances, would be a fair test of their relative strength.

[17]

These conditions for a battery are easily satisfied, but for the ship, are partly dependent on the elements, and seldom to be wholly attained.

What result should we anticipate from the nature of the contending forces? The ship, under the circumstances we have supposed, can choose her point of attack, selecting the one she may deem the most vulnerable; but she herself is everywhere vulnerable; her men and guns are much concentrated, and consequently much exposed. But in the fort the guns and men are more distributed, a fort with an interior area of several acres not having a garrison as large as the crew of a seventy-four-gun ship. All parts of the vessel are liable to injury; while the fort offers but a small mark,—the opening of the embrasures, a small part of the carriage, and now and then a head or arm raised above the parapet,—the ratio of exposed surfaces being not less than *twenty to one*. In the vessel the guns are fired from an oscillating deck, and

the balls go at random; in the fort the guns are fired from an immoveable platform, and the balls reach their object with unerring aim. There is always more or less motion in the water, so that the ship's guns, though accurately pointed at one moment, at the next will be thrown entirely away from the object, even when the motion is too slight to be otherwise noticed; whereas in the battery the guns will be fired just as they are pointed; and the motion of the vessel will merely vary to the extent of a few inches the spot in which the shot is received. In the fort the men and guns are behind impenetrable walls of stone and earth; in the vessel they are behind frail bulwarks, whose splinters are equally destructive with the shot. The fort is incombustible; while the ship may readily be set on fire by incendiary projectiles. The ship has many points exposed that may be called vital points. By losing her rudder, or portions of her rigging, or of her spars, she may become unmanageable, and unable to use her strength; she may receive shots under water, and be liable to sink; she may receive hot shot, and be set on fire: these damages are in addition to those of having her guns dismounted and her people killed by shots that pierce her sides and scatter splinters from her timbers; while the risks of the battery are confined to those mentioned above—namely, the risk that the gun, the carriage, or the men may be struck.

The opinions of military writers, and the facts of history, fully accord with these deductions of theory. Some few individuals mistaking, or misstating, the facts of a few recent trials, assert that modern improvements in the naval service have so far outstripped the progress in the art of land defence, that a floating force is now abundantly able to cope, upon equal terms, with a land battery. Ignorant and superficial persons, hearing merely that certain forts had recently yielded to a naval force, and taking no trouble to learn the real facts of the case, have paraded them before the public as proofs positive of a new era in military science. This conclusion, however groundless and absurd, has received credit merely from its novelty. Let us examine the several trials of strength which have taken place between ships and forts within the last fifty years, and see what have been the results.

In 1792 a considerable French squadron attacked Cagliari, whose fortifications were at that time so dilapidated and weak, as scarcely to deserve the name of defences. Nevertheless, the French fleet, after a

bombardment of three days, was most signally defeated and obliged to retire.

In 1794 two British ships, "the Fortitude of seventy-four, and the Juno frigate of thirty-two guns," attacked a small town in the bay of Martello, Corsica, which was armed with one gun in barbette, and a garrison of thirty men. After a bombardment of two and a half hours, these ships were forced to haul off with considerable damage and loss of life. The little tower had received no injury, and its garrison were unharmed. Here were *one hundred and six guns* afloat against *one* on shore; and yet the latter was successful.

In 1797 Nelson attacked the little inefficient batteries of Santa Crux, in Teneriffe, with eight vessels carrying four hundred guns. But notwithstanding his great superiority in numbers, skill, and bravery, he was repelled with the loss of two hundred and fifty men, while the garrison received little or no damage. A single ball from the land battery, striking the side of one of his vessels, instantly sunk her with near a hundred seamen and marines!

In 1798, a French flotilla of fifty-two brigs and gunboats, manned with near seven thousand men, attacked a little English redoubt on the island of Marcou, which was armed with two thirty-two-pounders, two six-pounders, four four-pounders, and two carronades, and garrisoned with two hundred and fifty men. Notwithstanding this great disparity of numbers, the little redoubt sunk seven of the enemy's brigs and gunboats, captured another, and forced the remainder to retreat with great loss; while the garrison had but one man killed and three wounded.

In 1801, the French, with three frigates and six thousand men, attacked the poorly-constructed works of Porto Ferrairo, whose defensive force was a motley garrison of fifteen hundred Corsicans, Tuscans, and English. Here the attacking force was *four* times as great as that of the garrison; nevertheless they were unsuccessful after several bombardments and a siege of five months.

In July of the same year, 1801, Admiral Saumarez, with an English fleet of six ships of the line and two smaller vessels, carrying in all five hundred and two guns, attacked the Spanish and French defences of Algesiras. Supposing the floating forces of the contending parties to be equal, gun for

gun, (which is certainly a very fair estimate for the attacking force, considering the circumstances of the case,) we have a French land-battery of only twelve guns opposed by an English floating force of one hundred and ninety-six guns. Notwithstanding this inequality of nearly *seventeen* to *one*, the little battery compelled the superior naval force to retreat with great loss.

Shortly after this, the French and Spanish fleets attacked the same English squadron with a force of nearly *three* to *one*, but met with a most signal defeat; whereas with a land-battery of only *one* to *seventeen*, the same party had been victorious. What proof can be more decisive of the superiority of guns on shore over those afloat!

In 1803 the English garrison of Diamond Rock, near Port Royal Bay, with only one hundred men and some fifteen guns, repelled a French squadron of two seventy-four-gun ships, a frigate, and a brig, assisted by a land attack of two hundred troops. There was not a single man killed or wounded in the redoubt, while the French lost fifty men! The place was afterwards reduced by famine.

In 1806 a French battery on Cape Licosa, of only two guns and a garrison of twenty-five men, resisted the attacks of a British eighty-gun ship and two frigates. The carriage of one of the land-guns failed on the second shot, so that, in fact, only *one* of them was available during the action. Here was *a single piece of ordnance* and a garrison of *twenty-five men,* opposed to a naval force of *over one hundred and fifty guns* and about *thirteen hundred men.* And what effects were produced by this strange combat? The attacking force lost *thirty-seven* men killed and wounded, the eighty-gun ship was much disabled, while the fort and garrison escaped entirely unharmed! What could not be effected by force was afterwards obtained by negotiation.

In 1808 a French land-battery of only *three* guns, near Fort Trinidad, drove off an English seventy-four-gun ship, and a bomb-vessel.

In 1813 Leghorn, whose defences were of a very mediocre character, and whose garrison at that time was exceedingly weak, was attacked by an English squadron of six ships, carrying over three hundred guns, and a land force of one thousand troops. The whole attempt was a perfect failure.

"In 1814, when the English advanced against Antwerp," says Colonel Mitchell, an English historian, "Fort Frederick, a small work of only two guns, was established in a bend of the Polder Dyke, at some distance below Lillo. The armament was a long eighteen-pounder and a five and a half inch howitzer. From this post the French determined to dislodge the English, and an eighty-gun ship dropped down with the tide and anchored near the Flanders shore, about six hundred yards from the British battery. By her position she was secured from the fire of the eighteen-pounder, and exposed to that of the howitzer only. As soon as every thing was made tight her broadside was opened; and if noise and smoke were alone sufficient to ensure success in war, as so many of the moderns seem to think, the result of this strange contest would not have been long doubtful, for the thunder of the French artillery actually made the earth to shake again; but though the earth shook, the single British howitzer was neither dismounted nor silenced; and though the artillery-men could not, perfectly exposed as they were, stand to their gun while the iron hail was striking thick and fast around, yet no sooner did the enemy's fire slacken for a moment than they sprang to their post, ready to return at least one shot for eighty. This extraordinary combat lasted from seven o'clock in the morning till near twelve at noon, when the French ship, having had forty-one men killed and wounded, her commander being in the list of the latter, and having besides sustained serious damage in her hull and rigging, returned to Antwerp without effecting any thing whatever. The howitzer was not dismounted, the fort was not injured,—there being in fact nothing to injure,—and the British had only one man killed and two wounded."

It is unnecessary to further specify examples from the wars of the French Revolution; the whole history of these wars is one continued proof of the superiority of fortifications as a maritime frontier defence. The sea-coast of France is almost within stone's throw[18] of the principal British naval dépôts; here were large towns and harbors, filled with the rich commerce of the world, offering the dazzling attraction of rich booty. The French navy was at this time utterly incompetent to their defence; while England supported a maritime force at an annual expense of near *ninety millions of dollars.* Her largest fleets were continually cruising within sight of these seaports, and not unfrequently attempting to cut out their shipping. "At this period," says one of her naval historians, "the naval force of Britain, so

multiplied and so expert from long practice, had acquired an intimate knowledge of their (the French) harbors, their bays and creeks; her officers knew the depth of water, and the resistance likely to be met with in every situation." On the other hand, these harbors and towns were frequently stripped of their garrisons by the necessities of distant wars, being left with no other defence than their fortifications and militia. And yet, notwithstanding all this, they escaped unharmed during the entire contest. They were frequently attacked, and in some instances the most desperate efforts were made to effect a permanent lodgment; but in no case was the success at all commensurate with the expense of life and treasure sacrificed, and no permanent hold was made on either the maritime frontiers of France or her allies. This certainly was owing to no inferiority of skill and bravery on the part of the British navy, as the battles of Aboukir and Trafalgar, and the almost total annihilation of the French marine, have but too plainly proven. Why then did these places, escape? We know of no other reason, than that *they were fortified*; and that the French knew how to defend their fortifications. The British maritime expeditions to Quiberon, Holland, Boulogne, the Scheldt, Constantinople, Buenos Ayres, &c., sufficiently prove the ill-success, and the waste of life and treasure with which they must always be attended. But when her naval power was applied to the destruction of the enemy's marine, and in transporting her land forces to solid bases of operations on the soil of her allies, in Portugal and Belgium, the fall of Napoleon crowned the glory of their achievements.

[18]

Only eighteen and a half miles across the Channel at the narrowest place.

Let us now examine the several British naval attacks on our own forts, in the wars of the Revolution and of 1812.

In 1776 Sir Peter Parker, with a British fleet of nine vessels, carrying about two hundred and seventy[19] guns, attacked Fort Moultrie, in Charleston harbor, which was then armed with only twenty-six guns, and garrisoned by only three hundred and seventy-five regulars and a few militia. In this contest the British were entirely defeated, and lost, in killed and wounded, two hundred and five men, while their whole two hundred and seventy guns killed and wounded only thirty-two men in the fort. Of this trial of strength,

which was certainly a fair one, Cooper in his Naval History, says:—"It goes fully to prove the important military position that ships cannot withstand forts, when the latter are properly armed, constructed, and garrisoned. General Moultrie says only thirty rounds from the battery were fired, and was of opinion that the want of powder alone prevented the Americans from destroying the men-of-war."

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These vessels *rated* two hundred and fifty-four guns, but the number actually carried is stated to have been two hundred and seventy.

In 1814 a British fleet of four vessels, carrying ninety-two guns, attacked Fort Boyer, a small redoubt, located on a point of land commanding the passage from the Gulf into the bay of Mobile. This redoubt was garrisoned by only one hundred and twenty combatants, officers included; and its armament was but twenty small pieces of cannon, some of which were almost entirely useless, and most of them poorly mounted "in batteries hastily thrown up, and leaving the gunners uncovered from the knee upward," while the enemy's land force, acting in concert with the ships, consisted of twenty artillerists with a battery of two guns, and seven hundred and thirty marines, Indians, and negroes. His ships carried five hundred and ninety men in all. This immense disparity of numbers and strength did not allow to the British military and naval commanders the slightest apprehension "that four British ships, carrying ninety-two guns, and a land force somewhat exceeding seven hundred combatants, could fail in reducing a small work mounting only twenty short carronades, and defended by a little more than a hundred men, unprovided alike with furnaces for heating shot, or casements to cover themselves from rockets and shells." Nevertheless, the enemy was completely repulsed; one of his largest ships was entirely destroyed, and 85 men were killed and wounded on board the other; while our loss was only eight or nine. Here a naval force of *five* to *one* was repelled by the land-battery.

Again, in 1814, a barbette battery of one four-pounder and two eighteen-pounder guns at Stonington, repelled a British fleet of one hundred and thirty-four guns. During the engagement the Americans exhausted their ammunition, and spiked their eighteen-pounders, and only one of them was

afterwards used. Two of the enemy's ships, carrying one hundred and twelve guns, were engaged during the whole time of attack, and during much of this time bombarded the town from a position beyond reach of the land-battery. They were entirely too far off for the four-pounder gun to be of any use. Supposing the two eighteen-pounders to have been employed during the whole action, and also all the guns of the fleet, *one* eighteen-pounder on land must have been more than equivalent to *sixty-seven* guns afloat, for the ships were so much injured as to render it necessary for them to withdraw. The British loss was twenty killed, and more than fifty wounded. Ours was only two killed and six wounded.[20]

[20]

Perkins says two killed and six wounded. Holmes says six wounded, but makes no mention of any killed.

The fleet sent to the attack of Baltimore, in 1814, consisted of forty sail, the largest of which were ships of the line, carrying an army of over six thousand combatants. The troops were landed at North Point, while sixteen of the bomb-vessels and frigates approached within reach of Fort McHenry, and commenced a bombardment which lasted twenty-five hours. During this attack, the enemy threw "fifteen hundred shells, four hundred of which exploded within the walls of the fort, but without making any impression on either the strength of the work or the garrison," and the British were compelled to retire with much loss.

In 1815, a squadron of British ships, stationed off the mouths of the Mississippi, for the purpose of a blockade, ascended the river as high as Fort St. Philip, which is a small work capable of an armament of only twenty guns in all. A heavy fire of shot and shells was continued with but few and short pauses for nine days and nights, but making no impression either on the fort or garrison, they retreated to their former position at the mouth of the river.

There is but a single instance in the war of 1812, where the enemy's vessels succeeded in reducing a fort; and this has sometimes been alluded to, by persons ignorant of the real facts of the case, as a proof against the ability of our fortifications to resist naval attacks. Even if it were a case of decided

failure, would this single exception be sufficient to overthrow the weight of evidence on the other side? We allude to the reduction of the so-called Fort Washington by the British fleet that ascended the Potomac in 1814, to assist in the disgraceful and barbarous operation of burning the capitol and destroying the archives of the nation. Fort Washington was a very small and inefficient work, incorrectly planned by an incompetent French engineer; only a small part of the fort was then built, and it has not yet been completed. The portion constructed was never, until very recently, properly prepared for receiving its armament, and at the time of attack could not possibly have held out a long time. But no defence whatever was made. Capt. Gordon, with a squadron of eight sail, carrying one hundred and seventy-three guns, under orders "to ascend the river as high as Fort Washington, and try upon it the experiment of a bombardment," approached that fort, and, upon firing a single shell, which did no injury to either the fort or the garrison, the latter deserted the works, and rapidly retreated. The commanding officer was immediately dismissed for his cowardice. An English naval officer, who was one of the expedition, in speaking of the retreat of the garrison, says: "We were at loss to account for such an extraordinary step. The position was good and the capture would have cost us at least fifty men, and more, had it been properly defended; besides, an unfavorable wind and many other chances were in their favor," &c. The fleet ascended the river to Alexandria, but learning soon afterwards that batteries were preparing at White House and Indian Head to cut off its retreat, it retired, in much haste, but not without injury.

Some have also pretended to find in modern European history a few examples contradictory of the relative power which we have here assigned to ships and forts. Overlooking the numerous and well-authenticated examples, where forts of small dimensions and of small armament have repelled large fleets, they would draw their conclusions from the four or five instances where fleets have gained (as was at first supposed) a somewhat doubtful victory over forts. But a careful and critical examination of the facts in these cases, will show that even these are no exceptions to the general rule of the superiority of guns ashore over guns afloat.

The only instances where it has ever been pretended by writers of any note, that ships have gained advantage, are those of the attack on Copenhagen in 1801; the passage of the Dardanelles, in 1807; the attack on Algiers, in

1816; the attack on San Juan d'Ulloa, in 1838; and the attack on St. Jean d'Acre, in 1840.

Let us examine these examples a little in detail:—

Copenhagen.—The British fleet sent to attack Copenhagen, in 1801, consisted of fifty-two sail, eighteen of them being line-of-battle ships, four frigates, &c. They sailed from Yarmouth roads on the 12th of March, passed the Sound on the 30th, and attacked and defeated the Danish line on the 2d of April.

The Sound between Cronenberg and the Swedish coast is about two and a half miles wide, (vide Fig. 34.) The batteries of Cronenberg and Elsinore were lined with one hundred pieces of cannon and mortars; but the Swedish battery had been much neglected, and then mounted only six guns. Nevertheless, the British admiral, to avoid the damage his squadron would have to sustain in the passage of this wide channel, defended by a force scarcely superior to a single one of his ships, preferred to attempt the difficult passage of the Belt; but after a few of his light vessels, acting as scouts, had run on rocks, he returned to the Sound.

He then tried to negotiate a peaceful passage, threatening, however, a declaration of war if his vessels should be fired upon. It must be remembered that at this time England was at peace with both Denmark and Sweden, and that no just cause of war existed. Hence, the admiral inferred that the commanders of these batteries would be loath to involve their countries in a war with so formidable a power as England, by commencing hostilities, when only a free passage was asked. The Danish commander replied, that he should not permit a fleet to pass his post, whose object and destination were unknown to him. He fired upon them, as he was bound to do by long-existing commercial regulations, and not as an act of hostility against the English. The Swedes, on the contrary, remained neutral, and allowed the British vessels to lie near by for several days without firing upon them. Seeing this friendly disposition of the Swedes, the fleet neared their coast, and passed out of the reach of the Danish batteries, which opened a fire of balls and shells; but all of them fell more than two hundred yards short of the fleet, which escaped without the loss of a single man.

The Swedes excused their treachery by the plea that it would have been impossible to construct batteries at that season, and that, even had it been possible, Denmark would not have consented to their doing so, for fear that Sweden would renew her old claim to one half of the rich duties levied by Denmark on all ships passing the strait. There may have been some grounds for the last excuse; but the true reason for their conduct was the fear of getting involved in a war with England. Napoleon says that, even at that season, a few days would have been sufficient for placing a hundred guns in battery, and that Sweden had much more time than was requisite. And with a hundred guns on each side of the channel, served with skill and energy, the fleet must necessarily have sustained so much damage as to render it unfit to attack Copenhagen.

On this passage, we remark:—

1st. The whole number of guns and mortars in the forts of the Sound amounted to only one hundred and six, while the fleet carried over seventeen hundred guns; and yet, with this immense superiority of more than *sixteen* to *one*, the British admiral preferred the dangerous passage of the Belt to encountering the fire of these land-batteries.

2d. By negotiations, and threatening the vengeance of England, he persuaded the small Swedish battery to remain silent and allow the fleet to pass near that shore, out of reach of Cronenberg and Elsinore.

3d. It is the opinion of Napoleon and the best English writers, that if the Swedish battery had been put in order, and acted in concert with the Danish works, they might have so damaged the fleet as to render it incapable of any serious attempt on Copenhagen.

We now proceed to consider the circumstances attending the attack and defence of Copenhagen itself. The only side of the town exposed to the attack of heavy shipping is the northern, where there lies a shoal extending out a considerable distance, leaving only a very narrow approach to the heart of the city, (Fig. 35) On the most advanced part of this shoal are the Crown-batteries, carrying in all eighty-eight guns.[21] The entrance into the Baltic between Copenhagen and Salthorn, is divided into two channels by a bank, called the Middle Ground, which is situated directly opposite Copenhagen. To defend the entrance on the left of the Crown-batteries, they

placed near the mouth of the channel four ships of the line, one frigate, and two sloops, carrying in all three hundred and fifty-eight guns. To secure the port and city from bombardment from the King's Channel, (that between the Middle Ground and town,) a line of floating defences were moored near the edge of the shoal, and manned principally by volunteers. This line consisted of old hulls of vessels, block-ships, prames, rafts, &c., carrying in all six hundred and twenty-eight guns—a force strong enough to prevent the approach of bomb-vessels and gunboats, (the purpose for which it was intended,) but utterly incapable of contending with first-rate ships of war; but these the Danes thought would be deterred from approaching by the difficulties of navigation. These difficulties were certainly very great; and Nelson said, beforehand, that "the wind which might carry him in would most probably not bring out a crippled ship." Had the Danes supposed it possible for Nelson to approach with his large vessels, the line of floating defences would have been formed nearer Copenhagen, the right supported by batteries raised on the isle of Amack. "In that case," says Napoleon, "it is probable that Nelson would have failed in his attack; for it would have been impossible for him to pass between the line and shore thus lined with cannon." As it was, the line was too extended for strength, and its right too far advanced to receive assistance from the battery of Amack. A part of the fleet remained as a reserve, under Admiral Parker, while the others, under Nelson, advanced to the King's Channel. This attacking force consisted of eight ships of the line and thirty-six smaller vessels, carrying in all eleven hundred guns, (without including those in the six gun-brigs, whose armament is not given.) One of the seventy-four-gun ships could not be brought into action, and two others grounded; but, Lord Nelson says, "although not in the situation assigned them, yet they were so placed as to be of great service." This force was concentrated upon *a part* of the Danish line of floating defences, the whole of which was not only inferior to it by three hundred and eighty-two guns, but so situated as to be beyond the reach of succor, and without a chance of escape. The result was what might have been expected. Every vessel of the right and centre of this outer Danish line was taken or destroyed, except one or two small ones, which cut and run under protection of the fortifications. The left of the line, being supported by the Crown-battery, remained unbroken. A division of frigates, in hopes of providing an adequate substitute for the ships intended to attack the batteries, ventured to engage them, but "it suffered considerable loss,

and, in spite of all its efforts, was obliged to relinquish this enterprise, and sheer off."

[21]

Some writers say only sixty-eight or seventy; but the English writers generally say eighty-eight. A few, (apparently to increase the brilliancy of the victory,) make this number still greater.

The Danish vessels lying in the entrance of the channel which leads to the city, were not attacked, and took no material part in the contest. They are to be reckoned in the defence on the same grounds that the British ships of the reserve should be included in the attacking force. Nor was any use made of the guns on shore, for the enemy did not advance far enough to be within their range.

The Crown-battery was *behind* the Danish line, and mainly masked by it. A part only of its guns could be used in support of the left of this line, and in repelling the direct attacks of the frigates, which it did most effectually. But we now come to a new feature in this battle. As the Danish line of floating defences fell into the hands of the English, the range of the Crown-battery enlarged, and its power was felt. Nelson saw the danger to which his fleet was exposed, and, being at last convinced of the prudence of the admiral's signal for retreat, "made up his mind to weigh anchor and retire from the engagement." To retreat, however, from his present position, was exceedingly difficult and dangerous. He therefore determined to endeavor to effect an armistice, and dispatched the following letter to the prince-regent:

"Lord Nelson has directions to spare Denmark when no longer resisting; but if the firing is continued on the part of Denmark, Lord Nelson must be obliged to set on fire all the floating batteries he has taken, without the power to save the brave Danes who have defended them."

This produced an armistice, and hostilities had hardly ceased, when three of the English ships, including that in which Nelson himself was, struck upon the bank. "They were in the jaws of destruction, and would never have escaped if the batteries had continued their fire. They therefore owed their safety to this armistice." A convention was soon signed, by which every

thing was left *in statu quo*, and the fleet of Admiral Parker allowed to proceed into the Baltic. Edward Baines, the able English historian of the wars of the French Revolution, in speaking of Nelson's request for an armistice, says: "This letter, which exhibited a happy union of policy and courage, was written at a moment when Lord Nelson perceived that, in consequence of the unfavorable state of the wind, the admiral was not likely to get up to aid the enterprise; that *the principal batteries* of the enemy, and the ships at the mouth of the harbor, *were yet untouched;* that two of his own division had grounded, and others were likely to share the same fate." Campbell says these batteries and ships "*were still unconquered.* Two of his [Nelson's] own vessels were grounded and exposed to a heavy fire; others, if the battle continued, might be exposed to a similar fate, while he found it would be scarcely practicable to bring off the prizes under the fire of the batteries."

With respect to the fortifications of the town, a chronicler of the times says they were of no service while the action lasted. "They began to fire when the enemy took possession of the abandoned ships, but it was at the same time the parley appeared." The Danish commander, speaking of the general contest between the two lines, says: "The Crown-battery did not come at all into action." An English writer says distinctly: "The works (fortifications) of Copenhagen were absolutely untouched at the close of the action." Colonel Mitchel, the English historian, says: "Lord Nelson never fired a shot at the town or fortifications of Copenhagen; he destroyed a line of block-ships, prames, and floating batteries that defended the sea approach to the town; and the Crown Prince, seeing his capital exposed, was willing to finish by armistice a war, the object of which was neither very popular nor well understood. What the result of the action between Copenhagen and the British fleet might ultimately have been, is therefore altogether uncertain. THE BOMBARDMENT OF COPENHAGEN BY NELSON, as it is generally styled, is therefore, like most other oracular phrases of the day, a mere combination of words, without the slightest meaning."

The British lost in killed and wounded nine hundred and forty-three men; and the loss of the Danes, according to their own account, which is confirmed by the French, was but very little higher. The English, however, say it amounted to sixteen or eighteen hundred; but let the loss be what it may, it was almost exclusively confined to the floating defences, and can in

no way determine the relative accuracy of aim of the guns ashore and guns afloat.

The facts and testimony we have adduced, prove incontestably—

1st. That of the fleet of fifty-two sail and seventeen hundred guns sent by the English to the attack upon Copenhagen, two ships carrying one hundred and forty-eight guns were grounded or wrecked; seven ships of the line, and thirty-six smaller vessels, carrying over one thousand guns, were actually brought into the action; while the remainder were held as a reserve to act upon the first favorable opportunity.

2d. That the Danish line of floating defences, consisting mostly of hulls, sloops, rafts, &c., carried only six hundred and twenty-eight guns of all descriptions; that the fixed batteries supporting this line did not carry over eighty or ninety guns at most; and that both these land and floating batteries were mostly manned and the guns served by *volunteers*.

3d. That the fixed batteries in the system of defence were either so completely masked, or so far distant, as to be useless during the contest between the fleet and floating force.

4th. That the few guns of these batteries which were rendered available by the position of the floating defences, repelled, with little or no loss to themselves, and some injury to the enemy, a vastly superior force of frigates which attacked them.

5th. That the line of floating defences was conquered and mostly destroyed, while the fixed batteries were uninjured.

6th. That the fortifications of the city and of Amack island were not attacked, and had no part in the contest.

7th. That, as soon as the Crown-batteries were unmasked and began to act, Nelson prepared to retreat, but, on account of the difficulty of doing so, he opened a parley, threatening, with a cruelty unworthy of the most barbarous ages, that, *unless the batteries ceased their fire upon his ships, he would burn all the floating defences with the Danish prisoners in his possession;* and that this armistice was concluded just in time to save his own ships from destruction.

8th. That, consequently, the battle of Copenhagen cannot be regarded as a contest between ships and forts, or a triumph of ships over forts: that, so far as the guns on shore were engaged, they showed a vast superiority over those afloat—a superiority known and confessed by the English themselves.

Constantinople.—The channel of the Dardanelles is about twelve leagues long, three miles wide at its entrance, and about three-quarters of a mile at its narrowest point. Its principal defences are the outer and inner castles of Europe and Asia, and the castles of Sestos and Abydos. Constantinople stands about one hundred miles from its entrance into the Sea of Marmora, and at nearly the opposite extremity of this sea. The defences of the channel had been allowed to go to decay; but few guns were mounted, and the forts were but partially garrisoned. In Constantinople not a gun was mounted, and no preparations for defence were made; indeed, previous to the approach of the fleet, the Turks had not determined whether to side with the English or the French, and even then the French ambassador had the greatest difficulty in persuading them to resist the demands of Duckforth.

The British fleet consisted of six sail of the line, two frigates, two sloops, and several bomb-vessels, carrying eight hundred and eighteen guns, (besides those in the bomb-ships.) Admiral Duckforth sailed through the Dardanelles on the 19th of February, 1807, with little or no opposition. This being a Turkish festival day, the soldiers of the scanty garrison were enjoying the festivities of the occasion, and none were left to serve the few guns of the forts which had been prepared for defence. But while the admiral was waiting on the Sea of Marmora for the result of negotiations, or for a favorable wind to make the attack upon Constantinople, the fortifications of this city were put in order, and the Turks actively employed, under French engineers and artillery officers, in repairing the defences of the Straits. Campbell, in his Naval History, says:—"Admiral Duckforth now fully perceived the critical situation in which he was placed. He might, indeed, succeed, should the weather become favorable, in bombarding Constantinople; *but unless the bombardment should prove completely successful in forcing the Turks to pacific terms, the injury he might do to the city would not compensate for the damage which his fleet must necessarily sustain. With this damaged and crippled fleet, he must repass the Dardanelles, now rendered infinitely stronger than they were when he came through them*."

Under these circumstances the admiral determined to retreat; and on the 3d of April escaped through the Dardanelles, steering midway of the channel, with a favorable and strong current. "This escape, however," says Baines, "was only from destruction, but by no means from serious loss and injury. * * * * In what instance in the whole course of our naval warfare, have ships received equal damage in so short a time as in this extraordinary enterprise?" In detailing the extent of this damage, we will take the ships in the order they descended. The first had her wheel carried away, and her hull much damaged, but escaped with the loss of only three men. A stone shot penetrated the second, between the poop and quarter deck, badly injured the mizzen-mast, carried away the wheel, and did other serious damage, killing and wounding twenty men. Two shot struck the third, carrying away her shrouds and injuring her masts; loss in killed and wounded, thirty. The fourth had her mainmast destroyed, with a loss of sixteen. The fifth had a large shot, six feet eight inches in circumference, enter her lower deck; loss fifty-five. The sixth, not injured. The seventh, a good deal damaged, with a loss of seventeen. The eighth had no loss. The ninth was so much injured that, "had there been a necessity for hauling the wind on the opposite tack, she must have gone down:" her loss was eight. The tenth lost twelve. The eleventh was much injured, with a loss of eight—making a total loss in repassing the Dardanelles, of one hundred and sixty-seven; and in the whole expedition two hundred and eighty-one, exclusive of two hundred and fifty men who perished in the burning of the Ajax.

Such was the effect produced on the British fleet, sailing with a favorable wind and strong current past the half-armed and half-manned forts of the Dardanelles. Duckforth himself says, that "had he remained before Constantinople much longer—till the forts had been completely put in order —no return would have been open to him, and the unavoidable sacrifice of the squadron must have been the consequence." Scarcely had the fleet cleared the Straits, before it (the fleet) was reinforced with eight sail of the line; but, even with this vast increase of strength, the English did not venture to renew the contest. They had effected a most fortunate escape. General Jomini says that if the defence had been conducted by a more enterprising and experienced people, the expedition would have cost the English their whole squadron.

Great as was the damage done to the fleet, the forts themselves were uninjured. The English say their own fire did no execution, the shot in all probability not even striking their objects—"the rapid change of position, occasioned by a fair wind and current, preventing the certainty of aim." The state of the batteries when the fleet first passed, is thus described in James's Naval History: "Some of them were dilapidated, and others but partially mounted and poorly manned." And Alison says: "They had been allowed to fall into disrepair. The castles of Europe and Asia, indeed, stood in frowning majesty, to assert the dominion of the Crescent at the narrowest part of the passage, but their ramparts were antiquated, their guns in part dismounted, and such as remained, though of enormous calibre, little calculated to answer the rapidity and precision of an English broadside."

Much has been said because the fortifications of the Dardanelles did not hermetically seal that channel, (an object they were never expected to accomplish, even had they been well armed and well served;) but it is forgotten, or entirely overlooked, that twelve *Turkish line-of-battle -ships, two of them three-deckers, with nine frigates, were with their sails bent and in apparent readiness, filled with troops, and lying within the line of fortifications; and yet this naval force effected little or nothing against the invaders.* It is scarcely ever mentioned, being regarded of little consequence as a means of defence; and yet the number of its guns and the expense of its construction and support, could hardly have fallen short of the incomplete and half-armed forts, some of which were as ancient as the reign of Amurath!

Algiers.—The following narrative of the attack on Algiers, in 1816, is drawn from the reports of the English and Dutch admirals, and other official and authentic English papers.

The attack was made by the combined fleets, consisting of five sail of the line, eighteen or twenty frigates and smaller vessels, besides five bomb-vessels and several rocket-boats, carrying in all about one thousand guns. The armament of some of the smaller vessels is not given, but the guns of those whose armaments are known, amount to over nine hundred. The harbor and defences of Algiers had been previously surveyed by Captain Warde, royal navy, under Lord Exmouth's direction; and the number of the combined fleet was arranged according to the information given in this

survey—just so many ships, and no more, being taken, as could be employed to advantage against the city, without being needlessly exposed. Moreover, the men and officers had been selected and exercised with reference to this particular attack.

From the survey of Captain Warde, and the accompanying map, it appears that the armament of all the fortifications of Algiers and the vicinity, counting the water fronts and the parts that could flank the shore, was only two hundred and eighty-four guns of various sizes and descriptions, including mortars. But not near all of these could act upon the fleet as it lay. Other English accounts state the number of guns actually opposed to the fleet at from two hundred and twenty to two hundred and thirty. Some of these were in small and distant batteries, whereas nearly all the fleet was concentrated on the mole-head works. (Fig. 36.) Supposing only one broadside of the ships to have been engaged, the ratio of the forces, as expressed by the number of guns, must have been about as 5 to 2. This is a favorable supposition for the ships; for we know that several of them, from their position and a change of anchorage, brought both broadsides to bear; moreover, at no one time could *all* the guns of the water fronts of the batteries bear on the attacking ships. The Algerine shipping in the harbor was considerable, including several vessels of war, but no use was made of them in defence, and nearly all were burnt. The attacking ships commanded some of the batteries, and almost immediately dismounted their guns. The walls of the casemated works were so thin as to be very soon battered down. Most of the Algerine guns were badly mounted, and many of them were useless after the first fire. They had no furnaces for heating shot, and, as "they loaded their guns with loose powder, put in with a ladle," they could not possibly have used hot shot, even had they constructed furnaces. The ships approached the forts, and many of them anchored in their intended position, without a shot being fired from the batteries. The action commenced at a quarter before three, and did not entirely cease till half-past eleven. The ships then took advantage of the land breeze, and, by warping and towing off, were able to get under sail and come to anchor beyond reach of the land-batteries. Negotiations were again opened, and the Dey surrendered the Christian slaves and yielded to the terms of the treaty.

During the contest, the fleet "fired nearly one hundred and eighteen tons of powder, and fifty thousand shot, (weighing more than five hundred tons of

iron,) besides nine hundred and sixty thirteen and ten-inch shells, (thrown by the bomb-vessels,) and the shells and rockets from the flotilla." The vessels were considerably crippled, and their loss in killed and wounded amounted to eight hundred and eighty-three. The land batteries were much injured, and a large part of their guns dismounted. Their loss is not known; the English confess they could obtain no account of it, but suppose it to have been very great. This seems more than probable; for, besides those actually employed in the defence, large numbers of people crowded into the forts to witness the contest. So great was this curiosity, that, when the action commenced, the parapets were covered with the multitude gazing at the manœuvres of the ships. To avoid so unnecessary and indiscriminate a slaughter, Lord Exmouth (showing a humanity that does him great credit) motioned with his hand to the ignorant wretches to retire to some place of safety. This loss of life in the batteries, the burning of the buildings within the town and about the mole, the entire destruction of their fleet and merchant vessels anchored within the mole and in the harbor, had a depressing effect upon the inhabitants, and probably did more than the injuries received by the batteries in securing an honorable conclusion to the treaty. We know very well that these batteries, though much injured, *were not silenced* when Lord Exmouth took advantage of the land breeze and sailed beyond their reach. The ships retired—1st, because they had become much injured, and their ammunition nearly exhausted; 2d, in order to escape from a position so hazardous in case of a storm; and 3d, to get beyond the reach of the Algerine batteries. Lord Exmouth himself gives these as his reasons for the retreat, and says, "the land wind saved me many a gallant fellow." And Vice-admiral Von de Capellan, in his report of the battle, gives the same opinion: "*in this retreat*" says he, "which, from want of wind and the damage suffered in the rigging, was very slow, *the ships had still to suffer much from the new-opened and redoubled fire of the enemy's batteries*; at last, the land breeze springing up," &c. An English officer, who took part in this affair, says: "It was well for us that the land wind came off, or we should never have got out; and God knows what would have been our fate, had we remained all night."

The motives of the retreat cannot, therefore, be doubted. Had the Arabs set themselves zealously at work, during the night, to prepare for a new contest, by remounting their guns, and placing others behind the ruins of those

batteries which had fallen,—in other words, had the works now been placed in hands as skilful and experienced as the English, the contest would have been far from ended. But (to use the words of the Board of Defence) Lord Exmouth relied on the effects produced on the people by his dreadful cannonade; and the result proves that he was right. His anxiety to clear the vessels from the contest shows that there was a power still unconquered, which he thought it better to leave to be restrained by the suffering population of the city, than to keep in a state of exasperation and activity by his presence. What was this power but an unsubdued energy in the batteries?

The true solution of the question is, then, not so much the amount of injury done on the one side or the other—particularly as there was on one side a city to suffer as well as the batteries—as the relative efficiency of the parties when the battle closed. All political agitation and popular clamor aside, what would have been the result had the fight been continued, or even had Lord Exmouth renewed it next morning? These are questions that can be answered only on conjecture; but the manner the battle ended certainly leaves room for many doubts whether, had the subsequent demands of Lord Exmouth been rejected, he had it in his power to enforce them by his ships; whether, indeed, if he had renewed the fight, he would not have been signally defeated. On the whole, we do not think that this battle, although it stands pre-eminent as an example of naval success over batteries, presents an argument to shake the confidence which fortifications, well situated, well planned, and well fought, deserve, as the defences of a seaboard.

We cannot help regarding these conclusions as just, when we reflect upon all the circumstances of the case. The high character, skill, and bravery of the attacking force; their immense superiority in number of guns, with no surplus human life to be exposed; the antiquated and ill-managed works of defence, the entire want of skill of the Algerine artillerists, and the neglect of the ordinary means of preparation; the severe execution which these ill-served guns did upon the enemy's ships,—an execution far more dreadful than that effected by the French or Dutch fleets in their best-contested naval battles with the ships of the same foe,—from these facts, we must think that those who are so ready to draw from this case conclusions unfavorable to

the use of land-batteries as a means of defence against shipping, know but little of the nature of the contest.

An English historian of some note, in speaking of this attack, says:—"It is but little to the purpose, unless to prove what may be accomplished by fleets against towns exactly so circumstanced, placed, and governed. Algiers is situated on an amphitheatre of hills, sloping down towards the sea, and presenting therefore the fairest mark to the fire of hostile ships. But where is the capital exactly so situated that we are ever likely to attack? And as to the destruction of a few second-rate towns, even when practicable, it is a mean, unworthy species of warfare, by which nothing was ever gained. The severe loss sustained before Algiers must also be taken into account, because it was inflicted by mere Algerine artillery, and was much inferior to what may be expected from a contest maintained against batteries manned with soldiers instructed by officers of skill and science, not only in working the guns, but in the endless duty of detail necessary for keeping the whole of an artillery material in a proper state of formidable efficiency."

San Juan d'Ulloa.—The following facts, relative to the attack on San Juan d'Ulloa by the French, in 1838, are drawn principally from the report of a French engineer officer who was one of the expedition.

The French fleet consisted of four ships, carrying one hundred and eighty-eight guns, two armed steamboats, and two bomb-ketches with four large mortars. The whole number of guns, of whatever description, found in the fort was one hundred and eighty-seven; a large portion of these, however, were for land defence. (Fig. 37.)

When the French vessels were towed into the position selected for the attack, "it was lucky for us," says the French officer in his report, "that the Mexicans did not disturb this operation, which lasted nearly two hours, and that they permitted us to commence the fire." "We were exposed to the fire of one twenty-four-pounder, five sixteen-pounders, seven twelve-pounders, one eight-pounder, and five eighteen-pounder carronades—*in all nineteen pieces only*." If these be converted into equivalent twenty-four-pounders, in proportion to the weight of the balls, the whole nineteen guns will be *less than twelve twenty-four pounders*. This estimate is much too great, for it

allows three eight-pounders to be equal to one twenty-four-pounder, and each of the eighteen-pounder carronades to be three quarters the power of a long twenty-four-pounder; whereas, at the distance at which the parties were engaged, these small pieces were nearly harmless. Two of the powder magazines, from not being bomb-proof, were blown up during the engagement, by which three of the nineteen guns on the water front of the castle were dismounted; thus reducing the land force to *an equivalent of ten twenty-four-pounders*. The other sixteen guns were still effective when abandoned by the Mexicans. The cannonade and bombardment continued about six hours, eight thousand two hundred and fifty shot and shells being fired at the fort by the French. The principal injury received by the work was from the explosion of the powder magazine. But very few guns were dismounted by the fire of the French ships, and only three of these on the water front. The details of the condition of the ships and fort are given in the report of the French officer,[22] but it is unnecessary to repeat them here.

[22]

Vide also House Doc. No. 206, twenty-sixth Congress, first session

In general terms, it appears from the above-mentioned report, that the number of guns actually brought into action by the floating force, (counting only one broadside of the ship,) amounted to *ninety-four guns, besides four heavy sea-mortars*; that the whole number so employed in the fort was only *nineteen, including the smallest calibres*; that these guns were generally so small and inefficient, that their balls would not enter the sides of the ordinary attacking frigates; the principal injury sustained by the castle was produced by the explosion of powder magazines injudiciously placed and improperly secured; that the castle, though built of poor materials, was but slightly injured by the French fire; that the Mexicans proved themselves ignorant of the ordinary means of defence, and abandoned their works when only a few of their guns had been dismounted; that notwithstanding all the circumstances in favor of the French, their killed and wounded, in proportion to the guns acting against them, was upwards of *four times* as great as the loss of the English at the battle of Trafalgar!

St. Jean d'Acre.—The narratives of the day contained most exaggerated accounts of the English attack on St. Jean d'Acre; now, however, the

principal facts connected with this attack are fully authenticated. For the amount of the fleet we quote from the British official papers, and for that of the fort, from the pamphlet of Lieutenant-colonel Matuszewiez. These statements are mainly confirmed by the narratives, more recently published, of several English and French eye-witnesses.

The fortifications were built of poor materials, antiquated in their plans, and much decayed. Their entire armament amounted to only two hundred guns, some of which were merely field-pieces. The water fronts were armed with one hundred cannon and sixteen mortars, those of the smaller calibre included. (Fig. 38.) When approached by the British fleet, the works were undergoing repairs, and, says Commodore Napier, "were fast getting into a state of preparation against attack."

The British fleet consisted of eight ships of the line, carrying six hundred and forty-six guns; six frigates, carrying two hundred and thirty-six guns; four steamers, carrying eighteen guns; and two or three other vessels, whose force is not given. "Only a few guns," says Napier, "defended the approach from the northward," and most of the ships came in from that direction. The western front was armed with about forty cannon; but opposed to this were six ships and two steamers, carrying about five hundred guns. Their fire was tremendous during the engagement, but *no breach was made* in the walls. The south front was armed in part by heavy artillery and in part by field-pieces. This front was attacked by six ships and two steamers, carrying over two hundred guns. The eastern front was armed only with light artillery; against this was concentrated the remainder of the fleet, carrying about two hundred and forty guns. The guns of the works were so poorly mounted, that but few could be used at all; and these, on account of the construction of the fort, could not reach the ships, though anchored close by the walls. "Only five of their guns," says Napier, "placed in a flanking battery, were well served, and never missed; but they were pointed too high, and damaged our spars and rigging only." The stone was of so poor a quality, says the narrative of Colonel Matuszewiez, that the walls fired upon presented on the exterior a shattered appearance, but they were nowhere seriously injured. In the words of Napier, "*they were not breached, and a determined enemy might have remained secure under the breastworks, or in the numerous casemates, without suffering much loss*." The accidental explosion of a magazine within the fort, containing six thousand casks of

powder, laid in ruins a space of sixty thousand square yards, opened a large breach in the walls of the fortifications, partially destroyed the prisons, and killed and wounded a thousand men of the garrison. This frightful disaster, says the French account, hastened the triumph of the fleet. The prisoners and malefactors, thus released from confinement, rushed upon the garrison at the same time with the mountaineers, who had besieged the place on the land side. The uselessness of the artillery, the breaches of the fort, the attacks of the English, all combined to force the retreat of the garrison, "in the midst of scenes of blood and atrocious murders."

We will close this account with the following extract of a speech of the Duke of Wellington, in the House of Lords, Feb. 4, 1841: "He had had," he said, "a little experience in services of this nature; and he thought it his duty to warn their lordships, on this occasion, that they must not always expect that ships, however well commanded, or however gallant their seamen might be, were capable of commonly engaging successfully with stone walls. He had no recollection, in all his experience, except the recent instance on the coast of Syria, of any fort being taken by ships, excepting two or three years ago, when the fort of San Juan d'Ulloa was captured by the French fleet. This was, he thought, the single instance that he recollected, though he believed that something of the sort had occurred at the siege of Havana, in 1763. The present achievement he considered one of the greatest of modern times. This was his opinion, and he gave the highest credit to those who had performed such a service. It was, altogether, a most skilful proceeding. He was greatly surprised at the small number of men that was lost on board the fleet; and, on inquiring how it happened, he discovered that it was because the vessels were moored within one-third of the ordinary distance. The guns of the fortress were intended to strike objects at a greater distance; and the consequence was, that the shot went over the ships that were anchored at one-third the usual distance. By that means, they sustained not more than one-tenth of the loss which they would otherwise have experienced. Not less than five hundred pieces of ordnance were directed against the walls, and the precision with which the fire was kept up, the position of the vessels, and, lastly, the blowing up of the large magazine—all aided in achieving this great victory in so short a time. He had thought it right to say thus much, because he wished to warn the public against supposing that such deeds as this could be effected every day. He

would repeat that this was a singular instance, in the achievement of which undoubtedly great skill was manifested, but which was also connected with peculiar circumstances, which they could not hope always to occur. It must not therefore be expected, as a matter of course, that all such attempts must necessarily succeed."

Having completed our examination of the ability of land batteries to cope, gun for gun, with a naval force, let us consider, for a few moments, the objection which is sometimes made to the use of fortifications for the defence of the sea-coast, viz.: *that our maritime cities and arsenals can be better and more economically secured by a home squadron*.

We have already alluded to the impossibility of substituting one means of defence for another. The efficiency of the bayonet can in no way enable us to dispense with artillery, nor the value of engineer troops in the passage of rivers, and the attack and defence of forts, render cavalry the less necessary in other operations of a campaign. To the navy alone must we look for the defence of our shipping upon the high seas; but it cannot replace fortifications in the protection of our harbors, bays, rivers, arsenals, and commercial towns.

Let us take a case in point. For the defence of New York city, it is deemed highly important that the East River should be closed to the approach of a hostile fleet at least fifteen or twenty miles from the city, so that an army landed there would have to cross the Westchester creek, the Bronx, Harlem river, and the defiles of Harlem heights—obstacles of great importance in a judicious defence. Throg's Neck is the position selected for this purpose; cannon placed there not only command the channel, but, from the windings of the river, sweep it for a great distance above and below. No other position, even *in* the channel itself, possesses equal advantages. Hence, if we had only naval means of defence, it would be best, were such a thing possible, to place the floating defences themselves on this point. Leaving entirely out of consideration the question of relative *power, position* alone would give the superior efficiency to the fort. But there are other considerations no less important than that of position. Fort Schuyler can be garrisoned and defended in part by the same militia force which will be employed to prevent the march of the enemy's army on the city. On the other hand, the crews of the floating defences must be seamen; they will

consequently be of less value in the subsequent land operations. Moreover, forts, situated as this is, can be so planned as to bring to bear upon any part of the channel a greater number of guns than can be presented by any hostile squadron against the corresponding portion of the fort. This result can be obtained with little difficulty in narrow channels, as is done in most of the other works for the defence of New York, the works for Boston, Newport, Philadelphia, Baltimore, Charleston, Savannah, New Orleans, &c., and an approximation to it is not incompatible with the defence of the broader estuaries, like the Chesapeake.

But we will suppose that there are no such points of land, in the inlets to our harbors, and that we rely for defence upon a naval force exclusively. Let us leave out of consideration the security of all our other harbors and our commerce on the high seas, and also the importance of having at command the means of attacking the enemy's coast, in the absence of his fleet. We take the single case of the attack being made on New York harbor, and that our whole fleet is assembled there. Now, if this fleet be equal in number to the enemy, the chances of success may be regarded as equal; if inferior, the chances are against us—for an attacking force would probably be of picked men and of the best materials. But here the consequences of victory are very unequal: the enemy can lose his squadron only, while we put in peril both our squadron and the objects it is intended to defend. If we suppose our own naval force superior to that of the enemy, the defence of this harbor would in all respects be complete, provided this force never left the harbor. But, then, all the commerce of the country upon the ocean must be left to its fate; and no attempt can be made to react offensively upon the foe, unless we can control the chances of finding the enemy's fleets within his ports, and the still more uncertain chance of keeping him there; the escape of a single vessel being sufficient to cause the loss of our harbor.

These remarks are based upon the supposition that we have but the single harbor of New York; whereas Portland, Portsmouth, Boston, Newport, the Delaware, the Chesapeake, Charleston, Savannah, Pensacola, Mobile, New Orleans, and numerous other places, are equally open to attack, and therefore must be equally defended, for we know not to which the enemy will direct his assaults. If he come to one of these in the absence of our fleet, his object is attained without resistance; or, if his whole force be concentrated upon one but feebly defended, we involve both fleet and

harbor in inevitable ruin. Could our fleet be so arranged as to meet these enterprises?

"As it cannot be denied that the enemy can select the point of attack out of the whole extent of coast, where is the prescience that can indicate the spot? And if it cannot be foretold, how is that ubiquity to be imparted that shall always place our fleet in the path of the advancing foe? Suppose we attempt to cover the coast by cruising in front of it, shall we sweep its whole length —a distance scarcely less than that which the enemy must traverse in passing from his coast to ours? Must the Gulf of Mexico be swept, as well as the Atlantic; or shall we give up the Gulf to the enemy? Shall we cover the southern cities, or give them up also? We must unquestionably do one of two things—either relinquish a great extent of coast, confining our cruisers to a small portion only, or include so much that the chances of intercepting an enemy would seem to be out of the question."

"On the practicability of covering a small extent of coast by cruising in front of it—or, in other words, the possibility of anticipating an enemy's operations, discovering the object of movements of which we get no glimpse and hear no tidings, and seeing the impress of his footsteps on the surface of the ocean—it may be well to consult experience."

The naval power of Spain under Philip II. was almost unlimited. With the treasures of India and America at his command, the fitting out of a fleet of one hundred and fifty or two hundred sail, to invade another country, was no very gigantic operation. Nevertheless, this naval force was of but little avail as a coast defence. Its efficiency for this purpose was well tested in 1596. England and Holland attacked Cadiz with a combined fleet of one hundred and seventy ships, which entered the Bay of Cadiz without, on its approach to their coast, being once seen by the Spanish navy. This same squadron, on its return to England, passed along a great portion of the Spanish coast without ever meeting with the slightest opposition from the innumerable Spanish floating defences.

In 1744, a French fleet of twenty ships, and a land force of twenty-two thousand men, sailed from Brest to the English coast, without meeting with any opposition from the superior British fleet which had been sent out, under Sir John Norris, on purpose to intercept them. The landing of the

troops was prevented by a storm, which drove the fleet back upon the coast of France to seek shelter.

In 1755, a French fleet of twenty-five sail of the line, and many smaller vessels, sailed from Brest for America. Nine of these soon afterwards returned to France, and the others proceeded to the gulf of St. Lawrence. An English fleet of seventeen sail of the line and some frigates had been sent out to intercept them; but the two fleets passed each other in a thick fog, and all the French vessels except two reached Quebec in safety.

In 1759, a French fleet, blockaded in the port of Dunkirk by a British force under Commodore Bogs, seizing upon a favorable opportunity, escaped from the enemy, attacked the coast of Scotland, made a descent upon Carrickfergus, and cruised about till February, 1760, without meeting a single British vessel, although sixty-one ships of the line were then stationed upon the coasts of England and France, and several of these were actually in pursuit.

In 1796, when the French attempted to throw the army of Hoche into Ireland, the most strenuous efforts were made by the British navy to intercept the French fleet in its passage. The Channel fleet, of near thirty sail of the line, under Lord Bridport, was stationed at Spithead; Sir Roger Curtis, with a smaller force, was cruising to the westward; Vice-admiral Colpoys was stationed off Brest, with thirteen sail of the line; and Sir Edward Pellew (afterwards Lord Exmouth) watched the harbor, with a small squadron of frigates. Notwithstanding this triple floating bulwark, as it was called—one fleet on the enemy's coast, a second in the Downs, and a third close on their own shores—the French fleet of forty-four vessels, carrying a land force of twenty-five thousand men, reached Bantry Bay in safety! This fleet was eight days on the passage, and three more in landing the troops; and most of the vessels might have returned to Brest in safety, had it not been for disasters by storms, for only *one* of their whole number was intercepted by the vast naval force which England had assembled for that express object. "The result of this expedition," says Alison, "was pregnant with important instructions to the rulers of both countries. To the French, as demonstrating the extraordinary risks which attend a maritime expedition, in comparison with a land campaign; the small number of forces which can be embarked on board even a great fleet; and the unforeseen

disasters which frequently, on that element, defeat the best concerted enterprises. To the English, as showing that *the empire of the seas does not always afford security against invasion;* that, in the face of superior maritime forces, her possessions were for sixteen days at the mercy of the enemy; and that neither the skill of her sailors nor the valor of her armies, but the fury of the elements, saved them from danger in the most vulnerable part of their dominions. While these considerations are fitted to abate the confidence in invasion, they are calculated, at the same time, to weaken an overweening confidence in naval superiority, and to demonstrate that *the only base upon which certain reliance can be placed*, even by an insular power, *is a well-disciplined army and the patriotism of its own subjects*."

Subsequent events still further demonstrated the truth of these remarks. In the following year, a French squadron of two frigates and two sloops, passed the British fleets with perfect impunity, destroyed the shipping in the port of Ilfracombe, and safely landed their troops on the coast of Wales. Again, in 1798, the immense British naval force failed to prevent the landing of General Humbert's army in the bay of Killala; and, in the latter part of the same year, a French squadron of nine vessels and three thousand men escaped Sir J.B. Warren's squadron, and safely reached the coast of Ireland. As a further illustration, we quote from the report of the Board of National Defence in 1839.

The Toulon fleet, in 1798, consisting of about twenty sail of the line and twenty smaller vessels of war, and numerous transports, making in all, three hundred sail and forty thousand troops, slipped out of port and sailed to Malta. "It was followed by Nelson, who, thinking correctly that they were bound for Egypt, shaped his course direct for Alexandria. The French, steering towards Candia, took the more circuitous passage; so that Nelson arrived at Alexandria before them, and, not finding them there, returned, by way of Caramania and Candia, to Sicily, missing his adversary in both passages. Sailing again for Alexandria, he found the French fleet at anchor in Aboukir bay, and, attacking them there, achieved the memorable victory of the Nile. When we consider the narrowness of the sea; the numerous vessels in the French fleet; the actual crossing of the two fleets on a certain night; and that Nelson, notwithstanding, could see nothing of the enemy himself, and hear nothing of them from merchant vessels, we may judge of the probability of waylaying our adversary on the broad Atlantic."

"The escape of another Toulon fleet in 1805; the long search for them in the Mediterranean by the same able officer; the pursuit in the West Indies; their evasion of him among the islands; the return to Europe; his vain efforts subsequently, along the coast of Portugal, in the bay of Biscay, and off the English channel; and the meeting at last at Trafalgar, brought about only because the combined fleets, trusting to the superiority that the accession of several reinforcements had given, were willing to try the issue of a battle—these are instances, of the many that might be cited, to show how small is the probability of encountering upon the ocean an enemy who desires to avoid a meeting, and how little the most untiring zeal, the most restless activity, the most exalted professional skill and judgment, can do to lessen the adverse chances. For more than a year Nelson most closely watched his enemy, who seems to have got out of port as soon as he was prepared to do so, and without attracting the notice of any of the blockading squadron. When out, Nelson, perfectly in the dark as to the course Villeneuve had taken, sought for him in vain on the coast of Egypt. Scattered by tempests, the French fleet again took refuge in Toulon; whence it again put to sea, when refitted and ready, joining the Spanish fleet at Cadiz."

"On the courage, skill, vigilance, and judgment, acceded on all hands to belong in a pre-eminent degree to the naval profession in this country, this system of defence relies to accomplish, against a string of chances, objects of importance so great that not a doubt or misgiving as to the result is admissible. It demands of the navy to do perfectly, and without fail, that which, to do at all, seems impossible. The navy is required to know the secret purposes of the enemy, in spite of distance, and the broken intercourse of a state of war, even before these purposes are known to the leader who is to execute them; nay, more, before the purpose itself is formed. On an element where man is but the sport of storms, the navy is required to lie in wait for the foe at the exact spot and moment, in spite of weather and seasons; to see him in spite of fogs and darkness."

"Finally, after all the devices and reliances of the system are satisfactorily accomplished, and all the difficulties subdued, it submits to the issue of a single battle, on equal terms, the fate of the war, having no hope or reserve beyond."

"The proper duty of our navy is, not coast or river defence; it has a more glorious sphere—that of the *offensive*. In our last war, instead of lying in harbor, and contenting themselves with keeping a few more of the enemy's vessels in watch over them than their own number—instead of leaving the enemy's commerce in undisturbed enjoyment of the sea, and our commerce without countenance or aid, they scattered themselves over the wide surface of the ocean, penetrated to the most remote seas, everywhere acting with the most brilliant success against the enemy's navigation. And we believe, moreover, that in the amount of the enemy's property thus destroyed, of American property protected or recovered, and in the number of hostile ships kept in pursuit of our scattered vessels, ships evaded if superior, and beaten if equal—they rendered benefits a thousand-fold greater, to say nothing of the glory they acquired for the nation, and the character they imparted to it, than any that would have resulted from a state of passiveness within the harbors. Confident that this is the true policy as regards the employment of the navy proper, we doubt not that it will in the future be acted on, as it has been in the past; and that the results, as regards both honor and advantage, will be expanded commensurately with its own enlargement. In order, however, that the navy may always assume and maintain that active and energetic deportment, in offensive operations, which is at the same time so consistent with its functions, and so consonant with its spirit, we have shown that it must not be occupied with mere coast defence."

A few remarks on the relative cost of ships and forts, and the economy of their support, and we will close this discussion. We do not regard this question, however, as a matter of any great importance, for it can seldom be decisive in the choice of these two means of defence. No matter what their relative cost may be, the one cannot often be substituted for the other. There are some few cases, however, where this might be taken into consideration, and would be decisive. Let us endeavor to illustrate our meaning. For the defence of New York city, the Narrows and East River must be secured by forts; ships cannot, in this case, be substituted. But let us suppose that the *outer* harbor of New York furnishes no favorable place for the debarkation of troops, or that the place of debarkation is so far distant that the troops cannot reach the city before the defensive forces can be prepared to repel them. This outer harbor would be of great importance to the enemy as a

shelter from storms, and as a place of debarkation or of rendezvous preparatory to a forcible passage of the Narrows; while to us its possession would not be absolutely essential, though very important. Strong fortifications on Sandy Hook, and one of the shoals, might probably be so constructed as to furnish a pretty sure barrier to the entrance of this outer harbor; on the other hand, a naval force stationed within the inner harbor, and acting under the protection of forts at the Narrows, might also furnish a good, though perhaps less certain protection for this outer roadstead. Here, then, we might well consider the question of relative cost and economy of support of the proposed fortifications, and of a home squadron large enough to effect the same object, and to be kept continually *at home* for that special purpose. If we were to allow it to go to sea for the protection of our commerce, its character and efficiency as a *harbor* defence would be lost. We can therefore regard it only as a local force—fixed within the limits of the defence of this particular place—and our estimates must be made accordingly.

The average durability of ships of war in the British navy, has been variously stated at seven and eight years in time of war, and from ten to twelve and fourteen years in time of peace. Mr. Perring, in his "Brief Inquiry," published in 1812, estimates the average durability at about eight years. His calculations seem based upon authentic information. A distinguished English writer has more recently arrived at the same result, from estimates based upon the returns of the Board of Admiralty during the period of the wars of the French Revolution. The data in our own possession are less complete; the appropriations for *building* and *repairing* having been so expended as to render it impossible to draw any accurate line of distinction. But, in the returns now before us, there are generally separate and distinct amounts of the *timbers* used for these two purposes; and consequently, so far as this (the main item of expense) is concerned, we may form pretty accurate comparisons.

According to Edge, (pp. 20, 21,) the average cost of timber, for hulls, masts, and yards, in *building* an English 74 gun ship, is £61,382. Let us now compare this cost of timber for *building*, with that of the same item for *repairs*, for the following fifteen ships, between 1800 and 1820. The list would have been still further enlarged, but the returns for other ships during some portion of the above period are imperfect:

Name of Ship	No. of guns	When built	Repaired from	Cost.
Vengeance	74		1800 to 1807	£84,720
Ildefonso	74		1807 to 1808	85,195
Scipio	74		1807 to 1809	60,785
Tremendous	74		1807 to 1810	135,397
Elephant	74		1808 to 1811	67,007
Spencer	74	1800	1809 to 1813	124,186
Romulus	74		1810 to 1812	73,141
Albion	74	1802	1810 to 1813	102,295
Donegal	74		1812 to 1815	101,367
Implacable	74		1813 to 1815	59,865
Illustrious	74	1803	1813 to 1816	74,184
Northumberland	74		1814 to 1815	59,795
Kent	74		1814 to 1818	88,357
Sultan	74	1807	1816 to 1818	61,518
Sterling Castle	74		1816 to 1818	65,280

This table, although incomplete, gives for the above fifteen ships, during a period of less than twenty years, the cost of *timber alone* used in their repair, an average of about $400,000 each. More timber than this was used, in all probability, upon the same vessels, and paid for out of the funds appropriated "for such as may be ordered in course of the year to be repaired." But the amount specifically appropriated for timber for these fifteen ships, would, in every twelve or fifteen years, equal the entire *first cost* of the same items. If we add to this amount, the cost of labor required in the application of timber to the operations of repair, and take into consideration the expense of other materials and labor, and the decayed condition of many of the ships at the end of this period, we should not be surprised to find the whole sum *expended* under these heads to equal the first cost, even within the minimum estimate of seven years. The whole cost of timber used for hulls, masts, and yards, in building between 1800 and 1820, was £18,727,551; in repairs and "ordinary wear and tear,"

£17,449,780; making an annual average of $4,560,158 for building timber, and $4,273,371 for that used in repairs. A large portion of the vessels *built* were intended to replace others which had been lost, or were so decayed as to be broken up.

But it may be well to add here, the actual supplies voted for the sea-service, and for wear and tear, and the extraordinary expenses in building and repairing of ships from 1800 to 1815.

Year.	For the wear and tear of ships.	Extra Expences for building, repairing etc.	For entire sea service.
1800	£4,350,000	£772,140	£13,619,079
1801	5,850,000	933,900	16,577,037
1802	3,684,000	773,500	11,833,571
1803	3,120,000	901,140	10,211,378
1804	3,900,000	948,520	12,350,606
1805	4,680,000	1,553,690	15,035,630
1806	4,680,000	1,980,830	18,864,341
1807	5,070,000	2,134,903	17,400,337
1808	5,070,000	2,351,188	18,087,544
1809	3,295,500	2,296,030	19,578,467
1810	3,295,500	1,841,107	18,975,120
1811	3,675,750	2,046,200	19,822,000
1812	3,675,750	1,696,621	19,305,759
1813	3,549,000	2,822,031	20,096,709
1814	3,268,000	2,086,274	19,312,070
1815	2,386,500	2,116,710	19,032,700

It appears from this table that the appropriations for the service, during the first fifteen years of the present century, amounted to a little less than *ninety millions* of dollars per annum; and for the wear and tear of ships, and "the extraordinary expenses in building and repairing ships, &c.," the annual appropriations amounted to near *thirty millions*.

Our own naval returns are also so imperfect that it is impossible to form any very accurate estimate of the relative cost of construction and repairs of our men-of-war. The following table, compiled from a report of the Secretary of the Navy, in 1841, (Senate Doc. No. 223, 26th Congress,) will afford data for an approximate calculation:—

Name of Ship	No. of guns	Total cost of building, exclusive of armaments, stores, etc.	When completed.	Cost of repairs, exclusive of ordnance, etc.	Repaired between
Delaware	74	$543,368.00	1820	$354,132.56	1827 and 1838
N. Carolina	74	431,852.00	1825	317,628.92	1824 and 1836
Constitution	44	302,718.84	1797	266,878.34	1833 and 1839
United States	44	299,336.56	1797	571,972.77	1821 and 1841
Brandywine	44	[23]299,218.12	1825	[23]377,665.95	1826 and 1838
Potomac	44	[23]231,013.02	1822	[23] 82,597.03	1829 and 1835
Concord	20	115,325.80	1828	72,796.22	1832 and 1840
Falmouth	20	94,093.27	1827	130,015.43	1828 and 1837
John Adams	20	110,670.69	1829	119,641.93	1834 and 1837
Boston	20	91,973.19	1825	189,264.37	1826 and 1840
St. Louis	20	102,461.95	1828	135,458.75	1834 and 1839

Vincennes	20	111,512.79	1826	178,094.81	1830 and 1838
Vandalia	20	90,977.88	1828	59,181.34	1832 and 1834
Lexington	20?	114,622.35	1826	83,386.52	1827 and 1837
Warren	20?	99,410.01	1826	152,596.03	1830 and 1838
Fairfield	20	100,490.35	1826	65,918.26	1831 and 1837
Natches[24]	20?	106,232.19	1827	129,969.80	1829 and 1836
Boxer	10	30,697.88	1831	28,780.48	1834 and 1840
Enterprise	10	27,938.63	1831	20,716.59	1834 and 1840
Grampus	10	23,627.42	1821	96,086.36	1825 and 1840
Dolphin	10	38,522.62	1836	15,013.35	1839 and 1840
Shark	10	23,627.42	1821	93,395.84	1824 and 1839

[23]

Returns incomplete.

[24]

Broken up in 1840.

It appears from the above table, that the cost of constructing ships of the line is about $6,600 per gun; of frigates, $6,500 per gun; of smaller vessels of war, a little less than $5,000 per gun: making an average cost of vessels of war to be *more than six thousand dollars per gun.* And the expense of

repairs for these vessels is *more than seven per cent. per annum* on their first cost.

We have as yet had but little experience in the use of war-steamers. The Fulton, four guns, built in 1838-'39, cost three hundred and thirty-three thousand seven hundred and seventy dollars and seventy-seven cents; the Mississippi and Missouri, ten guns each, built in 1841, cost about six hundred thousand dollars a piece; making an average cost for war-steamers of *over sixty thousand dollars per gun.* The cost of repairs of steam ships will be much greater than those for vessels of war; but we have not yet had sufficient experience to determine the exact amount. It has been estimated, however, by competent judges, that when kept, the expense of repairs will at least equal twelve per cent. of the first cost. The expense of keeping them in commission is enormously great. "Their engines," says the Secretary of the Navy, in his annual report in 1842, "consume so much fuel as to add enormously to their expenses; and the necessity that they should return to port, after short intervals of time, for fresh supplies, renders it impossible to send them on any distant service. They cannot be relied on as cruisers, and are altogether too expensive for service in time of peace. I have therefore determined to take them out of commission, and substitute for them other and less expensive vessels."

The average cost of permanent fortifications is but *little more than three thousand dollars per gun*. And it must be obvious, from the nature of the materials of which they are constructed, that the expense of their support must be inconsiderable. It is true that for some years past a large item of annual expenditure for fortifications has been under the head of "repairs;" but much of this sum is for alterations and enlargements of temporary and inefficient works, erected anterior to the war of 1812. Some of it, however, has been for actual repairs of decayed or injured portions of the forts; these injuries resulting from the nature of the climate, the foundations, the use of poor materials and poor workmanship, and from neglect and abandonment. But if we include the risk of abandonment at times, it is estimated, upon data drawn from past experience, that *one-third of one per cent. per annum*, of the first cost, will keep in perfect repair any of our forts that have been constructed since the last war.

But it is unnecessary to further discuss this question We repeat what has already been said, no matter what may be the relative cost of ships and forts, the one, as a general thing, cannot be substituted for the other. Each has its own sphere of action, and each will contribute, in its own way, to the national defence; and any undue increase of one, at the expense of the other, will be attended by a corresponding diminution of national power.[25]

[25]

For further information concerning our system of sea-coast defences, the reader is referred to House Doc. 206, twenty-sixth Congress, second session; Senate Doc. 85, twenty-eighth Congress, second session; and to the annual reports of the Chief Engineer.

CHAPTER VIII.

OUR NORTHERN FRONTIER DEFENCES.

In discussing engineering as a branch of the military art, we spoke of the use of fortifications on land frontiers, and their influence on the strategic operations of a campaign. A brief notice was also given of the different systems that have been proposed for arranging these defensive works. Let us now apply this discussion to our northern frontier.

The principle laid down by Napoleon and Jomini, "that fortifications should always be constructed on important strategic points," is undoubtedly the correct one: but how to determine these points is a question that will often perplex the patience and try the skill of the engineer; yet determine them he must, or his fortifications will be worse than useless; for a fort improperly located, like a cannon with its fire reversed on its own artillerists, will be sure to effect the destruction of the very forces it was designed to protect.

The selection of positions for fortifications on our northern frontier must have reference to three distinct classes of objects, viz.: the security, *first*, of the large frontier towns, where much public and private property is exposed to sudden dashing expeditions of the foe, made either on land or by water; *second*, of lake harbors, important as places of refuge and security to our own ships, or to the enemy's fleets while engaged in landing troops or furnishing supplies to an invading army; *third*, of all strategic points on the probable lines of offensive or defensive operations. These objects are distinct in their nature, and would seem to require separate and distinct means for their accomplishment; nevertheless, it will generally be found that positions selected with reference to one of these objects equally fulfil the others, so intimately are they all connected. To determine the strategic points of a probable line of military operations is therefore the main thing to be attended to in locating fortifications. That such points of maximum importance are actually marked out by the peaceful or hostile intercourse of nations cannot be doubted.

The *relative* importance of cities and towns is less varied by the fluctuations of commerce on a land frontier than on the sea-coast. The ever-changing system of "internal improvements," by furnishing new highways and thoroughfares for the transportation of the products of manufacturers and agriculture, either continually varies the relative standing of the seaports already opened, or opens new ones for the exportation of these products, and the importation of foreign articles received in exchange. But these "internal improvements" are seldom carried so far as to connect together two separate and distinct countries, and consequently the principal places on the dividing line usually retain their relative importance, no matter how often they may have declined during times of hostility, or again flourished with the increased commercial intercourse which results from peace. The principal European places of traffic near the frontiers have remained the same for ages, and in all probability ages hence the great frontier marts will be nearly the same as at present. This stability of rank among border towns is not confined to commercial influence; the same holds true with respect to that established by intercourse of a hostile character. Military history teaches us that lines of hostile operations, and the fields upon which the principal battles between any two countries have been fought, are nearly the same, no matter how remote the periods of comparison. These points and lines, so important in commerce as well as in war, result from the natural features of the ground, and we ought therefore to expect that they would be as little liable to sudden changes as the character of the earth itself.

From these remarks it will readily be perceived that there are three distinct methods of determining the strategic points between this country and Canada: 1st, by an examination of the topography of the two countries; 2d, by tracing out the main channels of commercial intercourse; 3d, by reviewing the lines of their military operations. The last method is the least liable to error, and perhaps is the most easily understood, inasmuch as it is sometimes difficult to point out the precise degree of connection between prospective military lines and the channels of commerce, or to show why these two have a fixed relation to the physical features of the country. In the present instance, moreover, this method furnishes ample data for the formation of our decision, inasmuch as the campaigns between this country and Canada have been neither few in number nor unimportant in their character and results.

In tracing out the main features of the early wars upon our northern frontier, it must be borne in mind that nearly the same portion of country which is now possessed by the English, was then occupied by the French, and that the English possessions in North America included the present Middle and Northern States. At the period of the American revolution the French and English had completely changed ground, the armies of the former operating in the "States," while the English were in possession of Canada.

The first expedition to be noticed against that portion of the country, was conducted by Samuel Argall, who sailed from Virginia in 1613, with a fleet of eleven vessels, attacked the French on the Penobscot, and afterwards the St. Croix.

In 1654, Sedgwick, at the head of a small New England army, attacked the French on the Penobscot, and overrun all Arcadia.

In 1666, during the contest between Charles II. and Louis XIV., it was proposed to march the New England troops across the country by the Kennebec or Penobscot, and attack Quebec; but the terrors and difficulties of crossing "over rocky mountains and howling deserts" were such as to deter them from undertaking the campaign.

In 1689, Count Frontenac, governor of Canada, made a descent into New York to assist the French fleet in reducing that province. His line of march was by the river Sorrel and Lake Champlain. An attack upon Montreal by the Iroquois soon forced him to return; but in the following January a party of French and Indians left Montreal in the depth of a Canadian winter, and after wading for two and twenty days, with provisions on their backs, through snows and swamps and across a wide wilderness, reached the unguarded village of Schenectady. Here a midnight war-whoop was raised, and the inhabitants either massacred or driven half-clad through the snow to seek protection in the neighboring towns.

In 1690, a congress of the colonies, called to provide means for the general defence, assembled at New York, and resolved to carry war into Canada: an army was to attack Montreal by way of Lake Champlain, and a fleet to attempt Quebec by the St. Lawrence. The former advanced as far as the lake, when the quarrels of the commanding officers defeated the objects of the expedition. The Massachusetts fleet of thirty-four vessels, (the largest

carrying forty-four guns each,) and two thousand men, failed to reduce Quebec, though the defences of that place were then of the slightest character, and armed with only twenty-three guns.

In 1704, and again in 1707, Port Royal was attacked by costly expeditions fitted out by the eastern colonies; and again, in 1709, a land force of fifteen hundred men advanced against Montreal by Lake Champlain; but nothing of importance was effected by either expedition.

In 1711, Lord Bolingbroke planned the conquest of Canada. The land forces, numbering five thousand men in all, were separated into two distinct armies, the one sent against Detroit, and the other against Montreal by Lake Champlain; while a fleet of fifteen ships of war, forty transports, and six store-ships, carrying a land force of six thousand five hundred men, was to attack Quebec. The maritime expedition failed to reach its destination, and after losing a part of the fleet and more than a thousand men in the St. Lawrence, this part of the project was abandoned. Nor was any thing important accomplished by either division of the land forces.

The same plan of campaign was followed in 1712. An army of four thousand men marched against Montreal by Lake Champlain, but on hearing of the failure of the naval expedition and of the concentration of the French forces on the river Sorel, they retired towards Albany.

The next expedition of any importance was the naval one of 1745 against Louisburg. For the attack of this place the colonies raised about four thousand men, and one hundred small vessels and transports, carrying between one hundred and sixty and two hundred guns. They were afterwards joined by ten other vessels carrying near five hundred guns. This attacking force now, according to some of the English writers, consisted of six thousand provincials, and eight hundred seamen, and a combined naval force of near seven hundred guns. The troops landed, and laid siege to the town. The garrison of the fortifications of Louisburg consisted of six hundred regulars and one thousand Breton militia, or, according to some writers, of only twelve hundred men in all. The armament of these works was one hundred and one cannon, seventy-six swivels, and six mortars. Auxiliary to the main works were an island-battery of thirty twenty-two-pounders, and a battery on the main land armed with thirty large cannon.

Frequent attempts were made to storm the place, but the most persevering efforts were of no avail, many of the New Englanders being killed and wounded, and their boats destroyed, while the garrison remained unharmed. At length, after a siege of forty-nine days, want of provisions and the general dissatisfaction of the inhabitants, caused the garrison to surrender. When the New Englanders saw the strength of the works, and the slight impression which their efforts had produced, they were not only elated but greatly astonished at their success. It should be noticed, that in the above attack the number of guns in the fleet was almost *three* times as great as that of all the forts combined; and yet the *naval* part of the attack was unsuccessful. The besieging army was more than *four* times as great as all the garrisons combined; and yet the place held out forty-nine days, and at last was surrendered through the want of provisions and the disaffection of the citizens. This place was soon afterwards restored to the French.

We see that, thus far in these wars, the English were vastly superior in strength and numbers, yet the result of the several campaigns was decidedly in favor of the French, who not only retained their possessions in the North, but extended their jurisdiction to the mouth of the Mississippi, and laid claim to the whole country west of the Alleghany mountains. This success must be attributed, not to any superiority of the Canadians in bravery, but to the higher military character of their governors, *and more especially to their fortifications*, which were constructed in situations most judiciously selected, to influence the Indians and facilitate incursions into the English colonies. The French pursued interior and central lines, while the English followed exterior and divergent lines. The disparity of numbers was always very great. At the beginning of the eighteenth century, the whole population of the colonies amounted to upwards of one million of souls, while that of both Canada and Louisiana did not exceed fifty-two thousand. But the French possessions, though situated at the extremities of a continent and separated by an almost boundless wilderness, were nevertheless connected by a line of military posts, strong enough to resist the small arms that could then be brought against them. This fort-building propensity of the French became a matter of serious alarm to the colonies, and in 1710 the legislature of New York especially protested against it in an address to the crown. While the military art was stationary in England, France had produced her four great engineers—Errard, Pagan, Vauban, and Cormontaigne; and

nowhere has the influence of their system of military defence been more strikingly exhibited than in the security it afforded to the Canadian colony, when assailed by such vastly superior British forces. Still further accessions were now made to these English forces by large reinforcements from the mother country, while the Canadians received little or no assistance from France; nevertheless they prolonged the war till 1760, forcing the English to adopt at last the slow and expensive process of reducing all their fortifications. This will be shown in the following outline of the several campaigns.

Very early in 1755, a considerable body of men was sent from Great Britain to reinforce their troops in this country. These troops were again separated into four distinct armies. The *first*, consisting of near two thousand men, marched to the attack of Fort Du Quesne, but was met and totally defeated by one-half that number of French and Indians. The *second* division, of fifteen hundred, proceeded to attack Fort Niagara by way of Oswego, but returned without success. The *third*, of three thousand seven hundred men, met and defeated Dieskau's army of twelve hundred regulars and six hundred Canadians and Indians, in the open field, but did not attempt to drive him from his works at Ticonderoga and Crown Point. The *fourth*, consisting of three thousand three hundred men and forty-one vessels, laid waste a portion of Nova Scotia; thus ending the campaign without a single important result. It was commenced under favorable auspices, with ample preparations, and a vast superiority of force; *but this superiority was again more than counterbalanced by the faulty plans of the English, and by the fortifications which the French had erected, in such positions as to give them a decided advantage in their military operations.* Washington early recommended the same system of defence for the English on the Ohio; and, after Braddock's defeat, advised "the erection of small fortresses at convenient places to deposit provisions in, by which means the country will be eased of an immense expense in the carriage, and it will also be a means of securing a retreat if we should be put to the rout again."

But this advice of Washington was unheeded, and the campaign of 1756 was based upon the same erroneous principles as the preceding one. The *first* division, of three thousand men, was to operate against Fort Du Quesne; the *second*, of six thousand men, against Niagara; the *third*, of ten thousand men, against Crown Point; and a *fourth*, of two thousand men,

was to ascend the Kennebec river, destroy the settlements on the Chaudiere, and, by alarming the country about Quebec, produce a diversion in favor of the third division, which was regarded as the main army, and was directed along the principal line of operations. The entire French forces at this time consisted of only three thousand regulars and a body of Canadian militia. Nevertheless, the English, with forces nearly *six times* as numerous, closed the campaign without gaining a single advantage.

We here see that the French, with very inferior forces, still continued successful in every campaign, uniformly gaining advantage over their enemy, and gaining ground upon his colonies. By the possession of Forts William Henry, Ticonderoga, and Crown Point, they completely commanded Lake George and Lake Champlain, which afforded the shortest and easiest line of communication between the British colonies and Canada. By means of their forts at Montreal, Frontenac, Detroit, &c., they had entire dominion of the lakes connecting the St. Lawrence with the Mississippi, and Canada with Louisiana; moreover, by means of Fort Du Quesne and a line of auxiliary works, their ascendency over the Indians on the Ohio was well secured. But experience had at length taught the English wherein lay the great strength of their opponents, and a powerful effort was now to be made to displace the French from their fortresses, or at least to counterbalance these works by a vast and overwhelming superiority of troops.

In 1757, a British fleet of fifteen ships of the line, eighteen frigates, and many smaller vessels, and a land force of twelve thousand effective men, were sent to attempt the reduction of the fortifications of Louisburg; but they failed to effect their object.

In 1758 the forces sent against this place consisted of twenty ships of the line and eighteen frigates, with an army of fourteen thousand men. The harbor was defended by only five ships of the line, one fifty-gun ship, and five frigates, three of which were sunk across the mouth of the basin. The fortifications of the town had been much neglected, and in general had fallen into ruins. The garrison consisted of only two thousand five hundred regulars, and six hundred militia. Notwithstanding that the number of guns of the British fleet exceeded both the armaments of the French ships and of all the forts, these British ships did not risk an attack, but merely acted as

transports and as a blockading squadron. Even the French naval defence, and the outer works commanding the harbor, were reduced by the temporary land-batteries which Wolfe erected; and the main work, although besieged by an inequality of forces of nearly *five* to *one*, held out for two months, and even then surrendered through the fears and petitions of the non-combatant inhabitants, and not because it had received any material injury from the besiegers. The defence, however, had been continued long enough to prevent, for that campaign, any further operations against Canada. The whole number of the English land forces in this campaign was computed at fifty thousand men, of which more than forty thousand were in the field. The *first* division, of nine thousand men, was directed against Fort Du Quesne, whose garrison did not exceed as many hundred. The *second* division, of sixteen thousand effective troops, proceeded against Ticonderoga and Crown Point; while a detachment of three thousand men captured Fort Frontenac, then garrisoned by only one hundred and ten men. The whole force of the French amounted to only five thousand; the English attempted to drive them from their works by storm, but were repulsed with a loss of near two thousand men, while their opponents were scarcely injured. The *third* division acted, as has just been stated, in concert with the naval force against Louisburg.

In 1759, the *western* division of the English army, consisting of a strong body of Indians, and five thousand troops, wasted the whole season in reducing Fort Niagara, which was garrisoned by only six hundred men. The *central* column of thirteen thousand men was sufficiently successful to enable it to winter at Crown Point. The *eastern* division of eight thousand men under Wolfe ascended the St. Lawrence with a fleet of twenty-two ships, thirteen frigates, and fourteen sloops, and smaller vessels, carrying one thousand nine hundred and ninety guns, and five thousand five hundred and ninety seamen. The naval defence of Quebec consisted of eight frigates, carrying two hundred and ten guns; the land forces numbered about nine thousand, and the fortifications were armed with ninety-four guns and five mortars, only a part of which could be brought to bear upon the anchorage ground. Several attempts were made by the combined forces to carry these works, but they proved equally unsuccessful. Although the English fleet carried *twenty times* as many guns as the forts, their inability to reduce these works was acknowledged. The siege had continued for two months, and

still the fortifications were uninjured. General Wolfe himself distinctly stated, that, in any further attempt to carry the place, the "guns of the shipping could not be of much use;" and the chief engineer of the expedition gave it as his opinion, that "the ships would receive great damage from the shot and bombs of the upper batteries, without making the least impression upon them." Under these circumstances it was finally determined to endeavor to decoy Montcalm from his works, and make him risk a battle in the open field. In an evil hour, the French consented to forego the advantages of their fortifications, and the contest was finally decided on the plains of Abraham, with forces nearly equal in number. Both Wolfe and Montcalm fell in this battle, but the former on the field of victory; and five days afterwards the inhabitants of Quebec, weakened and dispirited by their losses, surrendered the town, although its fortifications were still unharmed.

The French, in this campaign, had relinquished all idea of opposing the enemy in the open field, and confined their efforts to retard the advance of the English till France could send troops to their relief; but no such relief came, and when the campaign of 1760 opened, the little French army was concentrated at Montreal. As the English divisions advanced, one by Oswego, one by Lake Champlain, and the third by Quebec, they afforded to the French a fine opportunity for the strategic movement from a centre against converging lines; but the garrison was too weak to hope for success in either direction, and therefore awaited the enemy within their works. Montreal, being but slightly fortified, was soon reduced, and with it fell the French empire erected in this country at infinite labor and expense.

At the first outbreak of the American Revolution, it was so obviously important to get possession of the military works commanding the line of Lake Champlain, that expeditions for this purpose were simultaneously fitted out by Massachusetts and Connecticut. The garrisons of these works were taken by surprise. This conquest, says Botta, the able and elegant historian of the Revolution, "was no doubt of high importance, but it would have had a much greater influence upon the course of the whole war, if these fortresses, *which are the bulwarks of the colonies*, had been defended in times following, with the same prudence and valor with which they had been acquired."

In the campaign of 1775, an army of two thousand seven hundred and eighty-four effective men, with a reserve of one thousand at Albany, crossed the lake and approached the fortress of St. John's about the 1st of September. The work was garrisoned by only about five or six hundred regulars, and some two hundred militia. This was the only obstacle to prevent the advance of our army into the very heart of Canada; to leave it unreduced in rear would cut off all hope of retreat. Allen had already made the rash and foolish attempt, and his whole army had been destroyed, and he himself made prisoner. The reduction of this place was therefore deemed absolutely necessary, but was not effected till the 3d of November, and after a long and tedious siege. This delay decided the fate of the campaign; for, although Montreal fell immediately afterwards, the season was so far advanced that a large portion of our troops, wearied with their sufferings from cold and want of clothing, now demanded their discharge. The eastern division, of one thousand men under Arnold, crossing the country by the Kennebeck and Chaudiere, through difficulties and suffering almost unparalleled, arrived opposite Quebec on the 9th of November. The place was at this time almost without defence, and, had Arnold possessed a suitable pontoon equipage, it might easily have been taken by surprise. But by the time that the means for effecting a passage could be prepared, and a junction could be effected between the two American armies, Quebec was prepared to sustain their attack. The result of that attack is too well known to require a repetition here.

Early the next season it was deemed necessary to withdraw the American army from Canada. This retreat of undisciplined troops, in the presence of vastly superior numbers of the enemy, would have been extremely hazardous had it not been effected on a line of forts which were held by our own troops. As it was we sustained no considerable loss.

Carleton pursued on rapidly, to co-operate with General Howe, who was now lying at New York with over one hundred ships and about thirty-five thousand troops; but he received a decided check from the guns of Ticonderoga, and retired again to Canada.

By the British plan of campaign in 1777, the entire force of their northern army was to concentrate at Albany. One division of fifteen hundred men, including Indians, advanced by Oswego, Wood Creek, and the Mohawk; but

Fort Stanwix, with a garrison of only six hundred men, arrested their progress and forced them to return. Another, leaving New York, ascended the Hudson as far as Esopus; but its progress was so much retarded by the small forts and water-batteries along that river, that it would have been too late to assist Burgoyne, even if it could possibly have reached Albany. The principal division of the enemy's army, numbering about nine thousand men, advanced by the Champlain route. Little or no preparations were made to arrest its progress. The works of Ticonderoga were so out of repair as to be indefensible on the flanks. Its garrison consisted of only fifteen hundred continental troops, and about as many militia, over whom the general had no control. Their supply of provisions was exhausted, and only one man in ten of the militia had bayonets to their guns. Under these circumstances it was deemed best to withdraw the garrison six days after the investment. Burgoyne now advanced rapidly, but with so little precaution as to leave his communications in rear entirely unprotected. Being repulsed by the American forces collected at Saratoga, his line of supplies cut off by our detached forts, his provisions exhausted, his troops dispirited, and his Indian allies having deserted him, retreat became impossible, and his whole army was forced to capitulate. This campaign closed the military operations on our northern frontier during the war of the Revolution.

We now come to the war of 1812. In the beginning of this war the number of British regulars in the Canadas did not exceed three thousand men, who were scattered along a frontier of more than nine hundred miles in extent. In the whole of Upper Canada there were but seven hundred and twenty men, and at Montreal, Three Rivers, and on the whole line of the Sorel the whole defensive force amounted to only thirteen hundred and thirty men, and the garrison of Quebec was so small, that no detachment could be made without great inconvenience and danger. The fortifications of Isle aux Noix, then emphatically the key of central Canada, was without a garrison during nearly the whole of the first campaign. Under these circumstances an American force of fifteen hundred or two thousand men marching rapidly from Albany, might readily have broken the enemy's line of defence, and cut off all Upper Canada from supplies and reinforcements from England by way of Quebec. Let us see what course was pursued.

On the 1st of June an army of two thousand men was collected at Dayton, in Ohio, placed under the command of an imbecile old officer of the

Revolution, and directed by Detroit against the Canadian Peninsula. The dilatory march, absurd movements, and traitorous surrender of Hull's army to a British force of three hundred regulars and four hundred militia, are but too well known. Another American army of about ten thousand men was afterwards raised in the west; the main division of this army under Harrison marched by three separate routes to invade Canada by way of Malden; but they failed to reach their destination, and wintered behind the river Portage. The Eastern army was collected at Albany in the early part of the summer and placed under the command of General Dearborn, another old officer of the Revolution. Instead of pushing this force rapidly forward upon the strategic line of Lake Champlain, the general was directed to divide it into three parts, and to send one division against the Niagara frontier, a *second* against Kingston, and a *third* against Montreal. These orders were dispatched from Washington the 26th of June, nearly a month after Hull had begun his march from Dayton. Dearborn's army, on the first of September, consisted of six thousand five hundred regulars and seven thousand militia —thirteen thousand five hundred in all: six thousand three hundred for the Niagara frontier, two thousand two hundred at Sacketts Harbor, and five thousand for Lake Champlain. Even with this absurd plan of campaign and faulty division of the forces, we might have succeeded if the general had acted with energy, so exceedingly weak were the Canadian means of defence; but instead of taking advantage of his superiority in numbers and the favorable circumstances of the time, he entered into an armistice with the British general, and his whole army of thirteen thousand five hundred men lay inactive till the 13th of October, when the absurd project of crossing the Niagara at Lewiston failed, because the New-York militia had *constitutional scruples* against crossing a river so long as the enemy were on the other side. The Lake Champlain column, consisting of three thousand regulars and two thousand militia, a considerable portion of which had been collected as early as the first of August, had in four months advanced as far as La Cole river, a distance of about two hundred miles from Albany. The unimportant action at this place terminated the campaign, and the army of the North returned to winter-quarters.

All the early part of the campaign of 1813, on the northern frontier, was spent in a war of detachments, in which our troops captured Fort George and York, and repelled the predatory excursions of the enemy. In these

operations our troops exhibited much courage and energy, and the young officers who led them, no little skill and military talent. But nothing could have been more absurd than for a general, with superior forces in the vicinity of an enemy, to act only by detachments at a time when his opponents were daily increasing in number. This useless war of outposts and detachments was continued till July, when General Dearborn was recalled, and General Wilkinson, another old officer of the Revolution, put in his place. It was now determined to make a push for Montreal, with the combined forces of the Northern army. Wilkinson, with 8,000 men, descended the St. Lawrence, but did not reach Prescott till the 6th of November, thus affording to the English plenty of leisure to prepare for his reception. Hampton, another old officer of the Revolution, ascended Lake Champlain with another column of 4,000 men, but refused to form any co-operation with Wilkinson, and after the unimportant combat of Chrystler's Field, the whole army again retired to winter-quarters.

In the mean time the army of the West, under Harrison, who was assisted by the military skill and science of McCrea and Wood, and the bravery of Croghan and Johnson, held in check the British and Indians; and the battle of the Thames and the victory of Lake Erie formed a brilliant termination to the campaign in that quarter. Had such victories been gained on the Montreal or eastern portion of the frontier, they would have led to the most important results.

The plan of operations for the campaign of 1814 was of the same diverse and discordant character as before. But the command of the troops had now fallen into the hands of young and energetic officers, and Brown, assisted by such men as Wood, McCrea, Scott, Ripley, Miller, soon gained the victories of Fort Erie, Chippewa, and Lundy's Lane; while McComb and McDonough drove back the enemy from the line of Lake Champlain. With these operations terminated the Northern campaign of 1814, the last which has been conducted on that frontier.

Let us now turn to the system of works projected for the defence of this line.

The first works are at the Falls of St. Mary, on the western extremity of the line.

The second works are at Mackinaw.

The third works are at the foot of Lake Huron.

The fourth works are near Detroit.

The fifth works are near Buffalo.

The sixth works are at the mouth of the Niagara river.

The seventh works are at Oswego.

The eighth works are at Sacketts Harbor.

The ninth works are below Ogdensburg.

The tenth works are at Rouse's Point.

The eleventh works are near the head-waters of the Kennebec or the Penobscot.

The twelfth works are at Calais, on the St. Croix.

All these works are small, and simple in their character, well calculated to assist the operations of armed forces in the field, but incapable of resisting a protracted siege. They are entirely different in their character from those on the coast, the latter being intended principally for the use of our citizen-soldiery, in the defence of our seaport towns, while the former are intended merely as auxiliaries to the operations of more disciplined troops.

This system of defence for our Northern frontier has been much commented on by men professing some knowledge of the military art, and various opinions have been advanced respecting its merits. Some have thought that more and larger works should be placed on the western extremity of this line; others attach by far the greatest importance to the central or Montreal portion of the frontier; while others, again, attach a higher value to the eastern extremity of the line.

These last would have us concentrate our main forces on the head-waters of the Kennebec and the Penobscot, and then advance upon Quebec, a distance of some 250 miles, along the isolated carriage-road, through the valley of the Chaudiere. Here is only a single road, but little travelled, and

penetrating a wide and almost uninhabited wilderness. General Jomini says emphatically, that *a line of operations should always offer two or three roads for the movement of an army in the sphere of its enterprises*,—an insuperable objection to the Kennebec route, except as a diversion to the main attack. But there are still stronger objections to this route, than its want of feasibility for the transportation of the main army; for even should that army succeed in reaching Quebec in safety, the expedition would be entirely without military results, unless that fortress could be immediately reduced,—a contingency which would be extremely doubtful under the most favorable circumstances; and even should we be ever so fortunate in our operations, the siege of such a place would occupy a considerable length of time. It would be throwing our forces along the most difficult line of operations, against the strongest point in the enemy's line of defence, and making the success of the whole plan depend upon the contingency of a reduction, in a few days, of one of the strongest fortresses in the world. What principle in military science would justify such a plan of campaign? We are fully aware of the great advantages to be derived from the reduction of Quebec; and we are also aware of the great difficulties to be encountered in any attempt to accomplish that object. It may, and probably will ere long, be made to surrender to our arms; but it would be utter folly to base our military operations on the contingency of a short and successful siege. By advancing upon Montreal by the Lake Champlain route, we could cut off the Canadian forces in the West from all reinforcements; and then, as circumstances might direct, could besiege Quebec, or attack the enemy in the field, or perhaps, manœuvring as the French did at the siege of Mantua, accomplish both objects at the same time.

We have seen that it was one of Napoleon's maxims that *an army should choose the shortest and most direct line of operations, which should either pierce the enemy's line of defence, or cut off his communications with his base*. It is the opinion of men of the best military talent in our army that the Lake Champlain line satisfies all these conditions at the same time;—that it is the most direct, most feasible, and most decisive line which can be pursued in case of operations against Canada; and that it is indispensable to success in war that this line be well fortified in time of peace. All agree that the St. Lawrence above Quebec constitutes the *key* point of the enemy's defence, and the *objective* point towards which all our operations should be

directed. To reach this point, all our Boards of Engineers have deemed it best to collect our troops at Albany and advance by Lake Champlain, a distance of only two hundred miles. Besides the advantages of a good water communication the whole distance for the transportation of military stores, there are several roads on each side, all concentrating on this line within our own territory. It has already been shown by the brief sketch of our northern wars, that this line has been the field of strife and blood for *fifteen campaigns*. Nature has marked it out as our shortest and easiest line of intercourse with Canada, both in peace and war. Military diversions will always be made on the eastern and western extremities of this frontier, and important secondary or auxiliary operations be carried on by the eastern and western routes; but until we overthrow the whole system of military science as established by the Romans, revived by Frederick and practised and improved by Napoleon, the *central and interior line*, under all ordinary circumstances, will furnish the greatest probabilities of success.

If the line of Lake Champlain is, as we have endeavored to show, the most important line in the north; its security by fortifications is a matter of the greatest interest. The works recommended by the Board, consist of a single fort, costing $600,000, at Rouse's Point, on the extreme frontier, and unfortified dépôts at Plattsburg and Albany. But is this sufficient to accomplish the object? If the hostile army should pass the extreme frontier barrier, what is to retard his advance,—what defensive works are to protect the débouché of the Northern canal, or even to save the great central dépôt? We know of no foreign engineer who has recommended less than *three* lines of fortifications for the security of a land frontier; and Napoleon, the Archduke Charles, and General Jomini, agree in recommending at least this number of lines. There may be circumstances that render it unnecessary to resort to a three-fold defence throughout the whole extent of our northern frontier; but upon our main line of communication with Canada,—a line of maximum importance both to us and to the enemy, we know of no reason for violating the positive rules of the art,—rules which have been established for ages; and sanctioned by the best engineers and greatest generals of modern times.

Ticonderoga has more than once stayed the waves of northern invasion; and we know of no change in the art of war, or in the condition of the country, that renders less important than formerly the advantages of an intermediate

point of support between Albany and the Canadian lines. Indeed it would seem that the connection of the Hudson with the lake by the northern canal had even increased the value of such a point.

It would seem, moreover, that the great value of a central dépôt near Albany would warrant a resort to the best means of security which can be afforded by defensive works. Here we already have one of our largest arsenals of construction; here are to be located magazines for the collection and deposit, in time of peace, of gunpowder; here, in time of war, is to be formed the grand military dépôt for our whole northern armies; and here is the point of junction of the lines of communication of our northern and eastern states, and the great central rallying point where troops are to be collected for the defence of our northern frontier, or for offensive operations against Canada. Such a place should never be exposed to the *coup-de-main* of an enemy. The chance operations of a defensive army are never sufficient for the security of so important a position. We do not here pretend to say what its defences should be. Perhaps strong *têtes-de-pont* on the Mohawk and Hudson rivers, and detached works on the several lines of communication, may accomplish the desired object; perhaps more central and compact works may be found necessary. But we insist on the importance of securing this position by *some* efficient means. The remarks of Napoleon, (which have already been given,) on the advantages to be derived from fortifying such a central place, where the military wealth of a nation can be secured, are strikingly applicable to this case.

But let us look for a moment at what is called the *western* plan of defence for our northern frontier.

Certain writers and orators of the western states, in their plans of military defence, would have the principal fortifications of the northern frontier established on Lake Erie, the Detroit river, the St. Clair, and Lake Huron; and the money proposed for the other frontier and coast works, expended in establishing military and naval dépôts at Memphis and Pittsburg, and in the construction of a ship-canal from the lower Illinois to Lake Michigan,—for the purpose of obtaining the naval control of the northern lakes.

It is said that British military and steam naval forces will ascend the St. Lawrence to Lake Ontario; that to counteract these operations we must

build an opposition steam-navy at Pittsburg and Memphis, and collect out troops on the Ohio and Mississippi, ascend the Mississippi and Illinois, Lake Michigan, Lake Huron, and the Georgian Bay, cross over to the Ottawa by French river and Lake Nipissing, or Moon river and the Muskago, then descend the Ottawa river to Montreal. But as there might be some difficulty in conveying their war-steamers over some twelve or fifteen portages between the Georgian Bay and the Ottawa, and as the upper waters of that river are not navigable by such craft, it has, by some of the military writers before alluded to, been deemed preferable to descend Lake Huron, St. Clair river and lake, run the gauntlet past the British forts on the Detroit, descend Lake Erie and the Niagara[26] into Lake Ontario, so as to meet the English as they come steaming up the St. Lawrence!

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How they are to pass the Falls was not determined either by Harry Bluff or the Memphis Convention.

It is agreed upon all sides that the British must first collect their forces at Quebec, and then pass along the line of the St. Lawrence and Lake Ontario to reach the Niagara and Detroit frontiers. Our boards of engineers have deemed it best to collect troops on the Champlain line, and, by penetrating between Montreal and Quebec, separate the enemy's forces and cut off all the remainder of Canada from supplies and reinforcements from England. But it has been discovered by certain western men that to cut the *trunk* of a tree is not the proper method of felling it: we must climb to the *top* and pinch the buds, or, at most, cut off a few of the smaller limbs. To blow up a house, we should not place the mine under the foundation, but attach it to one of the shingles of the roof! We have already shown that troops collected at Albany may reach the great strategic point on the St. Lawrence by an easy and direct route of *two hundred miles*; but forces collected at Pittsburg and Memphis must pass over a difficult and unfrequented route of *two thousand miles*.

Our merchant marine on the lakes secures to us a naval superiority in that quarter at the beginning of a war; and our facilities for ship-building are there equal if not superior to any possessed by the enemy. The only way, therefore, in which our ascendency on the lakes can be lost, is by the introduction of steam craft from the Atlantic. The canals and locks constructed for this object will pass vessels of small dimensions and drawing not over eight and a half feet water.

How are we to prevent the introduction of these Atlantic steamers into our lakes? Shall we, at the first opening of hostilities, march with armed forces upon the enemy's line of artificial communication and blow up the locks of their ship-canals, thus meeting the enemy's marine at the very threshold of its introduction into the interior seas; or shall we build opposition steam-navies at Pittsburg and Memphis, some two thousand miles distant, and then expend some forty or fifty millions[27] in opening an artificial channel to enable them to reach Lake Ontario, after its borders have been laid waste

by the hostile forces? Very few disinterested judges would hesitate in forming their opinion on this question.[28]

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The construction of the Illinois ship-canal, for vessels of eight and a half feet draught, is estimated at fifteen millions; to give the same draught to the Mississippi and lower Illinois, would require at least ten millions more; a ship canal of the corresponding draught around Niagara Falls, will cost, say, ten millions; the navy yard at Memphis, with docks, storehouses, &c., will cost about two millions, and steamers sent thence to the lakes will cost about fifty thousand dollars per gun. On the other hand, the military defences which it is deemed necessary to erect in time of peace for the security of the Champlain frontier, will cost only about two thousand dollars per gun; the whole expenditure not exceeding, at most, two millions of dollars!

It is not to be denied that a water communication between the Mississippi and the northern lakes will have great commercial advantages, and that, in case of a protracted war, auxiliary troops and military stores may be drawn from the valley of the Mississippi to assist the North and East in preventing any great accessions to the British military forces in the Canadas. We speak only of the policy of expending vast sums of money on this *military* (?) *project*, to the neglect of matters of more immediate and pressing want. We have nothing to say of its character as a *commercial project*, or of the ultimate military advantages that might accrue from such a work. We speak only of the present condition and wants of the country, and not of what that condition and those wants may be generations hence!

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There are no books devoted exclusively to the subjects embraced in this chapter; but the reader will find many remarks on the northern frontier defences in the histories of the war of 1812, in congressional reports, (vide House Doc. 206, XXVIth Congress, 2d session; and Senate Doc., No. 85, XXVIIIth Congress, 2d session,) and in numerous pamphlets and essays that have appeared from the press within the last few years.

CHAPTER IX.

ARMY ORGANIZATION—STAFF AND ADMINISTRATIVE CORPS.

By the law of the 12th of December, 1790, on the organization of the public force of France, the Army was defined, "A standing force drawn from the public force, and designed to act against external enemies." [*Une force habituelle extraite de la force publique, et destinée essentiellement à agir contre les ennemis du dehors*.]

In time of peace, the whole organized military force of the State is intended when we speak of *the army*; but in time of war this force is broken up into two or more fractions, each of which is called an *army*. These armies are usually named from the particular duty which may be assigned to them—as, *army of invasion, army of occupation, army of observation, army of reserve, &c.*; or from the country or direction in which they operate—as, *army of the North, of the South, of Mexico, of Canada, of the Rhine, &c.*; or from the general who commands it—as, the *army of Soult, army of Wellington, army of Blücher, &c.*

All modern armies are organized on the same basis. They are made up of a Staff and Administrative departments, and four distinct arms—Infantry, Cavalry, Artillery, and Engineers; each having distinct duties, but all combining to form one and the same military body. In the actual operations of a campaign, these forces are formed into *corps d'armée*, each *corps d'armée* being composed of two or more *grand-divisions*; each grand-division, of two or more *brigades*; and each brigade, of several *companies, squadrons*, or *batteries*.

In speaking of an army in the field, it is sometimes supposed to be divided into two classes of men—the *Staff* and *the line*. We here include in the first class—

All officers, of whatever arm, above the rank of colonel;

All officers of the staff corps of whatever grade, and

All officers attached to the staff as aides, &c.;

All officers of the administrative departments;

All officers of artillery and engineer staffs;

The corps of geographical or topographical engineers, and

The guards.

In the second class are included all troops, of whatever arm, which belong to the active army, in infantry, cavalry, artillery, and engineers. All troops on detached service, such as recruiting, guarding posts and dépôts, escorting convoys, &c., as well as all sedentary corps, garrisons of fortified places, &c., are not regarded in this classification as composing any part of the *line* of the army.

Troops of the line is a term applied only to such troops as form the principal line on the battle-field, viz:—The heavy infantry and heavy cavalry. These are technically called *infantry of the line*, and *cavalry of the line*. In this sense of the term, light infantry, light cavalry or dragoons, artillery, and engineers, are not classed as troops of the *line*. But this distinction is now pretty much fallen into disuse, and the division of an army into Staff and Administrative departments, and four arms of service—Infantry, Cavalry, Artillery, and Engineers—is now regarded as the most convenient, from being precise and definite in its meaning.

The *general staff* of an army includes all general officers of the army, and such officers of lower grades as are attached to this general duty, instead of serving with troops, or on special administrative duty. The general officers are—1st, the *generalissimo*, or commander-in -chief; 2d, *generals*, or marshals, as they are called in France, or field-marshals and generals of infantry and cavalry, as they are called in England and the northern states of Europe; 3d, *lieutenant-generals*; 4th, *generals of division*, or major-generals, as they are called in England; 5th, *generals of brigade*, or brigadier-generals, as they are sometimes called;—colonels, majors, captains, lieutenants, ensigns, and cornets or cadets, are also either attached to the staff, or form a part of the *staff corps*. The titles of "adjutant-general,"

and of "inspector-general," are given to staff officers selected for these special services, either in the general staff or in the several *corps d'armée*. No special rank is attached to these offices themselves, and the grade of those who hold them is fixed by some special rule, or by their general rank in the army.

In the war of the Revolution, Washington held the rank of General, and in 1798 the rank of Lieutenant-general. In the war of 1812, the highest grade held by any of our officers was that of General of Division, or Major-general, as it was called. The highest grade in our army at the present time is called Major-general—a title that properly belongs, not to the general of an army, but to the chief of staff. Hamilton had this title when chief of Washington's staff; Berthier and Soult when chief of Napoleon's staff, the former till the close of the campaign of 1814, and the latter in the Waterloo campaign. General Jomini first greatly distinguished himself as chief of Ney's staff, and afterwards on the staff of the Emperor of Russia. Other generals have owed much of their success to the chiefs of their staff:—Pichegru to Regnier, Moreau to Dessoles, Kutusof to Toll, Barclay to Diebitsch, and Blücher to Sharnharst and Gneisenau.

The *generalissimo* or commander-in-chief of an army is the person designated by the law of the land to take charge of the organized military forces of the state. In this country the President, through his Secretary of War, exercises this general command. In England, Wellington acts in the capacity of commander-in-chief of all the British military forces. In France, the Minister of War, under the king, has this general direction. In other European services, some prince of the blood, or distinguished general, exercises the functions of generalissimo.

An active army in the field should be commanded by a *general*, or, as is done in some European countries, by a marshal. These may be regarded as of assimilated rank.

A *corps d'armée* should, be commanded by a *Lieutenant-general*. This rule is almost universal in Europe. The number of marshals in France under Napoleon was so great, that officers of this grade were often assigned to *corps d'armée*.

A grand division of an army should be commanded by a *General of Division*. In England, the assimilated grade is that of major-general, and in France at the present time, the younger lieutenant-generals, or the *maréchaux-de-camp*, command divisions.

A brigade should be commanded by a *Brigadier-general*. At the present time in the French service, *maréchaux-de-camp* act as commanders of brigades.

The several *corps d'armée* are designated by numbers, 1st, 2d, 3d, &c., and in the same way the several divisions in each *corps d'armée*, and the several brigades in each division.

When the number of troops are placed on a war footing, each *corps d'armée* ordinarily contains from twenty to thirty thousand men.

The command of these several *corps d'armée*, divisions, and brigades, is taken by the officers of the corresponding grades according to seniority of rank, and without reference to arms, unless otherwise directed by the generalissimo, who should always have the power to designate officers for special commands.

The *chief of staff* of an army is usually selected from the grade next below that of the general commanding, and receives the title, for the time being, which is used to designate this special rank. In some European armies, and formerly in our own service, this officer was called major-general. In France, if the generalissimo commands in person, a marshal is made chief of staff with the temporary title of *major-général*; but if a marshal commands the army, a lieutenant -general or *maréchal-de-camp* becomes chief of staff with the title of *aide-major-général*. The chiefs of staff of *corps d'armée* and of divisions, are selected in precisely the same way.

The position assigned by the commanding general for the residence of his staff, is denominated the *General Head-Quarter of the army*; that of a *corps d'armée* staff, the *Head-Quarters of* [1st or 2d, &c.] *corps d'armée*; that of a division, the *Head-Quarters of* [1st or 2d, &c.] *division*, [1st or 2d, &c.] *corps d'armée*.

The petty staffs of regiments, squadrons, &c., consisting of an adjutant, sergeant-major, &c., are especially organized by the commandants of the

regiments, &c., and have no connection whatever with the general staff of an army. Of course, then, they are not embraced in the present discussion.

The subordinate officers of the staff of an army, in time of war, are charged with important and responsible duties connected with the execution of the orders of their respective chiefs. But in time of peace, they are too apt to degenerate into fourth-rate clerks of the Adjutant-general's department, and mere military dandies, employing their time in discussing the most unimportant and really contemptible points of military etiquette, or criticising the letters and dispatches of superior officers, to see whether the wording of the report or the folding of the letter exactly corresponds to the particular regulation applicable to the case. Such was the character given to the first staff of Wellington, and a similar class of men composed the staff of the army of Italy when it was abolished by Napoleon and a new one formed in its place. There are also some officers of this stamp in our own service, but they are regarded by the army with universal contempt. The staff of our army requires a new and different organization, and should be considerably enlarged.

The following is the composition of a regularly organized general staff in the French service, for an army of forty or fifty thousand men divided into two *corps d'armée* and a reserve.

1st. The marshal (or general) commanding-in-chief; and one colonel or lieutenant-colonel, one major, three captains and three subalterns, as aides-de-camp.

2d. A lieutenant-general as chief-of-staff, with the title of *major-general*, assisted by one colonel or lieutenant-colonel, three majors, five captains, and one subaltern, as aides-de-camp.

3d. Three lieutenant-generals, commanding the *corps d'armée* and reserve. Each of these will be assisted by aides in the same way as the *major-general*, and each will also have his regularly-organized staff of *corps d'armée*, with a general of division or general of brigade as chief.

4th. Six or nine generals commanding divisions, each having his own distinct and separately organized staff. In the French army, the staff of an

officer commanding a division is composed of one colonel, two majors, three captains, and six subalterns.

5th. Twelve or more generals of brigade, each having one captain, and one subaltern for aides.

6th. There is also attached to the staff of the general-in-chief of the army, the commandants of artillery and engineers, with several subordinates, inspector-generals, and the ranking officers of each of the administrative departments, with their assistants.

The generals select their aides and assistants from the staff corps, or from either of the four arms of service.

The troops of these arms may be distributed as follows:

52 battalions of infantry,	35,000 men.
42 squadrons of horse	6,500
13 batteries of artillery, (4 mounted and 9 foot,)	2,500
5 companies of sappers, 2 of pontoniers,[29] and 1 of artificers	1,500
	45,500

[29]

One bridge-equipage is required for each *corps d'armée*.

If we add to these the staff, and the several officers and employés of the administrative departments, we have an army of nearly fifty thousand men.

This, it will be remembered, is the organization of an army in the field; in the entire military organization of a state, the number of staff officers will be still higher.

In 1788, France, with a military organization for about three hundred and twenty thousand men, had eighteen marshals, two hundred and twenty-five lieutenant-generals, five hundred and thirty-eight *maréchaux-de-camp*, and four hundred and eighty-three brigadiers. A similar organization of the

general staff was maintained by Napoleon. At present the general staff of the French army consists of nine marshals, (twelve in time of war;) eighty lieutenant-generals in active service, fifty-two in reserve, and sixty two *en retraite*—one hundred and ninety-four in all; one hundred and sixty *maréchaux-de-camp* in active service, eighty-six in reserve, and one hundred and ninety *en retraite*—four hundred and thirty-six in all. The officers of the staff-corps are: thirty colonels, thirty lieutenant-colonels, one hundred majors, three hundred captains, and one hundred lieutenants. Those of other European armies are organized on the same basis.

It will be seen from these remarks that the organization of our own general staff is exceedingly defective, and entirely unsuited to the object for which it is created. We have two brigadier-generals for the command of two brigades, and one general of division, with the title of major-general, who acts in the fourfold capacity of general commanding the army, lieutenant-general, general of division, and chief of staff of the army. But as it is impossible with this number to maintain a proper organization, the President (with the advice and consent of the Senate) has, from time to time, increased this number to three major-generals, and nine brigadier-generals, and numerous officers of staff with lower grades. Nearly all these officers are detached from their several regiments and corps, thus injuring the efficiency of regiments and companies; and we have in our service, by this absurd mode of supplying the defects of our system of organization by brevet rank, the anomaly of *officers being generals, and at the same time not generals; of holding certain ranks and grades, and yet not holding these ranks and grades!* Let Congress do away this absurd and ridiculous system, and establish a proper and efficient organization of the general staff, and restore the grades of general and lieutenant-general. In the war of 1812, instead of resorting to a proper organization when an increase of the general staff was required, we merely multiplied the number of major-generals and generals of brigade by direct appointment, or by conferring brevet rank. It is now conceded that there never was a more inefficient general staff than that with which our army was cursed during the war; and the claims of brevet rank have ever since been a source of endless turmoils and dissatisfaction, driving from the army many of its noblest ornaments.

In the event of another war, it is to be hoped that Congress will not again resort to the ruinous system of 1812. Possibly it may by some be objected to

the creation of generals, lieutenant-generals, &c., that it increases the expense of the army and the number of its officers. This need not be. The number, pay, &c., may remain the same, or nearly the same, as at present. But by increasing the grades you avoid in a considerable measure the difficulties of seniority claims and brevet rank—the principal curses of our present system. If we merely increase the number of each existing grade, giving a part of these rank above their name and office, we merely multiply evils. But we will leave this subject for the present, and recur to the general discussion of staff duties.

The following remarks of Jomini on the importance of the staff of an army are worthy of attention. "A good staff," says he, "is, more than all, indispensable to the constitution of an army; for it must be regarded as the nursery where the commanding general can raise his principal supports—as a body of officers whose intelligence can aid his own. When harmony is wanting between the genius that commands, and the talents of those who apply his conceptions, success cannot be sure; for the most skilful combinations are destroyed by faults in execution. Moreover, a good staff has the advantage of being more durable than the genius of any single man; it not only remedies many evils, but it may safely be affirmed that it constitutes for the army the best of all safeguards. The petty interests of coteries, narrow views, and misplaced egotism, oppose this last position: nevertheless, every military man of reflection, and every enlightened statesman, will regard its truth as beyond all dispute; for a well-appointed staff is to an army what a skilful minister is to a monarchy—it seconds the views of the chief, even though it be in condition to direct all things of itself; it prevents the commission of faults, even though the commanding general be wanting in experience, by furnishing him good councils. How many mediocre men of both ancient and modern times, have been rendered illustrious by achievements which were mainly due to their associates! Reynier was the chief cause of the victories of Pichegru, in 1794; and Dessoles, in like manner, contributed to the glory of Moreau. Is not General Toll associated with the successes of Kutusof? Diebitsch with those of Barclay and Witgenstein? Gneisenau and Muffling with those of Blücher? Numerous other instances might be cited in support of these assertions."

"A well-established staff does not always result from a good system of education for the young aspirants; for a man may be a good mathematician

and a fine scholar, without being a good warrior. The staff should always possess sufficient consideration and prerogative to be sought for by the officers of the several arms, and to draw together, in this way, men who are already known by their aptitude for war. Engineer and artillery officers will no longer oppose the staff, if they reflect that it will open to them a more extensive field for immediate distinction, and that it will eventually be made up exclusively of the officers of those two corps who may be placed at the disposal of the commanding general, and who are the most capable of directing the operations of war."

"At the beginning of the wars of the Revolution," says this able historian elsewhere, "in the French army the general staff, which is essential for directing the operations of war, had neither instruction nor experience." The several adjutant-generals attached to the army of Italy were so utterly incompetent, that Napoleon became prejudiced against the existing staff-corps, and virtually destroyed it, drawing his staff-officers from the other corps of the army. In his earlier wars, a large portion of staff duties were assigned to the engineers; but in his later campaigns the officers of this corps were particularly required for the sieges carried on in Germany and Spain, and considerable difficulty was encountered in finding suitable officers for staff duty. Some of the defects of the first French staff-corps were remedied in the latter part of Napoleon's career, and in 1818 it was reorganized by Marshal Saint-Cyr, and a special school established for its instruction.

Some European nations have established regular staff-corps, from which the vacancies in the general staff are filled; others draw all their staff-officers from the corps of the army. A combination of the two systems is preferred by the best judges. Jomini recommends a regular staff-corps, with special schools for its instruction; but thinks that its officers should be drawn, at least in part, from the other corps of the army: the officers of engineers and artillery he deems, from their instruction, to be peculiarly qualified for staff duty. The policy of holding double rank at the same time in the staff and in the corps of the army, as is done in our service, is pronounced by all competent judges as ruinous to an army, destroying at the same time the character of the staff and injuring the efficiency of the line.

The following remarks on the character and duties of general-officers of an army, made at the beginning of the war of 1812, are from the pen of one of the ablest military writers this country has yet produced:—

"Generals have been divided into three classes,—*Theorists*, who by study and reflection have made themselves acquainted with all the rules or maxims of the art they profess; *Martinets*, who have confined their attention merely to the mechanical part of the trade; and *Practical men*, who have no other or better guide than their own experience, in either branch of it. This last description is in all services, excepting our own, the most numerous, but with us gives place to a fourth class, viz., men destitute alike of *theory* and of *experience*."

"Self-respect is one thing, and presumption another. Without the former, no man ever became a good officer; under the influence of the latter, generals have committed great faults. The former is the necessary result of knowledge; the latter of ignorance. A man acquainted with his duty can rarely be placed in circumstances new, surprising, or embarrassing; a man ignorant of his duty will always find himself constrained to *guess*, and not knowing how to be right by *system*, will often be wrong by *chance*."

"These remarks are neither made nor offered as applying exclusively to the science of war. They apply to all other sciences; but in these, errors are comparatively harmless. A naturalist may amuse himself and the public with false and fanciful theories of the earth; and a metaphysician may reason very badly on the relations and forms of matter and spirit, without any ill effect but to make themselves ridiculous. Their blunders but make us merry; they neither pick pockets, nor break legs, nor destroy lives; while those of a general bring after them evils the most compounded and mischievous,—the slaughter of an army—the devastation of a state—the ruin of an empire!"

"In proportion as ignorance may be calamitous, the reasons for acquiring instruction are multiplied and strengthened. Are you an *honest* man? You will spare neither labor nor sacrifice to gain a competent knowledge of your duty. Are you a man of *honor*? You will be careful to avoid self-reproach. Does your bosom glow with the holy fervor of *patriotism*? You will so

accomplish yourself as to avoid bringing down upon your country either insult or injury."

"Nor are the more selfish impulses without a similar tendency. Has *hunger* made you a soldier? Will you not take care of your bread! Is *vanity* your principle of action? Will you not guard those mighty blessings, your epaulets and feathers! Are you impelled by a love of *glory* or a love of *power*? And can you forget that these coy mistresses are only to be won by intelligence and good conduct?"

"But the *means* of instruction, say you, where are they to be found? Our standing army is but a bad and ill-organized militia, and our militia not better than a mob. Nor have the defects in these been supplied by Lycées, Prytanées, and Polytechnic schools. The morbid patriotism of some, and the false economy of others, have nearly obliterated every thing like military knowledge among us."

"This, reader, is but one motive the more for reinstating it. Thanks to the noble art of printing! you still have *books* which, if *studied*, will teach the art of war."

"*Books*! And what are they but the dreams of pedants? They may make a Mack, but have they ever made a Xenophon, a Cæsar, a Saxe, a Frederick, or a Bonaparte? Who would not laugh to hear the cobbler of Athens lecturing Hannibal on the art of war?"

"True; but as you are not Hannibal, listen to the cobbler. Xenophon, Cæsar, Saxe, Frederick, and Napoleon, have all thought well of books, and have even composed them. Nor is this extraordinary, since they are but the depositories of maxims which genius has suggested, and experience confirmed; since they both enlighten and shorten the road of the traveller, and render the labor and genius of past ages tributary to our own. *These* teach most emphatically, that the secret of successful war is not to be found in mere *legs* and *arms*, but in the *head* that shall direct them. If this be either ungifted by nature, or uninstructed by study and reflection, the best plans of manœuvre and campaign avail nothing. The two last centuries have presented many revolutions in military character, all of which have turned on this principle. It would be useless to enumerate these. We shall quote only the greatest and the last—*The troops of Frederick!* How illustrious

under him! How contemptible under his successors! Yet his system was there; his double lines of march at full distance; his oblique order of battle; his simple lines of manœuvre in the presence of an enemy; his wise conformation of an *état-major;*—all, in short, that distinguished his practice from that of ordinary men, survived him; but the head that truly comprehended and knew how to apply these, died with Frederick. What an admonition does this fact present for self-instruction,—for unwearied diligence,—for study and reflection! Nor should the force of this be lessened by the consideration that, after all, unless nature should have done her part of the work,—unless to a soul not to be shaken by any changes of fortune—cool, collected, and strenuous—she adds a head fertile in expedients, prompt in its decisions, and sound in its judgments, no man can ever merit the title of a *general*."

The celebrated Marshal Saxe has made the following remarks on the necessary qualifications to form a good general. The most indispensable one, according to his idea, is valor, without which all the rest will prove nugatory. The next is a sound understanding with some genius: for he must not only be courageous, but be extremely fertile in expedients. The third is health and a robust constitution.

"His mind must be capable of prompt and vigorous resources; he must have an aptitude, and a talent at discovering the designs of others, without betraying the slightest trace of his own intentions; he must be, *seemingly*, communicative, in order to encourage others to unbosom, but remain tenaciously reserved in matters that concern his own army; he must, in a word, possess activity with judgment, be able to make a proper choice of his officers, and never deviate from the strictest line of military justice. Old soldiers must not be rendered wretched and unhappy by unwarrantable promotions, nor must extraordinary talents be kept back to the detriment of the service on account of mere rules and regulations. Great abilities will justify exceptions; but ignorance and inactivity will not make up for years spent in the profession."

"In his deportment he must be affable, and always superior to peevishness or ill-humor; he must not know, or at least seem not to know, what a spirit of resentment is; and when he is under the necessity of inflicting military chastisement, he must see the guilty punished without compromise or

foolish humanity; and if the delinquent be from among the number of his most intimate friends, he must be doubly severe towards the unfortunate man. For it is better, in instances of correction, that one individual should be treated with rigor (by orders of the person over whom he may be supposed to hold some influence) than that an idea should go forth in the army of public justice being sacrificed to private sentiments."

"A modern general should always have before him the example of Manlius; he must divest himself of personal sensations, and not only be convinced himself, but convince others, that he is the organ of military justice, and that what he does is irrevocably prescribed. With these qualifications, and by this line of conduct, he will secure the affections of his followers, instill into their minds all the impulses of deference and respect; he will be feared, and consequently obeyed."

"The resources of a general's mind are as various as the occasions for the exercise of them are multiplied and checkered: he must be perfectly master of the art of knowing how to support an army in all circumstances and situations; how to apply its strength, or be sparing of its energy and confidence; how to post all its different component parts, so as not to be forced to give or receive battle in opposition to settled plans. When once engaged, he must have presence of mind enough to grasp all the relative points of disposition and arrangement, to seize favorable moments for impression, and to be thoroughly conversant in the infinite vicissitudes that occur during the heat of a battle; on a ready possession of which its ultimate success depends. These requisites are unquestionably manifold, and grow out of the diversity of situations and the chance medley of events that produce their necessity."

"A general to be in perfect possession of them, must on the day of battle be divested of every thought, and be inaccessible to every feeling, but what immediately regards the business of the day; he must reconnoitre with the promptitude of a skilful geographer, whose eye collects instantaneously all the relative portions of locality, and feels his ground as it were by instinct; and in the disposition of his troops he must discover a perfect knowledge of his profession, and make all his arrangements with accuracy and dispatch. His order of battle must be simple and unconfused, and the execution of his plan be as quick as if it merely consisted in uttering some few words of

command; as, *the first line will attack! the second will support it! or, such a battalion will advance and support the line.*"

"The general officers who act under such a general must be ignorant of their business indeed, if, upon the receipt of these orders, they should be deficient in the immediate means of answering them, by a prompt and ready co-operation. So that the general has only to issue out directions according to the growth of circumstances, and to rest satisfied that every division will act in conformity to his intentions; but if, on the contrary, he should so far forget his situation as to become a drill-sergeant in the heat of action, he must find himself in the case of the fly in the fable, which perched upon a wheel, and foolishly imagined that the motion of the carriage was influenced by its situation. A general, therefore, ought on the day of battle to be thoroughly master of himself, and to have both his mind and his eye riveted to the immediate scene of action. He will by these means be enabled to see every thing; his judgment will be unembarrassed, and he will instantly discover all the vulnerable points of the enemy. The instant a favorable opening offers, by which the contest may be decided, it becomes his duty to head the nearest body of troops, and, without any regard to personal safety, to advance against the enemy's line. [By a ready conception of this sort, joined to a great courage, General Dessaix determined the issue of the battle of Marengo.] It is, however, impossible for any man to lay down rules, or to specify with accuracy all the different ways by which a victory may be obtained. Every thing depends upon a variety of situations, casualties of events, and intermediate occurrences, which no human foresight can positively ascertain, but which may be converted to good purposes by a quick eye, a ready conception, and prompt execution."

"Prince Eugene was singularly gifted with these qualifications, particularly with that sublime possession of the mind, which constitutes the essence of a military character."

"Many commanders-in-chief have been so limited in their ideas of warfare, that when events have brought the contest to issue, and two rival armies have been drawn out for action, their whole attention has devolved upon a straight alignment, an equality of step, or a regular distance in intervals of columns. They have considered it sufficient to give answers to questions proposed by their aides-de-camp, to send orders in various directions, and

to gallop themselves from one quarter to another, without steadily adhering to the fluctuations of the day, or calmly watching for an opportunity to strike a decisive blow. They endeavor, in fact, to do every thing, and thereby do nothing. They appear like men whose presence of mind deserts them the instant they are taken out of the beaten track, or reduced to supply unexpected calls by uncommon exertions; and from whence, continues the same sensible writer, do these contradictions arise? from an ignorance of those high qualifications without which the mere routine of duty, methodical arrangement, and studied discipline must fall to the ground, and defeat themselves. Many officers spend their whole lives in putting a few regiments through a regular set of manœuvres; and having done so, they vainly imagine that all the science of a real military man consists in that acquirement. When, in process of time, the command of a large army falls to their lot, they are manifestly lost in the magnitude of the undertaking, and, from not knowing how to act as they ought, they remain satisfied with doing what they have partially learned."

"Military knowledge, as far as it regards a general or commander-in-chief, may be divided into two parts, one comprehending mere discipline and settled systems for putting a certain number of rules into practice; and the other originating a sublimity of conception that method may assist, but cannot give."

"If a man be born with faculties that are naturally adapted to the situation of a general, and if his talents do not fit the extraordinary casualties of war, he will never rise beyond mediocrity."

"It is, in fact, in war as it is in painting, or in music. Perfection in either art grows out of innate talent, but it never can be acquired without them. Study and perseverance may correct ideas, but no application, no assiduity will give the life and energy of action; these are the works of nature."

"It has been my fate (observes the Marshal) to see several very excellent colonels become indifferent generals. I have known others, who have distinguished themselves at sieges, and in the different evolutions of an army, lose their presence of mind and appear ignorant of their profession, the instant they were taken from that particular line, and be incapable of commanding a few squadrons of horse. Should a man of this cast be put at

the head of an army, he will confine himself to mere dispositions and manœuvres; to them he will look for safety; and if once thwarted, his defeat will be inevitable, because his mind is not capable of other resources."

"In order to obviate, in the best possible manner, the innumerable disasters which must arise from the uncertainty of war, and the greater uncertainty of the means that are adopted to carry it on, some general rules ought to be laid down, not only for the government of the troops, but for the instruction of those who have the command of them. The principles to be observed are: that when the line or the columns advance, their distances should be scrupulously observed; that whenever a body of troops is ordered to charge, every proportion of the line should rush forward with intrepidity and vigor; that if openings are made in the first line, it becomes the duty of the second instantly to fill up the chasms."

"These instructions issue from the dictates of plain nature, and do not require the least elucidation in writing They constitute the A, B, C of soldiers. Nothing can be more simple, or more intelligible; so much so, that it would be ridiculous in a general to sacrifice essential objects in order to attend to such minutiæ. His functions in the day of battle are confined to those occupations of the mind, by which he is enabled to watch the countenance of the enemy; to observe his movements, and to see with an eagle's or a king of Prussia's eye, all the relative directions that his opponents take. It must be his business to create alarms and suspicions among the enemy's line in one quarter, while his real intention is to act against another; to puzzle and disconcert him in his plans; to take advantage of the manifold openings which his feints have produced, and when the contest is brought to issue, to be capable of plunging with effect upon the weakest part, and carrying the sword of death where its blow is certain of being mortal. But to accomplish these important and indispensable points, his judgment must be clear, his mind collected, his heart firm, and his eyes incapable of being diverted, even for a moment, by the trifling occurrences of the day."

The *administrative service* of an army is usually divided into several distinct departments, as—

Pay department.	
Subsistence department	
Clothing department	
Medical department	These in our service are united.
Hospital Department	ditto
Barracks	These in our service are combined in one called the quartermaster's department
Fuel	
Transportation	
Recruiting	
Military Justice, or Court Martial department.	

It was intended to enter into the history, organization, and use of each of these civico-military departments of an army; but our limits are such as to preclude any thing like so detailed a discussion as would be necessary for a proper understanding of the subject. We therefore pass from the staff directly to the *line* or rather the four principal arms of an army organization. [30]

[30]

Of works that treat directly of staff organization and duties, those of Grimoard, Thiébault, Boutourlin, Labaume, are esteemed among the best. The writings of Jomini, Napoleon, Rocquancourt, Vauchelle, Odier, Scharnhorst, also contain much valuable information on this subject. The following list of books may be referred to for further information on the subjects alluded to in this chapter:

Aide-Mémoire des officiers généraux et supérieurs et des capitaines.

Précis de l'art de la guerre. Jomini.

Mémoires de Napoléon. Montholon et Gourgaud.

Cours élémentaire d'art et d'histoire militaires. Rocquancourt.

Cours élémentaire d'administration militaire. Vauchelle.

Droite élémentaire d'art militaire, &c. Gay de Vernon.

Annuaire militaire historique, &c. Sicard.

Cours abrégé d'administration militaire. Bernier.

Cours d'administration militaire, &c. Odier.

De l'administration de l'armée d'Espagne. Odier.

De l'organization de la force armée en France. Carion-Nisas.

Elémens de l'art militaire, &c. Cugnot.

Mémoires sur la guerre. Feuquiéres.

Cours d'art militaire et d'histoire. Jacquinot de Presle.

Cours d'art militaire. Fallot.

Théorie de l'officier supérieur. Léorier.

Histoire de l'administration de la guerre. Audouin.

Instructions diverses a l'usage de l'école d'application du corps royal d'état-major.

Handbuch für offiziere, &c. Scharnhorst.

Having omitted all discussion of the several departments of the administrative service of an army organization, it is not deemed necessary to give the names of books of reference on the subjects of pay, courts-martial, medicinal and hospital departments, &c., &c.

CHAPTER X

ARMY ORGANIZATION.[31]—INFANTRY AND CAVALRY

Infantry.—Infantry constitutes, in active service, by far the most numerous portion of an army; in time of peace its duties are simple, and, in most countries, of little comparative importance; but in our country the continually recurring difficulties on the Indian frontiers, render this arm peculiarly necessary and important, even in time of general peace. From the nature of infantry service—no peculiar technical knowledge (we speak of the privates and officers of the lower grades) being so absolutely indispensable as in the other arms—the soldier may in a short time be trained and instructed in his duties. For this reason the ratio of infantry in a peace establishment is ordinarily much less than in active service, this arm being always capable of great expansion when occasion requires.

[31]

In discussing our own organization, it may be well to compare it with the armies of some of the principal nations of Europe. Our limits will not allow us to go very much into details, nor to make a comparison with more than a single European power. We shall select France, inasmuch as her army organization has served as a model for the rest of Europe, and is still, in some respects, superior to most others.

In the early periods of society, and in countries where horses abounded, men have usually preferred fighting on horseback; but civilization and a more thorough acquaintance with war has always increased the importance of infantry.

The Hebrews, and also the Egyptians, employed this arm almost exclusively. The Asiatics generally employed both infantry and cavalry, but with the Greeks the *infantry* was the favorite arm. Even their kings and generals usually fought on foot. The Romans conquered the world mainly

with their infantry. This arm was also considered of the greatest importance by the ancient Germans and Gauls; but the migration of the Huns and other Mongolic tribes mounted on small and fleet horses, and the acquaintance formed by the Franks of northern Spain with the Moors, who were mounted on beautiful horses from Arabia and the plateau of Asia, introduced a taste for cavalry in western Europe. This taste was still further cultivated under the feudal system, for the knights preferred fighting on horseback to serving on foot. During the crusades the infantry fell into disrepute. But the invention of gunpowder changed the whole system of warfare, and restored to infantry its former importance.

"The Romans," says Napoleon in his Memoirs, "had two infantries; the first, lightly armed, was provided with a missile weapon; the second, heavily armed, bore a short sword. After the invention of powder two species of infantry were still continued: the arquebusiers, who were lightly armed, and intended to observe and harass the enemy; and the pikemen, who supplied the place of the heavy-armed infantry. During the hundred and fifty years which have elapsed since Vauban banished lances and pikes from all the infantry of Europe, substituting for them the firelock and bayonet, all the infantry has been lightly armed..... There has been since that time, properly speaking, only one kind of infantry: if there was a company of chasseurs in every battalion, it was by way of counterpoise to the company of grenadiers; the battalion being composed of nine companies, one picked company did not appear sufficient. If the Emperor Napoleon created companies of voltigeurs armed like dragoons, it was to substitute them for those companies of chasseurs. He composed them of men under five feet in height, in order to bring into use that class of the conscription which measured from four feet ten inches to five feet; and having been until that time exempt, made the burden of conscription fall more heavily on the other classes. This arrangement served to reward a great number of old soldiers, who, being under five feet in height, could not enter into the companies of grenadiers, who on account of their bravery, deserved to enter into a picked company: it was a powerful incentive to emulation to bring the giants and pigmies into competition. Had there been men of different colors in the armies of the emperor, he would have composed companies of blacks and companies of whites: in a country

where there were cyclops or hunchbacks, a good use might be made of companies of cyclops, and others of hunchbacks."

"In 1789, the French army as composed of regiments of the line and battalions of chasseurs; the chasseurs of the Cevennes, the Vivarais, the Alps, of Corsica, and the Pyrenees, who at the Revolution formed half brigades of light infantry; but the object was not to have two different sorts of infantry, for they were raised alike, instructed alike, drilled alike; only the battalions of chasseurs were recruited by the men of the mountainous districts, or by the sons of the garde-chasse; whence they were more fit to be employed on the frontiers of the Alps and Pyrenees; and when they were in the armies of the North, they were always detached, in preference, for climbing heights or scouring a forest; when these men were placed in line, in a battle, they served very well as a battalion of the line, because they had received the same instructions, and were armed and disciplined in the same manner. Every power occasionally raises, in war-time, irregular corps, under the title of free or legionary battalions, consisting of foreign deserters, or formed of individuals of a particular party or faction; but that does not constitute two sorts of infantry. There is and can be but one. If the apes of antiquity must needs imitate the Romans, it is not light-armed troops that they ought to introduce, but heavy-armed soldiers, or battalions armed with swords; for all the infantry of Europe serve at times as light troops."

Most European nations, for reasons probably similar to those of Napoleon, keep up this nominal division of *infantry of the line* and *light infantry*; but both are usually armed and equipped alike, and both receive the same organization and instruction. The light infantry are usually made up from the class of men, or district of country, which furnishes the greatest number of riflemen and sharpshooters. In France, the light infantry is best supplied by the hunters of the Ardennes, the Vosges, and the Jura districts; in Austria, by the Croates and Tyrolese; in Prussia, by the "försters," or woodsmen; and in Russia, by the Cossacks. Our own western hunters, with proper discipline, make the best tirailleurs in the world.

Light infantry is usually employed to protect the flanks of the main army, to secure outposts, to reconnoitre the ground, secure avenues of approach, deceive the enemy by demonstrations, and secure the repose of the other troops by patrolling parties. They usually begin a battle, and afterwards take

their places in the line, either on the flanks, or in the intervals between the larger bodies. The battle of Jena furnishes a good example of the use of French light infantry; and at the battle of Waterloo, the Prussian tirailleurs were exceedingly effective in clearing the ground for the advance of Blücher's heavy columns. The attack of Floh-hug by Augereau, of Vierzehn Heilegen by Suchet, of Iserstaedt by Desjardins, are models well worthy of study.

The infantry of the line acts in masses, and, on the field of battle, constitutes the principal fighting force. Its formations and the manner of engaging it have already been discussed under the head of tactics.

The importance of infantry is due, in considerable part, to the fact that it can be used everywhere—in mountains or on plains, in woody or open countries, in cities or in fields, on rivers or at sea, in the redoubt or in the attack of the breach; the infantry depends only on itself, whereas the other arms must depend in a considerable degree on the efficiency of their materials and the will and strength of brute force; and when the snows of Russia or the deserts of Egypt deprive their animals of the means of sustenance, they become perfectly useless.

Foot-soldiers, in olden times, were armed with a spear and sometimes with a sword, arrows, lance, and sling. At present they are armed with a gun and bayonet, and sometimes with a sword. In some European services, a few of the foot-soldiers are armed with a pike. Some of the light troops used as sharpshooters carry the rifle, but this weapon is useless for the great body of infantry. The short-sword is more useful as an instrument for cutting branches, wood, &c., than for actual fighting. The infantry have no defensive covering, or at least very little. The helmet or cap serves to protect the head, and the shoulders are somewhat defended by epaulets. It has often been proposed in modern times to restore the ancient defensive armor of the foot-soldier; but this would be worse than useless against fire-arms, and moreover would destroy the efficiency of these troops by impeding their movements. The strength of this arm depends greatly upon its discipline; for if calm and firm, a mass of infantry in column or in square is almost impenetrable.

The bayonet was introduced by Vauban in the wars of Louis XIV., and after the years 1703 and '4, the pike was totally suppressed in the French army. This measure was warmly opposed by Marshal Montesquieu, and the question was discussed by him and Marshal Vauban with an ability and learning worthy of these great men. The arguments of Vauban were deemed most conclusive, and his project was adopted by the king.

This question has been agitated by military writers in more recent times, Puységur advocating the musket, and Folard and Lloyd contending in favor of restoring the pike. Even in our own service, so late as the war of 1812, a distinguished general of the army strongly urged the use of the pike, and the fifteenth (and perhaps another regiment) was armed and equipped in part as *pikemen*; but experience soon proved the absurdity of the project.

Napoleon calls the infantry the *arm of battles* and the *sinews of the army*. But if it be acknowledged, that, next to the talent of the general-in-chief, the infantry is the first instrument of victory, it must also be confessed that it finds a powerful support in the cavalry, artillery, and engineers, and that without these it would often be compromised, and could gain but a half success.

The French infantry is divided into one hundred regiments of three battalions each, a battalion being composed of seven companies. There are also several other battalions of chasseurs, zuaves, &c., being organized especially for service in Africa, and composed in part of native troops.

In our own army we have eight regiments of infantry, each regiment forming a single battalion of ten companies. The flank companies are intended for light infantry.

In all properly organized armies the infantry constitutes from three-fourths to four-fifths of the entire active force in the field, and from two-thirds to three-fourths, say about seven-tenths of the entire military establishment. In time of peace this proportion may be slightly diminished.

Cavalry.—The use of cavalry is probably nearly as old as war itself. The Egyptians had cavalry before the time of Moses, and the Israelites often encountered cavalry in their wars with their neighbors, though they made no use of this arm themselves until the time of Solomon.

The Greeks borrowed their cavalry from the Asiatics, and especially from the Persians, who, according to Xenophon, held this arm in great consideration. After the battle of Platea, it was agreed by assembled Greece that each power should furnish one horseman to every ten foot-soldiers. In Sparta the poorest were selected for this arm, and the cavalry marched to combat without any previous training. At Athens the cavalry service was more popular, and they formed a well-organized corps of twelve hundred horsemen. At Thebes also this arm had consideration in the time of Epaminondas. But the cavalry of Thessaly was the most renowned, and both Philip and Alexander drew their mounted troops from that country.

The Romans had made but little progress in this arm when they encountered the Thessalians, who fought in the army of Pyrrhus. They then increased their cavalry, but it was not numerous till after their wars with the Carthaginians. Scipio organized and disciplined the Roman cavalry like that of the Numidians. This arm was supplied from the ranks of the richest citizens, and afterwards formed an order intermediary between the Senate and the people, under the name of *knights*.

At a later period, the cavalry of the Gauls was particularly good. The Franks were without cavalry when they made their first irruption into Gaul. Under the reign of Childeric I. we see for the first time the "cavaliers francs" figure as a part of the national forces. At the battle of Tours the cavalry and infantry were in the proportion of one to five, and under Pepin and Charlemagne their numbers were nearly equal. Under Charles the Bald armies were composed entirely of cavalry, and during the middle ages the knights disdained the foot service, and fought only on horseback.

After the introduction of artillery, cavalry was still employed, though to little advantage. Gustavus Adolphus was the first to perceive the real importance of this arm in modern warfare, and he used it with great success. But it was left for Seidlitz to perfect it under the direction of Frederick the Great.

Marshal Saxe very justly remarked, that cavalry is the "*arme du moment,*" for in almost every battle there are moments when a decisive charge of cavalry will gain the victory, but if not made at the instant it may be too late. The efficiency of cavalry depends upon the moral impression which it

makes on the enemy, and is greater in proportion to the size of the mass, and the rapidity of its motion. This last quality enables a commander to avail himself immediately of a decisive moment, when the enemy exposes a weak point, or when disorder appears in his ranks. But this requires a bold and active spirit, which shrinks not from responsibility, and is able to avail itself with quickness and decision of every opportunity. If it be remembered that it is essential that this *coup d'oeil*, so rare and so difficult to acquire, be accompanied by a courage and vigor of execution which nothing can shake, we shall not be astonished that history furnishes so few good cavalry generals, and that this arm so seldom does such execution as it did under Frederick and Napoleon, with Seidlitz and Murat as commanders.

The soldier gains great *velocity* by the use of the horse in war; but in other respects he is the loser. The great expense and care required of the cavalier to support his horse; the difficulty experienced in surmounting ordinary obstacles, and in using his fire-arms to advantage, are all prejudicial to success.

The unequal size of the horse, and the great diversity in his strength and breed, have rendered it necessary to divide this arm into *light* and *heavy* cavalry, and a mixed class called *dragoons*. The heavy cavalry is commonly used in masses where *force* is mainly requisite; the lighter troops are used singly and in small detachments, where rapidity of movement is most desired.

The *heavy* cavalry are divided into carabiniers, cuirassiers, and sometimes lancers. The two latter are frequently united, the cuirassiers being armed with the lance. These troops are seldom used for scouts, vanguards, and convoys; but are frequently employed to sustain the light cavalry. Their main duty is "*to appear on the field of battle and make the decisive charges*."

The *light* cavalry is composed of chasseurs, or troopers, hussars, and lancers. The latter, when composed of large men and mounted on heavy horses, are attached to the heavy cavalry.

The *dragoons* were formerly a mixed body of horse and foot, but it being found impossible to unite these two distinct arms in one, and the attempt having destroyed the usefulness of the body to act in either capacity, the

term was applied to a mixed kind of cavalry between the heavy and the light horse. In more recent wars they have also been instructed as infantry and employed as foot-soldiers, till horses could be found in the enemy's country with which to mount them. But we believe there is no instance in more modern wars in which they have been employed at the same time in both capacities.

This term is, very improperly, applied to all our cavalry; and some of the congressional wiseacres have recently experimented on one of our so-called regiments of *dragoons*, by dismounting it one year, selling its horses at auction, and changing its arms and equipments, and again, the next year, purchasing new horses, arms, and equipments for remounting it; and all this for *economy!*

The Roman cavalry at first wore a round shield and helmet, the rest of their body being nearly uncovered. Their arms were a sword and long thin javelin, or lance, with an iron head. They afterwards reduced the shield to a much smaller size, and made square, and their lance was greatly increased in size and length, and armed at both ends. In other respects they were armed in the same way as infantry. The use of the lance and the shield at the same time, of course rendered both nearly worthless. The Roman cavalry was superior to that of their enemies, except, perhaps, the light cavalry of the Parthians.

The heavy armor which was sometimes worn by the ancients, like the *gens d'armes* of the middle ages, rendered them greatly inferior to infantry in a close engagement. Tigranes, king of Armenia, brought an army of one hundred and fifty thousand horse into the field, against the Roman general Lucullus, who had only about six thousand horse and fifteen thousand foot. But the Armenian cavalry, called *cataphratti* were so overburdened with armor, that when they fell from their horses they could scarcely move or make any use of their arms. They were routed by a mere handful of Roman infantry.

The modern cavalry is much lighter, and, by dispensing with armor, shields, &c., it can move with much greater rapidity. A modern cavalry horse carries a weight of from two hundred and fifty to three hundred pounds, viz.:

	Heavy Cavalry	Light Cavalry
The rider	160	140 lbs.
His arms and equipments	55	40
His horse equipments	60	45
Two days' rations of provisions and grain	25	25
	300	250

The horse moves per minute—

At a walk,	from 110 yards to	120
At a trot,	220	240
At a gallop,	330	360

But on a march over the ordinary average of good and bad roads, cavalry will walk about one hundred yards per minute, and at an easy trot, two hundred.

An ordinary day's march for cavalry is about thirty miles, but on a forced march this arm can march fifty miles within the twenty-four hours. A single horseman, or a small detachment, can easily exceed this distance.

"Light cavalry," says Napoleon, in his Memoirs, "ought to reconnoitre and watch the motions of the enemy, considerably in advance of the army; it is not an appendage to the infantry: it should be sustained and protected especially by the cavalry of the line. Rivalry and emulation have always existed between the infantry and cavalry: light cavalry is indispensable to the vanguard, the rearguard, and the wings of the army; it, therefore, cannot properly be attached to, and forced to follow the movements of any particular corps of infantry. It would be more natural to attach it to the cavalry of the line, than to leave it in dependence upon the infantry, with which it has no connection; but it should be independent of both."

"If the light cavalry is to form vanguards, it must be organized into squadrons, brigades, and divisions, for the purpose of manœuvring; for that

is all vanguards and rearguards do: they pursue or retreat by platoons, form themselves into several lines, or wheel into column, or change their position with rapidity for the purpose of outfronting a whole wing. By a combination of such evolutions, a vanguard, of inferior numbers, avoids brisk actions and general engagements, and yet delays the enemy long enough to give time for the main army to come up, for the infantry to deploy, for the general-in-chief to make his dispositions, and for the baggage and parks to file into their stations. The art of a general of the vanguard, or of the rear-guard, is, without hazarding a defeat, to hold the enemy in check, to impede him, to compel him to spend three or four hours in moving a single league: tactics point out the methods of effecting these important objects, and are more necessary for cavalry than for infantry, and in the vanguard, or the rear-guard, than in any other position. The Hungarian Insurgents, whom we saw in 1797, 1805, and 1809, were pitiful troops. If the light troops of Maria Theresa's times became formidable, it was by their excellent organization, and, above every thing, by their numbers. To imagine that such troops could be superior to Wurmser's hussars, or to the dragoons of Latour, or to the Archduke John, would be entertaining strange ideas of things; but neither the Hungarian Insurgents, nor the Cossacks, ever formed the vanguards of the Austrian and Russian armies; because to speak of a vanguard or a rear-guard, is to speak of troops which manœuvre. The Russians considered a regiment of Cossacks who had been trained worth three regiments untrained. Every thing about these troops is despicable, except the Cossack himself, who is a man of fine person, powerful, adroit, subtle, a good horseman, and indefatigable; he is born on horseback, and bred among civil wars; he is in the field, what the Bedouin is in the desert, or the Barbet in the Alps; he never enters a house, never lies in a bed; and he always changes his bivouac at sunset, that he may not pass a night in a place where the enemy may possibly have observed him."

"Two Mamelukes kept three Frenchmen at bay, because they were better armed, better mounted, and better exercised; they had two pairs of pistols, a *tromblon*, a carbine, a helmet with a visor, a coat of mail, several horses, and several men on foot to attend them. But a hundred French did not fear a hundred Mamelukes; three hundred were more than a match for an equal number; and one thousand would beat fifteen hundred: so powerful is the influence of tactics, order, and evolutions! Murat, Leclerc, and Lasalle,

cavalry generals, presented themselves to the Mamelukes in several lines: when the latter were upon the point of outfronting the first line, the second came to its assistance on the right and left; the Mamelukes then stopped, and wheeled, to turn the wings of this new line: this was the moment seized for charging them; they were always broken."

"The duty of a vanguard, or a rear-guard, does not consist in advancing or retiring, but in manœuvring. It should be composed of a good light cavalry, supported by a good reserve of cavalry of the line, by excellent battalions of foot, and strong batteries of artillery: the troops must be well trained; and the generals, officers, and soldiers, should all be equally well acquainted with their tactics, each according to his station. An undisciplined troop would only embarrass the advanced guard."

"It is admitted that for facility in manœuvring, the squadron should consist of one hundred men, and that every three or four squadrons should have a superior officer."

"It is not advisable for all the cavalry of the line to wear cuirasses: dragoons, mounted upon horses of four feet nine inches in height, armed with straight sabres, and without cuirasses, should form a part of the heavy cavalry; they should be furnished with infantry-muskets, with bayonets: should have the *shakot* of the infantry, pantaloons covering the half-boot-buskin, cloaks with sleeves, and portmanteaus small enough to be carried slung across the back when the men are on foot. Cavalry of all descriptions should be furnished with fire-arms, and should know how to manœuvre on foot. Three thousand light cavalry, or three thousand cuirassiers, should not suffer themselves to be stopped by a thousand infantry posted in a wood, or on ground impracticable to cavalry; and three thousand dragoons ought not to hesitate to attack two thousand infantry, should the latter, favored by their position, attempt to stop them.

"Turenne, Prince Eugene of Savoy, and Vendome, attached great importance to dragoons, and used them successfully. The dragoons gained great glory in Italy, in 1796 and 1797. In Egypt and in Spain, during the campaigns of 1806 and 1807, a degree of prejudice sprung up against them. The divisions of dragoons had been mustered at Compiegne and Amiens, to be embarked without horses for the expedition of England, in order to serve

on foot until they should be mounted in that country. General Baraguay d'Hilliers, their first inspector, commanded them; he had them equipped with gaiters, and incorporated with them a considerable number of recruits, whom he exercised in infantry manœuvres alone. These were no longer cavalry regiments: they served in the campaign of 1806 on foot, until after the battle of Jena, when they were mounted on horses taken from the Prussian cavalry, three-fourths of which were unserviceable. These combined circumstances injured the dragoons; but in 1813 and 1814 their divisions acquired honor in rivalling the cuirassiers. Dragoons are necessary for the support of light cavalry in the vanguard, the rear-guard, and the wings of an army; cuirassiers are little adapted for van and rearguards: they should never be employed in this service but when it is requisite to keep them in practice and accustom them to war."

Napoleon further recommends that light cavalry be divided into two kinds, chasseurs or troopers, and light horse; and the heavy to be composed of dragoons and cuirassiers; the troopers to be mounted on horses of 4 ft 6 in.; light cavalry on horses of 4 ft. 7 or 8 in.; dragoons on horses of 4 ft. 9 in.; and cuirassiers on horses of 4 ft. 10 or 11 in.; which employ horses of all kinds for mounting the troops.

All cavalry must receive the same instruction; and all should be capable, in case of need, of performing any of the duties of mounted troops. The shock is the principal effect produced by this arm; therefore, the greater the velocity the greater must be this effect, provided the troops can be kept in mass. But it is found, by experience, that it is impossible to preserve them in line when put to the height of their speed. The best authorities therefore prefer, as we have said elsewhere, the charge at the trot, or at any rate the gallop should not be taken up till within a very short distance of the enemy. The charge of a compact mass at a trot is much greater than that of a wavering one at a gallop.

On the field of battle the cavalry of the line is considered as the arm of the shock, to break through any corps that may be in opposition; but it is unable of itself to resist a shock, and therefore should on no account wait to receive the charge of another body of mounted troops. It was on this account that Frederick directed his cavalry officers, under the severest penalties, never to

receive a charge, but always to meet the attacking force half way. This is the only mode of preventing defeat.

A good infantry can always sustain itself against the charges of cavalry. At the battle of Auerstedt, in 1806, Davoust ordered the divisions of Gudin to form squares to resist the Prussian cavalry, which, by means of a fog, had gained a most advantageous position. Blücher led his cavalry in repeated and impetuous charges, but all was in vain; the French infantry presented a front of iron. At the combat of Krasnoi, in 1812, the cavalry of Grouchy, Nansonty, and Bordesoult, attacked and overthrew the dragoons of Clarkof, but the Russian infantry under Neveroffskoi sustained itself against the repeated charges of vastly superior numbers of these French horse. At the battle of Molwitz, the grenadiers sustained the charges of the enemy's cavalry, although the cavalry of the great Frederick had already been completely overthrown.

But when the infantry is engaged with the infantry of the enemy, the charges of cavalry are generally successful, and sometimes decide the fate of the battle, as was the case at Rosbach, Zornsdorf, Wurtsburg, Marengo, Eylau, Borodino, &c.

Cavalry may also be very efficacious against infantry in wet weather, when the rain or snow renders it impossible for the foot soldiers to use their fire-arms to advantage, as was the case with the corps of Augereau, at Eylau, and with the Austrian left, at the battle of Dresden. Again, if the infantry be previously weakened, or thrown into disorder by the fire of batteries. The charge of the Russian cavalry at Hohenfriedberg, in 1745, is a remarkable example of this kind.

Cavalry should always be immediately sustained in its efforts either by infantry or other bodies of horse; for as soon as the charge is made, the strength of this arm is for a time exhausted, and, if immediately attacked, defeat becomes inevitable. The charge of the cavalry of Ney on Prince Hohenlohe at the battle of Jena, and of the French horse on Gossa at Leipsic, are fine examples of the successful charges of cavalry when properly sustained. Kunnersdorf and Waterloo are examples of the disastrous consequences of leaving such charges without support.

The choice of the field of battle is sometimes such as to render cavalry almost useless. Such was the case at the battle of Cassano, between the Duke of Vendome and the Prince Eugene. The field was so cut up by the Adda and the canals of Rittorto and Pendina, that Prince Eugene could make no use of his horse. If, when master of the bridge of Rittorto, he had been able to charge the French with a body of cavalry, there had been no doubt of his complete success.

After a battle, and in the pursuit of a flying enemy, cavalry is invaluable. If Napoleon had possessed a suitable number of mounted troops, with an able commander, at the battles of Lutzen and Ligny, the results of these victories had been decisive; whereas they were really without consequence. On the other hand, the Prussian army in 1806, after the battle of Jena, and Napoleon's army in 1815 at Waterloo, were completely cut to pieces by the skilful use of cavalry in the pursuit of a defeated and dispirited foe.

The want of good cavalry was severely felt in the war of the American Revolution. Had Washington possessed a few good squadrons of horse, his surprise and defeat in the lines of Brooklyn, and the consequent loss of New York, had never taken place. The efficient employment of a few good squadrons of cavalry might readily have prevented the defeat at Bladensburg, and the loss of the capitol, in 1814.

In a well-organized army, the cavalry should be from one-fourth to one-sixth of the infantry, according to the nature of the war.[32]

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To gain a competent knowledge of the duties connected with the two arms of service mentioned in this chapter, the officer should make himself thoroughly acquainted with Scott's System of Infantry Tactics, for the United States' Infantry, or at least with Major Cooper's abridged edition of Infantry Tactics, and with the system of Cavalry Tactics, adopted in our army; also with the directions for the use of these two arms in a campaign, and their employment on the battle-field, given in the writings of Jomini, Decker, Okouneff, Rocquancourt, and Jacquinot de Presle.

The following books may be referred to for further information respecting the history, organization, use, and instruction of infantry and cavalry:—

Essai général de tactique. Guibert.

Considérations générales sur l'infanterie française, par un général en rétraite. A work of merit.

De l'infanterie, par l'auteur de l'histoire de l'expédition de Russie.

Histoire de la guerre de la peninsule. Foy. This work contains many interesting and valuable remarks on the French and English systems of tactics, and particularly on the tactics of Infantry.

Cours d'art et d'histoire militaires. Jacquinot de Presle.

Art de la guerre. Rogniat.

Instruction destinée aux troupes légères, &c., redigée sur une instruction de Frederick II. à ses officiers.

English Infantry Regulations.

Ordonnance (French) *pour l'exercice et les manœuvres de l'infanterie,* par le commission de manœuvres.

Aide-mémoires des officiers généraux et supérieurs, et des capitaines.

Essai sur l'histoire générale de l'art militaire. Carion-Nisas.

Histoire de la milice française. Daniel.

Cours élémentaire d'art et d'histoire militaires. Rocquancourt.

Traité élémentaire d'art militaire, &c. Gay de Vernon.

Introduction à l'étude de l'art de la guerre. La Roche-Amyou.

Tactique des trois armes. Decker.

Examen raisonné des trois armes, &c. Okouneff.

The last two are works of great merit. The writings of Okouneff, however, are very diffuse.

Instruction pour le service de l'infanterie légère. Guyard.

Instruction de l'infanterie, &c. Schauenbourg.

Traité de tactique. Ternay et Koch.

Mécanism des manœuvres de guerre de l'infanterie polonaise. Vroniecki.

Traité sur l'infanterie légère. Beurmann.

English Cavalry Regulations.

Ordonnance (French) *sur l'exercice et les évolutions de la cavalerie.*

Les troupes à cheval de France, &c. De Bourge.

Avant-postes de cavalerie légère. Brack. The author served with distinction under Lassale, Colbert, Maison, Pujol, and Excelmans.

Réflexions sur l'emploi de la cavalerie, &c. Caraman.

Observations sur l'ordonnance, &c., de la cavalerie. Dejean.

Tactique de la cavalerie. Itier.

Eléments de tactique pour la cavalerie, par Mottin de la Balme. A work of rare merit.

De l'emploi de la cavalerie à la guerre. Schauenbourg.

Rémarques sur la cavalerie. Warnery. This work has long enjoyed a high reputation among the cavalry officers of the European services. The Paris edition is enriched with notes by a French general officer.

Nachrichten und Betrachtungen über die Thaten und Schicksale der Reiterei, &c. This work discusses the operations of cavalry in the campaigns of Frederick the Great and of Napoleon, down to the battle of Lutzen in 1813.

Examen du livret provisoire, &c. Marbot.

Le Spectateur Militaire, contains many essays by cavalry officers on the various questions connected with the organization and use of this arm.

Die Gefechtslehre der beiden verbundenen Waffen-Kavallerie und reitenden Artillerie. Decker.

Manuel de l'officier. Ruhle de Lilienstern.

Aide-mémoire, à l'usage des officiers de cavalerie.

Journal de l'infanterie et de la cavalerie.

Traité de tactique pour les officiers d'infanterie et de cavalerie.

Histoire des exploits et des vicissitudes de la cavalerie prussienne. Coutz.

CHAPTER XI.

ARMY ORGANIZATION.—ARTILLERY.

Artillery.—Previous to the invention of gunpowder in the thirteenth century, the machines of war were divided between two classes of military men, the engineers (*engignours*, as they were called in the middle ages) and the artillery, (*artilliers*, as they were formerly called,) the latter being particularly charged with the management of the lighter and more portable projectile machines, such as the balistas and arco-balistas, which were used for throwing different kinds of arrows—*flêches, viretons, carreaux, matras*, &c., while the former managed the battering-rams, cranes, helipoles, &c. And, indeed, for a long time after the discovery of gunpowder, this distinction was kept up, and the artillery retained all the more ordinary projectile machines, while the engineers constructed and managed the more ponderous weapons of attack and defence. But the new artillery was gradually introduced, without, however, immediately displacing the old, and there were for a time, if we may be allowed the expression, *two* artilleries, the one employing the old projectile machines, and the other those of the new invention. The latter were called *canoniers*, to distinguish them from the former, who still retained the name of *artilliers*.

The first cannon were invented in the early part of the fourteenth century, or, perhaps, among the Arabs as early as the middle of the thirteenth century, but they were not much known in Europe till about 1350. Cannon are said to have been employed by the Moors as early as 1249, and by the French in 1338. The English used artillery at the battle of Crecy in 1346. Both cannon and the ancient projectile machines were employed at the siege of Aiguillon in 1339, at Zara in 1345, at Rennes in 1357, and at Naples in 1380. At this last siege the ancient balista was employed to throw into the castle of Naples barrels of infectious matter and mutilated limbs of prisoners of war. We read of the same thing being done in Spain at a later period.

Cannon in France were at first called *bombards* and *couleuverines*, but were afterwards named from certain figures marked on them, such as *serpentines, basilisks, scorpions,*&c. In the infancy of the art they were made small, weighing only from twenty to fifty pounds, and were mounted on small moveable carriages. This species of fire-arms became quite numerous about the beginning of the fifteenth century. They were followed by heavier pieces, used in the attack and defence of towns. This siege artillery continued to be increased in dimensions till, towards the latter part of the fifteenth century, they reached such an enormous size as to be almost useless as a military machine. Louis XI. had an immense piece constructed at Tours, in 1770, which, it was said, carried a ball from the Bastille to Charenton, (about six miles!) Its caliber was that of five hundred pounds. It was intended for experiment, and burst on the second discharge. The famous culverin of Bolduc was said to carry a ball from that city to Bommel. The culverin of Nancy, made in 1598, was more than twenty-three feet in length. There is now an ancient cannon in the arsenal at Metz of about this length, which carries a ball of one hundred and forty pounds. Cannon balls were found at Paris as late as 1712, weighing near two hundred pounds, and from twelve to sixteen inches in diameter. At the siege of Constantinople in 1453, there was a famous metallic bombard which threw stone balls of an incredible size; at the siege of Bourges in 1412, a cannon was used which, it was said, threw stone balls "of the size of mill-stones." The Gantois, under Arteville, made a bombard fifty feet in length, whose report was heard at a distance of ten leagues!

The first cannon were made of wood, and covered with sheet-iron, or embraced by iron rings: longitudinal bars of iron were afterwards substituted for the wooden form. Towards the end of the fourteenth century, brass, tin, copper, wrought and cast iron, were successively used for this purpose. The bores of the pieces were first made in a conical shape, and it was not until a much later period that the cylindrical form was introduced.

In the wars between the Spaniards and Moors in the latter part of the fifteenth century, very great use was made of artillery in sieges and battles. Ferdinand the Catholic had at this time, probably, a larger artillery train than any other European power. The Spanish cannon, generally very large, were composed of iron bars about two inches in breadth, held together by bolts and rings of the same metal. The pieces were firmly attached to their

carriages, and incapable of either horizontal or vertical movement. The balls thrown by them were usually of marble, though sometimes of iron. Many of the pieces used at the siege of Baza, in 1486, are still to be seen in that city, and also the cannon balls then in use. Some of the latter are fourteen inches in diameter, and weigh one hundred and seventy-five pounds. The length of the cannon was about twelve feet. These dimensions are a proof of a slight improvement in this branch of military science, which was, nevertheless, still in its infancy. The awkwardness of artillery at this period may be judged of by its slowness of fire. At the siege of Zeteuel, in 1407, five "bombards," as the heavy pieces of ordnance were then called, were able to discharge only forty shot in the course of a day; and it is noticed as a remarkable circumstance at the siege of Albahar, that two batteries discharged one hundred and forty balls in the course of the twenty-four hours!

In the Italian wars between France and Spain, in the beginning of the sixteenth century, the difficulty of moving the heavy cannon then in use was so great that only a very small number of pieces were brought upon the battle-field. At the battle of Cerignola, in 1503, the number of cannon in the French army was only thirteen. Indeed, during the greater part of this century, four or five pieces were considered sufficient for an ordinary army in the field, and many agreed to the doctrine of Machiavelli, that the only legitimate use of artillery was in the attack and defence of places. But in the wars of Henry IV. of France, this arm of service was again increased, and the troops which this king destined against the house of Austria had an artillery train of fifty pieces. Great improvements were also made about this period in the manufacture of powder, and all kinds of fire-arms. Sully gave greater development to this arm of service, improving its materials, and increasing its efficiency. Then, as at most other periods, the French were in advance of most other nations in artillery.

It was near the close of the sixteenth or the beginning of the seventeenth century, that the heavy and ill-shaped artillery began to give place to more wieldy and useful pieces. A certain M. de Linar demonstrated, in the latter part of the sixteenth century, that cannon twelve feet in length would give a greater range than those seventeen feet in length, the calibre being the same; but some years elapsed before advantage was taken of this discovery. In 1624, Gustavus Adolphus caused experiments to be made to verify this

point, and, on being convinced of its truth, caused his batteries to be furnished with shorter and lighter pieces. This great king introduced, about the same time, a new and lighter kind of artillery, made of sheet iron and leather. Each piece had its chamber formed of thin metal and embraced by strong iron rings; over these was placed a form of hardened leather, which was again encircled with rings and held compactly together. These pieces were mounted on light carriages, so that two men could easily manœuvre them. It was said that they would fire from eight to ten rounds without requiring repairs. Gustavus made use of them in all his military operations from 1628 to the time of his death. They did him excellent service on numerous occasions; being so very light they could be easily transported, and, on the field of battle, their movements could be made to conform to the movements of his troops.

As cannon and small arms were gradually introduced into general use, various inventions and improvements were proposed and introduced from time to time. Cannon were constructed with two or more barrels; some were arranged for being loaded in the breech, and others at the mouth of the piece; two pieces were sometimes connected by horizontal timbers, which revolved about a vertical axis, so that the recoil of one piece would bring the other into battery; and various other arrangements of this description, which have recently been revived and some of them patented as new inventions. The small arms employed at this period were much the same as those used at the present day, except the matchlock, which afterwards gave place to flint-locks. Arms of this description were sometimes made to be loaded at the breach, and guns with two, three, and even as many as eight barrels, were at one time in fashion. In the *Musée de l'Artillerie* at Paris may be found many arms of this kind, which have been reproduced in this country and England as new inventions. In this Museum are two ancient pieces, invented near the end of the sixteenth or the beginning of the seventeenth century, which very nearly correspond with *Colt's patent*, with the single exception of the lock![33]

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It is not to be inferred that the modern *improvements* (as they are called) are copied from the more ancient *inventions*. Two men of different ages, or

even of the same age, sometimes fall upon the same identical discovery, without either's borrowing from the other.

The *materiel* of artillery employed in modern warfare is divided into two general classes: 1st. *Siege Artillery*, or such as is employed in the attack and defence of places. 2d. *Field Artillery*, or such as is used in battle, or in the field-operations of an army.

1. *Siege Artillery* is composed of *mortars, large howitzers, Paixhan guns* or *Columbiads*,[34] and *all cannon* of *a large calibre.* In our service this class of ordnance includes the twelve, eighteen, twenty-four, thirty-two, and forty-two-pounder guns, the eight, ten, and thirteen-inch mortars, the sixteen-inch stone mortar, the twenty-four-pounder coehorn mortar, the twenty-four-pounder carronade, and the eight, ten, and twelve-inch howitzers.

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These pieces were first invented by Colonel Bomford, of the U.S. army, and used in the war of 1812. The dimensions of these guns were first taken to Europe by a young French officer, and thus fell into the hands of General Paixhan, who immediately introduced them into the French service. They were by this means first made known to the rest of Europe, and received the name of the person who introduced them into the European services, rather than that of the original inventor. All these facts are so fully susceptible of proof, that Europeans now acknowledge themselves indebted to us for the invention; even General Paixhan gives up all claim to originality in his gun, and limits himself to certain improvements which he introduced. The original gun, which was invented by Colonel Bomford, and whose dimensions were carried to General Paixhan in France, is now lying at the ordnance dépôt, in New York harbor.

All these, except the smaller mortars, are made of cast iron. This substance is less tenacious than wrought iron or bronze, and the cannon made of it are, on this account, much heavier than of the other materials; but for the naval service, and the attack and defence of fortifications, the weight required to secure the necessary strength is not very objectionable. Wrought iron and bronze are much more expensive and less durable. Moreover, the difficulty

of forging wrought iron in masses of sufficient size has been such as to prevent its being brought into general use for artillery. Numerous attempts have been made, at different periods, to construct large guns of this material, but none have yet been successful. Improvements which are now making in the manufacture of wrought iron, may render this the preferable material for the smaller pieces of artillery; but the best informed military men deem it objectionable for the heavier cannon, both on account of its cost and the imperfection of its manufacture. Even should the latter objection be removed, its cost must prevent its general application to the construction of siege artillery. Charlatans in military science, both in this country and in Europe, bring this subject up every fifteen or twenty years as a new *invention*, and flaming notices of the *improvement*, and predictions of the revolution it is to effect in the art of war, are circulated in the newspapers to "gull" a credulous public; and after some fifty or one hundred thousand dollars have been squandered on some court-favorite, the whole matter ends in the explosion of the "*improvement*," and probably the destruction of the "*inventor*," and perhaps also of his spectators. Let us be distinctly understood on this subject. There may be *inventions* and *improvements* in the manufacture of wrought iron, but there is nothing *new* in its *application* to the construction of cannon, for it has been used for this purpose as long ago as the first invention of the art.

2. *Field Artillery* is composed of the smaller guns and howitzers. In our service this class of cannon includes the six and twelve-pounder guns, and the twelve and twenty-four-pounder howitzers. All these are now made of bronze. This material is more expensive than cast-iron, but its superior tenacity renders it more useful where great weight is objectionable. Improvements in the manufacture of cast iron may render it safe to employ this metal in the construction of field-pieces. It is also possible the wrought iron may be forged in masses large enough, and the cost be so reduced as to bring it into use for field-pieces. It is here important to combine strength with lightness, and additional expense may very properly be incurred to secure this important object.

The *projectiles* now in use are solid shot, shells, strap-shot, case or canister-shot, grape-shot, light and fire-balls, carcasses, grenades, and rockets.

Solid shot are now almost invariably made of cast iron,[35] formed in moulds of sand or iron. This projectile is used under almost every circumstance, whether in the battle-field or in the attack and defence of places, and is the only one that is effectual against the stone walls of forts. *Hot shot* are used against shipping and wooden structures of every description. Red-hot balls were first employed by the king of Poland, in 1575, but, on account of the difficulty of heating them with rapidity, and the danger of loading the piece with them, this kind of projectile was not in general use till a much later period. It was at first supposed that the expansion of the metal would be so great, when heated to a red or white heat, as to prevent the ball from entering the piece; it is found, however, that the windage is still sufficient for loading with facility. These red-hot balls are principally used to fire wooden buildings, ships, and other combustible matter. They are therefore much used as a projectile for coast defence, and all fortifications on the seaboard should be provided with furnaces and grates, arranged so as to heat them with facility and rapidity.

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In Mexico, where iron is scarce, copper is used for shot and shells; but it is a poor substitute.

There are several kinds of *hollow-shot* and *shells*, called *bombs, howitzes, grenades*, &c. They are made of cast iron, and usually in a spherical shape, the cavity being concentric with the exterior surface. The cavity was formerly made eccentric with the exterior, under the belief that the heavier side would always strike first. The rotary motion of the shell during its flight rendered this precaution of no use. Fire is communicated to the combustible matter within the shell by means of a fuse, which is so regulated that the explosion shall take place at the desired moment. Hollow-shot are used with advantage to destroy ordinary buildings, ships, earthwork, and thin walls of masonry; they, however, are of little avail in breaking the massive walls of well-constructed forts. Howitzes and grenades are particularly effective against cavalry and columns of infantry, and are much employed on the battle-field; they are also much used in the attack and defence of places.

We find that as early as 1486 the Spaniards made use of a projectile similar to the modern bomb. "They threw from their engines large globular masses, composed of certain inflammable ingredients mixed with gunpowder, which, scattering long trains of light," says an eye-witness, "in their passage through the air, filled the beholders with dismay, and descending on the roofs of edifices, frequently occasioned extensive conflagration." In the siege of Constantinople by Mahomet II., shells were used, and also mortars of enormous size. In 1572 Valturus proposed to throw, with a kind of mortar, "globes of copper filled with powder." In 1588, an artificer of Venloo burned Wachtendeck by throwing bombs into the place. A similar attempt had just been made at Berg-op-Zoom. The use of this projectile became quite common in France under Louis XIII. Howitzes were not much used till the seventeenth century. They are of German origin, and the howitzer first bore the name of *hausmitz*.

The *strap-shot* consists of a round ball attached to a *sabot* of the same calibre, by means of two strips of tin passing over the shot at right angles, and fastened to a third, which is soldered around the sabot. One end of the sabot is arranged for attaching it to the cartridge, the other being hollowed out to receive the shot. The supposed advantages of this arrangement are, 1st, a diminution of the windage; 2d, the gun may be loaded with greater rapidity; and, 3d, the cartridge is transported with greater safety.

The *case* or *canister-shot* is prepared by filling a tin canister with grape-shot or musket-balls, and attaching it to the cartridge by means of a sabot. There being two sizes of grape-shot, and one of musket-balls, we have three kinds of canister-shot calculated to reach at different distances. The three sizes of shot are frequently mixed in the same canister. This projectile is particularly effective against lines of infantry and cavalry, when the distance is short.

The *grape-shot* is composed of small balls arranged round an upright pin attached to a plate of wood or iron. The concave cast-iron plate is preferable, as it increases the range of the shot. The balls are covered with canvass, and thoroughly confined by a quilting of strong twine. This shot is used for the same purposes as the canister.

Light and *fire-balls* are formed of an oval case of sacking, filled with combustible matter, and attached to a culot of cast-iron. The whole is covered with a net of spun-yarn. Light-balls are used to light up our own works, and are not armed; fire-balls being employed to light up the works or approaches of an enemy, it is necessary to arm them with pistol-barrels, in order to prevent, any one from extinguishing them. When made of very combustible materials, and used for setting fire to wooden structures, they are denominated *incendiary balls*.

Carcasses are employed for the same purpose as incendiary balls; they are of two kinds: 1st, the *shell-carcass*; and, 2d, the *ribbed-carcass*. The first is composed of a spherical shell, cast with five fuse-holes, one being at the top, and the other four in a plane perpendicular to this and at right angles with each other; the shell is filled with matter highly combustible. The second is formed of iron ribs connected by iron straps, and attached at the ends to culots of the same material, the whole being filled with combustible composition. This is more expensive than the shell carcass, and cannot be fired with as great accuracy; it is now seldom used. Carcasses may be armed in the same manner as fire-balls.

Smoke and *suffocating balls* are used to drive an enemy from galleries and mines. They are thrown by hand.

The *personnel* of the French artillery was for a long time retained, together with the engineers, under the general direction of the "Grand Master of Cross-bows." In 1420 the master-general of artillery was made independent of the grand-master of cross-bows; but previous to the reign of Louis XIV., the artillery troops had no organization as a separate corps. In 1668 six companies of *canoniers* were created, and soon after two companies of *bombardiers*. In 1693 the first regiment of fusiliers was changed into a *royal regiment of artillery*, and both the canoniers and bombardiers were eventually incorporated with it. The staff of artillery, towards the close of this reign, was composed of one grand-master, sixty lieutenants, sixty commissaries, and eighty *officiers-pointeurs*. In 1721 the artillery was divided into five battalions and stationed at Metz, Strasbourg, Grenoble, Perpignan, and La Fère, where they established schools of theory and practice. In 1756 the artillery was organized into seven regiments, each

regiment having its own separate school. This organization continued without any remarkable change till the Revolution.

During the earlier campaigns of the French Revolution it is impossible to trace out the changes that took place in army organization, every thing was then so irregular and confused, the troops of different arms being frequently united together. In the campaign of 1792 there were some six or seven regiments of foot artillery, and ten companies of horse. This arm was greatly increased during the subsequent campaigns, and its organization was completely remodelled by Napoleon on his elevation to the head of the government. The *personnel* of the artillery was then composed of a general staff, nine regiments of foot and six of horse. In 1815 it was reduced to eight regiments of foot and four of horse.

The *personnel* of artillery in modern army organization is divided into four classes: the *staff, guards, artificers,* and *troops*.

I. The *Staff*, or *Ordnance*, as it is called in our service, is charged with the construction of all the materials of artillery, and the collection of powder and military stores. As the lives of persons using these materials, and, in a considerable degree, the success of war, depend upon the nature and quality of the stores thus manufactured and collected, it is obvious that the members of this branch of the artillery service should possess high and peculiar qualifications. In the French army the artillery staff is composed of two hundred and eighty-three officers of different grades: also twenty-four officers of the general staff are attached to this service. In our army the *ordnance* is composed of twenty-eight officers of different grades.

II. *Artillery-guards.*—These in our service are divided into two classes: 1st. *Military Store-keepers.* 2d. *Ordnance Sergeants.* Both are alike charged with the care and preservation of the artillery property and stores at the several garrisons, arsenals, and magazines. In our army we have fifty-eight of these guards, viz: fifteen commissioned military store-keepers, and forty-three ordnance sergeants. We seldom have more than this number of permanent posts; each one can therefore be supplied with an artillery guard for the care of the artillery stores. In the French service there are three hundred and fifteen of these artillery guards; they are divided into three classes.

III. *Artificers.*—This class of men are employed in the construction and repairs of military materials. In most of our arsenals and armories it is thought to be best to employ unenlisted workmen, by the piece or contract. Nevertheless a limited number of enlisted men of this description are found to be both useful and necessary. We have three hundred and thirty of these in our army, viz: two hundred and fifty enlisted "ordnance men," and eighty "artificers" attached to the regiments. In the French army they have for the service of the arsenals and establishments, one hundred and forty-nine "ouvriers," and twelve "artificers;" there are also three hundred and sixty "ouvriers" and seventeen "armuriers" attached to the corps of artillery, making in all five hundred and thirty-eight.

IV. *Artillery Troops.*—Artillery, as an arm of service, is divided in the same manner as its *materiel*; the *field*-artillery being intended for field service, and the garrison or *siege*-artillery, for the attack and defence of places. The troops of the artillery corps of a modern army usually do duty either in the field, or in sieges, or garrison, as occasion may require. When employed in the service of a campaign, artillery is usually divided into two classes: 1st. *Foot* Artillery; and 2d. *Horse* Artillery.

In the early history of artillery, as has already been shown, but few pieces were ever brought upon the battle-field. Charles VIII. crossed the Alps with a pretty large train; but a part of these were hand-guns, and but very few of the larger pieces were ever brought into battle; indeed, it was then thought that this arm would be of little use except in sieges. At the battle of Gravelines the army of Philip II. had only seventeen pieces of artillery; and at the battle of Ivry the French had only four pieces of cannon, and two culverins: the army of the League had also only four pieces. At the battle of Moncontour the opposing armies had but eight pieces each.

Gustavus Adolphus of Sweden not only improved the character of artillery, but also gave to it great development as an arm of service. At the battle of Bréetenfield he had one hundred pieces of artillery, great and small, and at the camp of Nuremberg he numbered about three hundred. This king also made a more skilful use of his cannon by uniting them more in mass than had been done by his predecessors; his system was nevertheless very imperfect. In the disposition of this arm on the field of battle, a vast improvement was made by Condé, Turenne, and Prince Eugene of Savoy.

Frederick the Great also made great use of this arm, and was the first to introduce horse artillery. This mode of using field-pieces has peculiar properties which in many circumstances render it an invaluable arm. The promptness and rapidity of its movements enable it to act with other troops without embarrassing them. The French soon introduced into their army the improvements made by the king of Prussia, and in 1763 the celebrated Gribeauval appeared. He improved the form of the cannon and greatly diminished the weight of field artillery, giving it an organization which has been but slightly changed since his time.

The successive improvements in artillery have for a long time constituted a prominent feature in war. The power of this arm to throw projectiles to a great distance, and to overturn and destroy opposing obstacles, renders it a necessary arm on the battle-field, and a strong barrier and safeguard of states. It is an essential element in all army organization.

In our army we have four regiments of artillery, forming the basis of forty batteries. In the French service there are fourteen regiments, forming the basis of two hundred and six field batteries.

The term *battery*, when applied to artillery as an arm of service, refers to a permanent organization of a certain number of cannon, with the men and other accessaries required to serve them. This is the unit of force in this arm. The regimental organization is a mere nominal arrangement, for in actual service artillery acts by batteries, and never by regiments. Its strength is therefore invariably estimated by the number of its batteries.

A battery is ordinarily composed of six pieces, two of them being howitzers. The lighter batteries would, in our service, be formed of six-pounder guns and twelve-pounder howitzers; and the heavier of twelve-pounder guns and twenty-four-pounder howitzers. These heavy batteries would usually form the reserve. Each piece being attended by its caisson, this formation would give twelve carriages to each battery, six for the guns and six for the caissons. The extra caissons form a part of the reserve, and move with the train. In some foreign services a battery is composed of eight pieces with their caissons.

This arm admits of three formations—*in column, in battle*, and *in battery*. In column it ordinarily moves by sections of two pieces, each piece being

followed or preceded by its caisson. Columns of half-batteries are sometimes formed, and also columns of single pieces; but the latter ought never to be employed except in cases of necessity in passing a narrow defile, and at a distance from the enemy.

In order of battle, the pieces are drawn up in line, their caissons forming a second line, at the distance of a few paces.

When in order of battery, the pieces are formed in the same way as for battle, except that the guns are directed towards the enemy and prepared for firing.

The movements and manœuvres of foot artillery correspond with those of infantry, and of mounted artillery with those of cavalry, a battery being regarded as a battalion or squadron, of which the pieces form the platoons. Mounted batteries can seldom move with greater rapidity than the trot, except in cases of emergency, and even then the gallop can be kept up only for a very short time; but this is of no great importance, as the batteries never accompany cavalry in the charge.

The French and German writers discuss artillery as employed in battle, under two distinct heads—1st, as an arm of preparation, and 2d, as an arm of succor.

I. As an arm of preparation it serves, 1st, to protect the deploying of the other troops; 2d, to disorganize the enemy's masses, and to facilitate the action of infantry and cavalry, by weakening the intended points of attack; 3d, to force an enemy to evacuate a position by overthrowing obstacles with which he has covered himself; 4th, to keep up the action till the other troops can be prepared to strike the decisive blow.

The force of this arm depends upon the rapidity and accuracy of its fire; rash valor is therefore far less desirable in artillery than skill, patience, and cool courage. Artillery always acts at a distance, and in mass; single pieces are seldom employed, except to cover reconnoitring parties, or to sustain the light infantry in a skirmish. Mounted batteries sometimes approach within two or three hundred yards of the enemy's infantry; but this is only done with a strong support of other troops, and to prepare the way for a charge of cavalry. The batteries do not accompany the charge, but they

should always follow up and complete the success; mounted batteries are particularly useful in pursuit. If Murat, in 1812, had accompanied his attacks upon Neveroffskoi's retreating columns of sixty thousand infantry by two or three batteries of mounted artillery, the whole column must have been captured or destroyed.

Artillery, on the field of battle, is very liable to allow its fire to be drawn, and its projectiles wasted, while the enemy is at too great a distance to be reached. It is a very common thing in a battle, to employ two or three pieces of heavy calibre at the beginning of the fight, in order to provoke the opposing batteries to open their fire before the proper time. The waste of material is not the only loss attending this error; the troops are fatigued and disheartened, while the courage and confidence of their opponents are always revived by a weak and inaccurate fire. To avoid such an error the commanding officer of a battery of artillery should be perfectly familiar with the effective ranges of his pieces, and accustomed to form a correct estimate of distances. For this purpose the eye should be frequently practised in time of peace in estimating the ranges for different calibres.

The effective range of a 12-pounder field-piece is about	1000 yds.
The effective range of a 6-pounder field piece	800
The effective range of a 24-pounder howitzer	600 yds.
The effective range of a 12-pounder howitzer	500 yds.
The effective range of grape and case shot is from	500 to 600 yds.

Even at these distances the aim is usually so inaccurate that a large portion of the projectiles are lost. In the attack on Spires, a whole column of artillery expended its fire while at a distance of 900 yards from the enemy, who, of course, received little or no injury. In firing from fortifications, the aim is far more accurate, and the artillery may therefore be employed to advantage as soon as the enemy comes within the longest range.

II. As an arm of succor, the artillery serves, 1st, to give impulsive force to the attacking columns; 2d, to assist in arresting, or at least in retarding, the offensive movements of an enemy; 3d, to protect the avenues of approach,

and to defend obstacles that cover a position; and, 4th, to cover a retrograde movement.

Mounted artillery is, like cavalry, much the most effective in attack; but batteries of foot are better calculated for defence. The cannoniers are so armed as to be capable of defending their pieces to the last extremity; they therefore cannot be easily captured by opposing columns of infantry. "As to pretending to rush upon the guns," says Napoleon, "and carry them by the bayonet, or to pick off the gunners by musketry, these are chimerical ideas. Such things do sometimes happen; but have we not examples of still more extraordinary captures by a *coup de main?* As a general rule, there is no infantry, however intrepid it may be, that can, without artillery, march with impunity the distance of five or six hundred toises, against two well-placed batteries (16 pieces) of cannon, served by good gunners; before they could pass over two-thirds of the way, the men would be killed, wounded, or dispersed. * * * * A good infantry forms, no doubt, the sinews of an army; but if it were required to fight for a long time against a very superior artillery, its good quality would be exhausted, and its efficiency destroyed. In the first campaigns of the wars of the Revolution, what France had in the greatest perfection was artillery; we know not a single instance in which twenty pieces of cannon, judiciously placed, and in battery, were ever carried by the bayonet. In the affair at Valmy, at the battles of Jemmapes, Nordlingen, and Fleurus, the French had an artillery superior to that of the enemy, although they had often only two guns to one thousand men; but that was because their armies were very numerous. It may happen that a general, more skilful in manœuvring, more expert than his adversary, and commanding a better infantry, may obtain successes during a part of a campaign, although his artillery may be far inferior to that of his opponent; but on the critical day of a general engagement, his inferiority in point of metal will be severely felt."

History furnishes us numerous examples of the use of artillery in protecting avenues of approach:—such as the defile of Köesen at the battle of Auerstedt; the avenues between the redoubts of Pultowa, &c., &c.

When an army is forced to retreat, it covers its rear by that portion of its cavalry and mounted artillery which has suffered least during the battle. By placing the squadrons of horse and the light batteries in echelon, the retiring

column may be well protected. The artillery, by using the prolonge, may also continue its retreat while in battery and firing. It was in this way that at the battle of Albuera, in 1811, the French artillery on the left wing held in check the right and centre of the Anglo-Spaniards till the army effected its retreat; the artillery then retired in echelons, by batteries and fractions of batteries, under the protection of the cavalry.

We have already discussed, under the general head of tactics, the position and use of artillery on the battle-field a few additional remarks must suffice.

As a general rule, batteries should be placed in positions from which they can employ their fire to advantage, and also be free to move in any direction that the progress of the battle may require. Advantage should always be taken of natural or artificial obstacles, such as hedges, clumps of trees, logs, mounds of earth, &c., to cover and conceal the guns till the moment they open their fire. Elevated positions are, contrary to the common opinion, generally unfavorable, for artillery cannot fire to advantage at any considerable angle of depression. The slopes in front should be of considerable length, otherwise the balls would do very little execution upon that portion of the column of attack which occupied the valley. The ground should also be smooth, for if rough the balls will either bury themselves in the earth, or ricochet at a high angle of deflection, thus destroying a considerable part of the effect of the fire. The counterforts or spurs of hills are favorable for artillery, as they enable it to see, with an enfilading fire, the slopes of the principal range. Batteries should seldom be placed so as to fire over other troops, for they will not only be intimidated by this fire, but also exposed to the opposing fire of the enemy's artillery. A large number of pieces should never be crowded into the same place, but an interval should be left between the guns of forty or fifty feet, according to the locality. The most favorable position for this arm in ordinary ground, is in the intervals between the regiments or brigades of the line, and far enough in advance of this line not to draw upon the other troops the fire of the enemy's artillery. The flanks of the line are also favorable for the action of this arm.

Sometimes artillery has been employed to form a part of the line of battle; but such instances are exceptions, and can never be comprised in general rules. Whenever this disposition has been made, it has resulted from the defective character of the other arms, or from some peculiar circumstance

in the battle which enabled a bold and skilful commander to deviate from the ordinary rules of tactics. Such was the case with Napoleon at Wagram. In Saxony, in 1813, he was several times obliged to substitute his artillery to supply the want of other arms.

In the defence and attack of field-works, and in the passage of rivers, artillery plays an important and indispensable part; but it here becomes an auxiliary to the dispositions of the engineers, or at least acts in concert with that arm.

The troops of artillery, in all well-regulated army organizations, should equal about two-thirds of the cavalry, or one-seventh of the infantry.[36]

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To qualify himself for the duties connected with his arm of service, the artillery officer must make himself thoroughly acquainted with—.

The Instruction for United States Field Artillery, horse and foot;

Capt. Anderson's Instruction for Garrison Artillery;

Kinsley's Notes on Pyrotechny;

Knowlton's Notes on Gunpowder,&c.; and

The writings of Thiroux and Piobert on theoretical and practical instruction, and the writings of Jomini, Decker, and Okotmeff, on the use of this arm on the field of battle.

The following list of books of reference may be of use to those who wish to make themselves perfectly familiar with all the branches of artillery.

Histoire général de l'artillerie. Brunet.

L'artillerie à cheval dans les combats de cavalerie. Par un officier de l'artillerie Prussienne.

Considérations et experiences sur le tir des obus à bulles. Bormann. *Essai sur les obusiers*. Dusaert.

Essai sur l'organisation de l'artillerie. Le Bourg.

Traité sur l'artillerie, (traduit de l'Allemand.) Rouvroy.

Bombardier Français. Bélidor.

Mémoires d'artillerie. St. Rémy.

Essai sur l'usage de l'artillerie dans la guerre de campagne et celle de siége. Dupuget.

Mémoires sur les nouveaux systèmes d'artillerie. St. Aubin.

Treatise on Artillery. Müller.

Artificial Fire-Works. Jones.

Table de tir les canons et obusiers. Lombard.

On Gunpowder. Antoni.

Recherches sur l'artillerie en général. Texier de Norbec.

Déscription de l'art de fabriquer les canons. Monge.

Procédés de la fabrication des armes blanches. Vandermonde.

Manuel de l'artilleur. Durtubie.

Traité du mouvement des projectiles. Lombard.

Treatise on Artillery. Scheel. (Translated from the German.)

Traité pratique des feux d'artifice. Morel.

Manuel du canonnier marin. Cornibert.

New Principles of Gunnery. Robins.

Mémoires sur la fabrication des armes portatives. Cotty.

Recherches sur la poudre. Cossigny.

Supplement. Cossigny.

Fabrication de la poudre. Renaud.

American Artillerist's Companion. Toussard.

Tables des portées des canons et canonades de la marine. Cornilwert.

Traité d'artifices de guerre. Bigot.

Traité élémentaire de la fabrication des bouches à feu. Dartein.

Traité de l'art de fabriquer la poudre à canon. Bottée et Riffault.

L'art du salpétrier. Bottée et Riffault.

Dictionary of Artillery. Hoyer. (German.)

New Experiments on Gunnery. Hutton—(Hutton's Tracts.)

Des bois propres au service des Arsenaux. Herbin de Halles.

Instruction sur le service de l'artillerie. Hulot.

Manœuvres de force. Bigot.

Balistique. Obenheim.

Treatise on Artillery. German. Scharnhorst. (Translated into French, 1840.)

Essai sur l'art de pointer. Poumet.

Réflexions sur la fabrication des bouches à feu. Lamartillière.

Mémoire sur la planchette du canonnier. Obenheim.

Aide-Mémoire. Gassendi.

Observations on the use of Artillery at the sieges of Badajos, St. Sebastian, etc..

Treatise on Artillery. Lallemand.

Elémens de pyrotechnie. Ruggieri.

Nouvelle force maritime. Paixhans.

Dictionnaire d'artillerie. Cotty.

Recherches balistiques. Coste.

Poudres fulminantes. Vergnaud.

Manuel de la métallurgie du fer. Culman.

Pyrotechnic militaire, (traduit de l'Allemand, par R. de Peretsdorff.)

Journal des Sciences Militaires.

Pyrotechny. Cutbush.

Traité élémentaire d'artillerie. Decker.

Fusées de guerre. Montgery.

Documens sur la matière à canons. Hervé.

Observations sur le nouveau système d'artillerie. Allix.

Système d'artillerie de campagne. Allix.

Pocket Gunner. Adye.

On the Rocket System. Congreve.

Essai sur l'art des fontes. Serres.

Receuil de Mémoires sur la poudre à canon. Proust.

Mémorial de l'artilleur marin. Michel.

Observations sur le nouveau système de l'artillerie. Poumet.

Mémorial d'artillerie.

British Gunner. Spearman.

Régles de pointage à bord des vaisseaux. Montgery.

Manuel du maître de forges. Landrin.

Naval Gunnery. Douglass.

Métallurgie du fer (traduit de l'Allemand, par Culman.) Karsten.

Aide-Mémoire à l'usage des officers d'artillerie. (Strasbourg.)

Traité de l'organisation et de la tactique de l'artillerie, (traduit de l'Allemand par Peretsdorff.) Grewenitz.

Supplement au dictionnaire d'artillerie. Cotty.

Memoir on Gunpowder. Braddock.

Manuel de l'armurier. Paulin-Desormeaux.

Journal des armes spéciales.

Cours sur le service des officiers dans les fonderies. Serres.

Expériences sur la fabrication et la durée des bouches à feu en fer et bronze, (traduit de l'Allemand par Peretsdorff.) Meyer.

Applications du fer aux constructions de l'artillerie. Thierry.

Aide-Mémoire d'art militaire. Lebas.

Mémorial à l'usage de l'armée Belge.

Instructions and Regulations for the service and management of heavy ordnance in the British service.

Experiences sur les principes du tir, faites à Metz, en 1834.

Traité d'artillerie théorique et pratique. Piobert.

Aide-Mémoire à l'usage des officiers d'artillerie, (avec approbation du comité d'artillerie.)

Manuel d'artillerie à l'usage des officiers de la République Helvétique. Bonaparte, (Napoleon Louis.)

Expériences comparatives entre des bouches à feu en fonte de fer, d'origine Franzaise, Anglaise et Suédoise, faites à Gavres, en 1836.

Expériences faites à Brest en 1831, *sur les canons.* Paixhans.

Essai sur l'organisation de l'artillerie. Le Bourg.

Expériences sur des projectiles creux, faites en 1829, '30, '31.

Instruction pratique sur l'emploi des projectiles, (traduit de l'Allemand par Peretsdorff.) Decker.

Effects of heavy ordnance as applied to ships of war. Simmons.

Expériences sur les poudres de guerre, faites à Esquerdes, en 1832, '33, '34, and '35. Maguin.

Cours d'artillerie à l'usage des sous-officiers. De Crépy.

Instruction théorique et pratique d'artillerie, à l'usage des élèves de St. Cyr. Thiroux.

Cours sur le service des officiers d'artillerie dans les forges.

Manuel historique de la technologie des armes à feu, (traduit de l'Allemand par M. Rieffel.) Meyer.

Formules rélatives aux effets du tir sur affût. Poisson.

Manuel de l'artificer. Vergnaud.

Etat actuel de l'artillerie de campagne de toutes les puissances de l'Europe, (traduit par Mazé; Ire partie, Artillerie Anglaise.) Jacobi. (Six other parts have been published in German, containing descriptions of the French, Belgian, Hessian, Wirtemburg, Nassau, and Swedish systems.)

Introduction à l'étude de l'artillerie. Madelaine.

Cours sur le service des officiers d'artillerie dans les fonderies. Description de la fabrication des bouches ù feu à la fonderie royale de Liège. Huguenin.

Poudre ù canon. Timmerhans.

Procédés de fabrication dans les forges, (extrait du cours sur le service des officiers dans les forges.)

Renseignements sur le matériel de l'artillerie navale de la Grande Bretagne. Zeni et des Hays.

Théorie des affûts et des voitures de l'artillerie. Migout et Bergery

Artillerist's Manual. Griffith.

Handbuch für die K.K. Oesterreichische Artillerie Offiziere, (manual for the Austrian artillery officers.)

Sammlung von Steindruckzeichnungen der Preussischen Artillerie, mit Erläuterungen, (collection of plates of the Prussian artillery, with explanatory text.)

Histoire des fusées de guerre.

Ordnance Manual, for the use of the officers of the United States Army.

Experiments on Gunpowder. Capt. Mordecai.

Pyrotechny, for the use of the Cadets at the United States Military Academy. Kinsley.

Notes on Gunpowder, Percussion Powder, Cannon, and Projectiles. Lt. Knowlton.

CHAPTER XII.

ARMY ORGANIZATION—ENGINEERS.

Engineers.—The term *engineer* is derived from the unclassical Latin word *ingenium*, which was applied both to a *machine* and the *mind* or *skill* of the person who devised or constructed it.

It was Philip Augustus, say the French writers, who first introduced engineers (*engigneurs*, or *engignours*, as they were called) into France, and restored the art of sieges. The engineers of that age were seldom charged with the construction of works of military defence, but, like Archimedes at Syracuse, and Longinus at Palmyra, they directed their attention principally to devising implements of war and the most effective manner of using them. Engines of war were at that time divided between the *engigneurs* and the *artilliers*; the former being charged with the heavier machines, and the latter with the smaller weapons used for throwing projectiles. After the invention of gunpowder, the old battering-rams, cranes, helipoles, &c., disappeared, and with them the *engigneurs*, or masters of engines. The new inventions were united with the few old projectile machines that remained in the artillery, and the engineers were for a time left almost without employment. The revival of the art of fortification was very slow, and the modern system scarcely began to be developed till near the sixteenth century.

We must omit for the present giving even an outline of the history of military engineering, and pass to the troops of this arm, as constituting an essential element of an army organization. The subject of fortification, and the history of its various changes, will be examined in the next chapter.

The engineers, in modern army organization, constitute the fourth arm of service, as, compared with artillery, their relative numbers are about as two to three. They are divided in the same manner as the artillery, viz.:—1st, the staff; 2d, guards, or fort-keepers; 3d, artificers; and 4th, the troops.

I. The officers constituting the staff of this corps are charged in time of peace with planning, constructing, and repairing all fortifications and other defensive works; the construction and preparation of all military materials, and stores connected with this arm; and (in our service) with the disbursements of money connected with these operations: in time of war they are charged with the attack and defence of military works, the laying out and construction of field defences, redoubts, intrenchments, roads, &c.; in the attack they form a part of the vanguard, to remove obstructions; and in retreat they form a part of the rear-guard, to erect obstacles, destroy roads, bridges, &c., so as to retard an enemy's pursuit.

From the important character of these duties as connected with the means essential to a national defence, and the vast amount of money expended in these operations, it is evident that a high order of acquirements should be deemed necessary to qualify one to perform the duties of a military engineer. This officer requires a knowledge of chemistry, to guide his choice of materials for mortars, cements, and mastics; of mineralogy and geology, for selecting stone; of botany, for timber and the means of preventing its decay; of mathematics, in laying out his work and calculating the thickness and stability of his walls, embankments, &c.; of mechanical philosophy, in constructing his machinery; of military engineering, in his plans of fortifications; and of all the higher branches of military science, in selecting positions for these works, such that they shall have the proper relations to the means of national defence, and to the grand operations of armies in the field. The avenues to appointment to this corps are guarded, in most European armies, with special care, to prevent the influence of money, politics, or family connections; and in our own army it is now specified by law of Congress, that the vacancies shall be filled only from the most distinguished graduates of the military academy. Formerly our service suffered most severely from the employment of incompetent persons, introduced through political influence from civil life, and foreign charlatans, the refuse of European armies. Many of our earlier military works (as will be mentioned hereafter) were modelled upon systems for a long time discarded by the profession in Europe, and even some of those which have been constructed within the last thirty years are made of such wretched materials and workmanship, that they are already crumbling into ruins. While the existing laws and regulations seem well calculated to

prevent the recurrence of similar abuses and errors, it nevertheless can be shown that the organization of this arm of our service requires modifications and extensions to give it the requisite degree of efficiency, and to economize the public expenditures.

The wars of Louis XIV. first led to a regular military organization, and a regular system of defence. In these wars the engineers received great development, and have ever since occupied a prominent position as parts of an army organization. We therefore find in all the great sieges and battles of this era a large and continually increasing number of engineers and engineer troops, this force being gradually augmented as the true principles of war became better understood, and as the wants of the service required. Even in the earliest of these battles we find the engineers taking a prominent and distinguished part. In the war of 1688, twenty-four engineers were killed and wounded at the siege of Philipsbourg, eighteen at Namur, eight at Huy, ten at Charleroi, eight at Ath, thirty at Barcelona, &c. Such losses were good proofs of the usefulness of these officers, and before this war was closed, their number was increased to six hundred; and in 1706 the army contained eight brigades of engineers and four companies of miners.

The engineer corps being partially disbanded in the early part of the French Revolution, great difficulty was experienced in reorganizing it and in finding competent men to supply the places of those who had been driven into exile or sacrificed during the reign of terror. Energy and activity, combined with republican zeal, could supply the place of skill in the other arms, but the science of the engineer could not be acquired in a day.

In 1799, the staff of the engineer corps consisted of four hundred and forty-nine officers, without including the general officers, commanding departments, or those connected with the engineer troops. The same organization was continued in 1804. The engineer staff of the French army now numbers four hundred and thirty-two officers. We have in our service forty-three engineer officers, for staff duty, who are now engaged in the construction and repairs of some sixty or seventy fortifications, and other works of a civil and military character.

II. *Engineer Guards*, or *Fort-Keepers*, are a class of men charged with the general care of forts, and all public property deposited in the several

engineer dépôts and garrisons, and in the public works during their construction.

There are five hundred and fifty of these "*gardes du Genie*" in the French army, who rank next the sub-lieutenants of engineers, and are assimilated with the sub-lieutenants of infantry in the hospitals, marches, &c. *In our service we have no engineer guards or fort-keepers.*

This defect in our organization has been the cause of serious inconvenience, and the consequent waste of public property. The expense of hiring civil agents for this purpose has more than trebled the cost of supporting a suitable number of non-commissioned guards to maintain the good order and efficiency of our forts, in the absence of engineer officers, and to preserve and keep in repair the military implements and stores connected with this department of the army. It has already been shown that we have fifty-eight of these guards for the artillery service, and it really seems somewhat singular that the engineers, with a much greater amount of public property in their charge, are allowed no assistants of this kind.

III. *Engineer artificers* are a class of men employed in the practical operations of constructing forts and other military defences, and in making and repairing all the implements used by the engineer troops in the operations of sapping and mining, in crossing rivers, in constructing field-defences, and in the attack and defence of field-works.

As very few new fortifications are now required in France, the services of engineer artificers are less necessary and important than in our service, where large sums of money are annually expended upon military defences, There are, however, in the French army a corps of engineer artificers, consisting of eight officers and a cadre of fifty-four non-commissioned officers, with a variable number of privates, organized into two companies. *But in our army we have no regular engineer artificers!* In our artillery service we have three hundred and thirty enlisted artillery artificers. If these are useful and necessary to the artillery service, which no one doubts, for still stronger reasons would it be advantageous to the public service to employ at least an equal number of enlisted engineer artificers on our fortifications; for the annual expenditure of public money is here much greater than in the corresponding branch of the artillery service.

IV. *Engineer troops* are divided into three classes—1st, *sappers and pioneers*; 2d, *miners*; and 3d, *pontoniers*.

In the French army of 1799, there were four battalions of sappers, consisting of 120 officers and 7,092 men. In 1804, Napoleon organized five battalions of these troops, consisting of 165 officers and 8,865 men. Even this number was found insufficient in his campaigns in Germany and Spain, and he was obliged to organize an additional number of sappers from the Italian and French auxiliaries. The pioneers were then partly attached to other branches of the service. There is, at present, in the French army a considerable number of sappers or pioneers detached for the service of the infantry regiments, three companies of *sapeurs-conducteurs*, and forty-two companies of *sapeurs*. In the French army of 1799, there were six companies of miners, consisting of 24 officers and 576 men. In 1804, Napoleon increased these troops to nine companies, containing 36 officers and 864 men. The present French peace establishment contains six companies of miners, organized much the same as under Napoleon. In the French army of 1799 there were two regiments of pontoniers, of 38 officers and 960 men. But this number was found too small in the remaining campaigns, and the deficiency was temporarily supplied by organizing sailors for these duties. In the present French army organization, there are eleven companies of pontoniers, forming a regiment of sixty-three officers.

We have in our service no sappers, miners, or pontoniers, and, in case of war, would be found without the means of executing any military works, or performing any military operation which would require engineer troops.

In the preliminary stages of army organization under Louis XIV., infantry troops were detailed as sappers, and instructed in these duties by the engineers. This irregularity of service soon caused difficulties and losses, and the evils springing from it were so great, that Vauban urged the propriety of a separate organization. In 1670 he officially recommended to the king to establish a regiment of twelve hundred sappers and *ouvriers*, and in a subsequent report on the value of these troops, used the following language: "They would be useful in peace as well as in war, and would be the means of saving much in all fortifications where they should be employed. In fact, I have not the least doubt that they would save annually to the king much more than their pay. I assert all I have said on this subject

with as much confidence as if I had seen the result; and I can, with the same certainty, add, that this small troop will be the means of saving large numbers of good engineers and brave officers and soldiers, from the stern necessity to which we are reduced of exposing, almost always, the laborers and those who support them; which necessity would not arise had we at command a sufficient number of this kind of workmen well instructed. To such a degree have I felt the necessity of sappers, at every siege at which I have been present, that I have always had reason to repent of not having more urgently solicited the creation of this company."

Such are the views of the greatest of military engineers, a man who fought one hundred and forty battles, conducted fifty-eight sieges, and built or repaired three hundred fortifications. His anticipations of the usefulness of engineer troops were fully realized, and they have ever since received the most careful attention, and now form, as has just been shown, one of the most important and efficient arms in the French service. The fortifications constructed by the engineers, as organized by Vauban, have ever since constituted one of the principal elements of the French military power.

In the wars of Napoleon there are innumerable instances in illustration of the delays and disasters attending the operations of armies not supplied with engineer troops; and, on the other hand, the advantages resulting from their services when properly organized and instructed. We have already pointed out the influence which the fortifications in the hands of the French exerted on the results of these wars, and the fatal consequences to the Allies of neglecting these works of national defence. Every student of military history will immediately call to mind the influence of Savona, Coni, Mondovi, Ceva, Govi, Alessandria, Tortona, Pizzighitone, Peschiera, Mantua, Palma-Nuova, Osopo, Klagenfurth, &c., in the campaigns of 1796-7; of Genoa, Port Bard, the fortifications of the Var, Ulm, Ingoldstadt, &c., in 1800; of Milan, Turin, Mantua, Roco d'Aufo, Genoa, Alessandria, &c., in 1805; the importance of Kehl, Cassel, Wesel, &c., to the French in 1806, and the fatal consequences to the Prussians in that campaign, of their total and culpable neglect of their own fortifications.

All military historians speak of the influence of fortifications in the Peninsular campaigns: those which had been given up to Napoleon previous to the opening of hostilities, contributed very much to the success of his

arms, while those which were retained by Spain and her allies, contributed in an equal degree to hamper and embarrass his operations. Some of these, like Saragossa and Tarragona, with their broken walls and defective armaments, kept the enemy in check some sixty days each, and did much to weaken the French power in the Peninsula.

Temporary or field-fortifications also had an important influence here. The lines of Torres-Vedras, the field-works of Ronda, the intrenched camps of the Pyrenees, Bayonne, Toulouse, &c., are examples under this head. In fact, field-works played a most important part in all of Napoleon's wars. We might mention the redoubt of Montenotte, the intrenchments at Milesimo, the batteries of Lobau, the field-defences of Hougomont, La Haye-Sainte, and Papelotte at Waterloo, and numerous other cases equally striking. Just before the battle of Waterloo, Wellington employed some eighteen thousand peasants and two thousand horses, under the direction of British officers of engineers. In speaking of these defences, Colonel Pasley says: "It may be easily conceived that to have directed such a great body of workmen to proper advantage, by means of a few officers of engineers, would have been impossible, but for the system adopted of subdividing the various works among the non-commissioned officers and privates of the engineer troops, each of whom was made responsible for laying out the details of his own portion, and for the direction of a party of from twenty to one hundred men, or even more, according to circumstances."

But to return to the Peninsular war. These campaigns exhibit in strong colors the advantages derived, on the one side, from a well-organized engineer corps, and the losses, delays, and defects suffered on the other, until the defects of the organization were remedied. Napoleon entered Spain with a well-appointed army, and soon, through strategy and well-directed force, gained possession of the important fortresses of the Peninsula; seizing in this way the strategic routes and important geographical points, he was enabled to retain possession of the country for eight years, in spite of the numerous forces arrayed against him, the absence of himself and his best generals in Germany, and the great inefficiency of Joseph and of many of his generals. These fortifications were old, and of strength inferior to modern works of defence, but it required years and the expenditure of millions in blood and treasure to expel from the country those who had possession of them.

For the first five years of this war the English struggled with a most imperfect army organization.[37] When "the first serious siege," says Napier, was undertaken by the British army, "to the discredit of the English government, no army was ever so ill provided with the means of prosecuting such an enterprise. The engineer officers were exceedingly zealous; and many of them were well versed in the theory of their business. But the ablest trembled when reflecting on their utter destitution of all that belonged to real service. Without a corps of sappers and miners, without a single private who knew how to carry on an approach under fire, they were compelled to attack fortresses defended by the most warlike, practised, and scientific troops of the age."

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In a letter dated February 11th, 1812, Wellington wrote to the Secretary of State as follows:—"I would beg leave to suggest to your lordship the expediency of adding to the engineer establishment a corps of sappers and miners. It is inconceivable with what disadvantages we undertake any thing like a siege for want of assistance of this description. There is no French *corps d'armée* which has not a battalion of sappers and a company of miners; but we are obliged to depend for assistance of this description upon the regiments of the line; and although the men are brave and willing, they want the knowledge and training which are necessary. Many casualties among them consequently occur, and much valuable time is lost at the most critical period of the siege."

"The best officers and finest soldiers were obliged to sacrifice themselves in a lamentable manner, to compensate for the negligence and incapacity of a government, always ready to plunge the nation into war, without the slightest care of what was necessary to obtain success. The sieges carried on by the British in Spain were a succession of butcheries; because the commonest materials, and the means necessary to their art, were denied the engineers." Colonel J.T. Jones writes in nearly the same terms of the early sieges in the Peninsula, and with respect to the siege of Badajos, adds in express terms, that "a body of sappers and miners, and the necessary fascines and gabions, would have rendered the reduction of the work certain."[38] Soon after this siege a body of engineer troops arrived from England, but their number was insufficient, and Wellington, having learned by sad experience the importance of engineer troops, ordered a body of two hundred volunteers to be detached from the line, "and daily instructed in the practice of sapping, making and laying fascines and gabions, and the construction of batteries, &c." The siege of Ciudad Rodrigo, which immediately followed this organization, was conducted with greater skill and success than any other till nearly the close of the war; and all military writers have attributed this result to the greater efficiency of the engineer force engaged in the siege. This arm was now gradually increased, and the last year of the war the engineer force with the English army in the field consisted of seventy-seven officers, seven assistant-engineers and surveyors, four surgeons and assistants, one thousand six hundred and forty-

six sappers, miners, artificers, &c., one thousand three hundred and forty horses and one hundred and sixty carriages.

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Colonel Pasley states that only *one and a half yards of excavation*, per man, was executed *in a whole night*, by the untrained troops in the Peninsular war; whereas an instructed sapper can easily accomplish this *in twenty minutes*, and that it has been done by one of his most skilful sappers, at Chatham, *in seven minutes!*

During all this time the French furnished their armies in Spain with well-organized engineer forces. We have endeavored to form a comparison of the number of French engineers and artillerists employed on these peninsular sieges. But from the loose manner in which these details are usually given by historians, it is almost impossible to distinguish between the two. Both are not unfrequently given under the same head, and when a distinction is apparently kept up, only the engineer *staff* is mentioned under the head of engineers—the sappers, miners, artificers, the train, &c., all being put down as artillery. In the following table we have endeavored to arrange them as is done in our own army. The trains of both arms are left out, for frequently that of one arm performed the duties of the other. Moreover, in our service a portion of these duties of engineer and artillery trains is performed by the quartermaster's department. For those who wish to know the exact organization of the French engineer train, we give it as it existed in 1811, viz.:—seven troops, each troop consisting of three officers, one hundred and forty-one non-commissioned officers and privates, two hundred and fifty horses, and fifty wagons, conveying five thousand two hundred and seventy intrenching tools, one thousand seven hundred cutting tools, one thousand eight hundred and two artificers' tools, two hundred and fifty-three miners' tools, and eight thousand three hundred and eighteen kilogrammes' weight of machinery and stores, each article being made to a particular pattern. The pioneers in Spain acted sometimes with one arm and sometimes with the other, and we have assigned them accordingly in the table. The pontoniers, however, in our service are included with the engineers; we have therefore put them, in our table, in the same column with the engineers.

Name of Siege.	Engineer staff, sappers, miners, pontoniers and pioneers.		Artillery staff, horse and foot artillery, ouvriers and pioneers		Total of engineers, sappers, miners, pontoniers and pioneers	Total of artillery staff, horse and foot artillery, ouvriers and pioneers
	Officers	Men	Officer	Men		
Saragossa	86	1180	90	1276	1275	1360
Rosas	21	211	-	-	232	461
Girona	54	603	62	1299	637	1361
Astorga	7	91	17	427	98	444
Lerida	15	316	11	208	331	219
Meguinenza	34	278	-	-	312	136
1st. Cuidad Rodrigo	34	441	-	-	475	1019
Almeida	34	489	-	-	523	1019
Tortosa	43	429	32	381	472	413
Tarragona	50	681	46	701	731	747
Olivensa	10	106	-	-	116	186
1st. Badajos	25	707	41	699	732	740
Tarifa	12	235	17	148	247	165
Peniscola	13	138	9	183	151	192
2nd. Cuidad Rodrigo	3	12	8	160	15	168
2nd. Badajos	9	256	-	-	265	268
Burgos	4	124	3	126	128	129
Castio Udiales	5	68	8	197	73	205
St Sebastian	13	248	7	166	261	173

From this table it appears that the ratio of the two arms at these sieges, making the comparison on the basis of our own organization, is about the

same as for the present French army in Algeria, or a little more than five of engineers to six of artillery.

Thus far we have spoken of the field-operations of engineer troops in connection with fortifications, alluding only incidentally to the use of military bridges and the passage of rivers. In the early wars of the French Revolution the want of pontoniers was severely felt, and from the deficiency of this branch of service, the operations of the French generals were on several occasions very much restricted. The evil was afterwards remedied in a great degree by the introduction of several battalions of ponioniers in the regular army organization. On many occasions, during his wars, did Napoleon feel and acknowledge the importance of these troops; but on none, perhaps, was this importance more clearly shown than in the passage of the Beresina during his retreat from Moscow with the wreck of his army. The Russians had cut the bridge of Borisow and taken position in great strength on the right bank of the river, both at this point and below; the French, wearied with long and difficult marches, destitute of artillery, provisions, and military stores, with a wide and deep river in front, and a powerful enemy on their flank and rear, benumbed by the rigors of a merciless climate, and dispirited by defeat—every thing seemed to promise their total destruction. "General Eblé," says an English general officer, in his remarks on this retreat, "who, from the beginning of the campaign, had made all the arrangements for the equipment and construction of military bridges, was specially charged with the important duty of providing for the passage of this river; and he discharged that duty with a degree of forecast and ability to which certainly Napoleon owed his escape and the wreck of his army its safety. General Eblé had begun to prepare, at Smolensko, for the difficulties which he foresaw in this operation. He formed, with every care, a train sufficient for the transport of all the tools and stores that might be required; and, further to provide against casualties and accidents, every man belonging to the companies of pontoniers was obliged to carry from Smolensko a tool or implement of some kind, and a proportion of nails: and fortunate was it for the army that he did so; for such was the difficulty in getting through the carriages containing stores, that only two forge-wagons and six caissons of tools and nails could be preserved. To these the general added a quantity of iron-work taken from the wheels of carriages that were abandoned on the march. Much was sacrificed to bring off these valuable

materials for making clamps and fastenings, but, as Segur observes, that exertion '*sauva l'armée*.'"

But it is not always in the possession of a thing that we are most likely to appreciate its utility; the evils and inconveniences resulting from the want of it not unfrequently impress us most powerfully with its importance and the advantages to be derived from its possession. A few examples of this nature, drawn from military history, may be instructive. We need not go back to the disastrous passage of the Vistula by Charles XII., the failure of Marlborough to pass the Dyle, and Eugene to cross the Adda in 1705, nor of the three unsuccessful attempts of Charles of Lorraine to cross the Rhine in 1743. The wars following the French Revolution are sufficiently replete with useful instruction on this subject.[39]

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Before recurring to these, it might be useful to give one example, as it is often referred to, in the campaign of 1702. It was deemed important for the success of the campaign to attack the Prince of Baden in his camp at Friedlingen. Accordingly, a bridge was thrown across the Rhine at Huningen, the passage effected, and the victory gained. But Villars was several times on the point of losing all for want of a sufficient ponton equipage. Having but a *single* bridge, the passage was necessarily slow; the artillery and stores were frequently interrupted by the infantry hurrying to the field of battle; disorder ensued, and the whole movement was retarded; Villars could bring only a small part of his artillery into action, and towards the close of the battle the infantry were in want of ammunition: moreover, the whole operation had nearly failed from the attempt of the enemy to destroy this bridge, but the skill of the French pontoniers saved it. We here remark, 1st, the passage secured to Villars an important victory; 2d, from having an inefficient bridge-equipage his whole army was placed in great peril, and the operation had nearly failed; 3d, if the Prince of Baden had possessed a skilful corps to oppose that of Villars, this single bridge would have been destroyed, and the army cut to pieces; 4th, the skill of the little corps of French pontoniers saved the bridge, and of consequence, the army.

In 1794 so great was the disorder in the direction of affairs, that the boats of the bridges across the Wahal and the Rhine were disposed of for

commercial purposes; and in the beginning of 1795, says Jomini, "the conquerors of Belgium and Holland had not even a bridge equipage, at a time too when the success of the campaign depended solely on the means of crossing a river." A few boats were procured from the Wahal and the Meuse, and others manufactured in the forests of the Moselle; but "these operations consumed precious time, and *four months* thus passed away in preparations." Even after other things were all ready, the army was obliged to wait thirty days for the arrival of boats for ponton bridges; during this delay the Austrians strengthened their position, and with very little exertion they might easily have prevented the passage.

In 1796, profiting by the errors of the former campaigns, the French collected more suitable bridge equipages, and the two armies passed the Rhine at Neuweid and Kehl without loss or delay. The latter of these passages has often been referred to as a model for such operations, and certainly does credit to the general who directed it. But Moreau's bridge equipage having been destroyed during this disastrous campaign, his operations the following year were considerably delayed in preparing a new one, and even then he was under the necessity of seizing all private boats that could be found within reach; but the difficulty of collecting and using boats of all sizes and descriptions was so great as entirely to defeat his plan of surprising the enemy on the opposite bank of the river. The necessity of co-operating with Hoche admitted of no further delay, and he was now obliged to force his passage in the open day, and in face of the enemy. Undertaken under such circumstances, "the enterprise was extremely sanguinary, and at one time very doubtful;" and had it failed, "Moreau's army would have been ruined for the campaign."

Napoleon's celebrated passage of the Po, at Placentia, shows plainly how important it is for a general to possess the means of crossing rivers. "I felt the importance of hastening the enterprise in order not to allow the enemy time to prevent it. But the Po, which is a river as wide and deep as the Rhine, is a barrier difficult to be overcome. We had no means of constructing a bridge, and were obliged to content ourselves with the means of embarkation found at Placentia and its environs. Lannes, chief of brigade, crossed in the first boats, with the advanced guard. The Austrians had only ten squadrons on the other side, and these were easily overcome. The passage was now continued without interruption, but very slowly. *If I*

had had a good ponton-equipage, the fate of the enemy's army had been sealed; but the necessity of passing the river by successive embarkations saved it."

In the campaign of 1799, the Archduke attempted to pass the Aar, and attacked the French on the opposite side, but for want of suitable equipage his operation was delayed till the enemy had collected sufficient forces to intercept the passage; he was now obliged to enter into a stipulation for a suspension of hostilities, and to withdraw his bridges.

The operations of the French in the campaign of 1800, led to the most glorious results, but their execution was attended with the greatest difficulties. The passage of the Alps was greatly facilitated by the ability of the chief engineer, Marescot, and the skill of the troops under his command; and the facility of passing rivers afforded Napoleon by his pontoniers, had an important influence upon the success of the campaign. "The army of the reserve had many companies of pontoniers and sappers; the pontons of course could not be taken across the St. Bernard, but the pontoniers soon found materials on the Po and Tesin for constructing bridge equipages." Moreau's army in the same year profited well by his pontoniers, in the passages of the Inn, the Salza, the Traun, the Alza, &c., and in the pursuit of the Austrian army—a pursuit that has but a single parallel example in modern history.

The facility with which Napoleon crossed rivers, made forced marches, constructed redoubts, fortified dépôts, and grasped the great strategic points of the enemy in the campaign of 1805, resulted from the skilful organization of his army, and the efficiency given to the forces employed in these important operations. The engineer staff of the French army at this period, consisted of four hundred and forty-nine officers, and there were four battalions of sappers, of one hundred and twenty officers and seven thousand and ninety-two men; six companies of miners, of twenty-four officers and five hundred and seventy-six men; and two regiments of pontoniers, of thirty-eight officers and nine hundred and sixty men. On the contrary, the enemy's neglect of these things is one of the most striking of the many faults of the war, and his ill-directed efforts to destroy the great wooden bridge across the Danube, and the successful operations of the

French sappers in securing it, formed one of the principal turning points in the campaign.

The same organization enabled the French to perform their wonderfully rapid and decisive movements in the Prussian campaign of 1806, and the northern operations of 1807.

In 1809, Napoleon's army crossed, with the most wonderful rapidity, the Inn, the Salza, the Traun, and other rivers emptying into the Danube, and reached Vienna before the wonder-stricken Austrians could prepare for its defence. It was then necessary for the French to effect a passage of the Danube, which was much swollen by recent rains and the melting snow of the mountains. Considering the depth and width of the river, the positions of the enemy, and his preparations to oppose a passage, with the disastrous consequences that would result to the French from any failure in its execution; taking all these things into consideration, Jomini pronounced it "one of the most hazardous and difficult of all the operations of War." Here the fate of the army depended, apparently, upon the skill and efficiency of the engineers and pontoniers, and nobly did they discharge the trust reposed in them. When the pontons failed, tressel-bridges were substituted, and even fifty-four enormous boats were put in requisition. So skilfully were these operations conducted, that Napoleon's immense army crossed over in safety, directly in the face of a superior enemy, and the same day fought the memorable battle of Esling. Forced to retire before numbers vastly superior to his own, Napoleon concentrated his forces on the island of Lobau, and intrenched his position. Surrounded by the broad and deep channel of the Danube, and watched by numerous and skilful enemies, it required the most constant activity and the greatest good fortune to effect a passage. Here the skill and efficiency of the engineers shone conspicuously; a number of bridges were thrown across the river in the face of the Austrians, and against obstacles almost insurmountable; the whole French army passed in safety, and soon put the finishing stroke to that brilliant campaign. So high an estimate did Napoleon attach to the construction of these bridges, that, when the passage was completed, he offered to place Bertrand, the constructing engineer, though of comparatively low rank, at the head of the French *corps du genie*.

On many occasions during the retreat in 1812-13, from the Beresina to the left of the Rhine, across the Niemen, the Vistula, the Oder, the Elbe, and the numerous other rivers which divide that immense country, the French derived vast advantages from the experience and skill of their engineers and pontoniers, several times whole corps escaping through their means from the grasp of their pursuers. When, however, the disasters of this retreat had absorbed most of the material of the army, and had sadly thinned the ranks of men of skill and experience, they sustained many severe, and, in other circumstances, unnecessary losses. Of this character we may mention the passage of the Elster by the bridge of Lindnau, where, through the ignorance and carelessness of those charged with the mines, and through the want of suitable bridge arrangements, thousands of brave men were buried in the muddy waters of this small river. So sensibly did Napoleon feel this want of bridge equipages, in the winter of 1813-14, that he addressed to his minister of war, on this subject, the following remarkable words: "If I had had pontons, I should have already annihilated the army of Schwartzenberg, and closed the war; I should have taken from him eight or ten thousand wagons, and his entire army in detail; but for want of the proper means I could not pass the Seine." Again, on the 2d of March he wrote: "If I had had a bridge equipage this morning, Blücher's army had been lost." Whoever will examine the details of the operations of this campaign, will be convinced of the full force of these remarks.

In Spain in 1808, Sir John Moore, in order to assist the native forces, had penetrated so near the army of Napoleon, that retreat became exceedingly difficult, and he was several times on the point of being lost. The English army was at this time very deficient in engineer troops, and Moore suffered much for want of miners to destroy bridges, and pontoniers to construct new ones. In order to cover his retreat and impede the advance of the French, the commander-in-chief, says Napier, "directed several bridges to be destroyed, but the engineers [for want of miners and miner's tools] failed of success in every attempt."

In Soult's retreat, in 1809, he crossed the Duero at Oporto, and destroyed the bridges so as to cut off the pursuit of Wellington. But while Soult, deceived by treachery in his own corps, neglected to guard the river with proper vigilance, Wellington collected boats at different points, crossed over his army, surprised the French, and, had it not been for the singular delay

and indecision of General Murray, would most certainly have forced the entire army to capitulate; as it was, his operation produced a decided influence on the campaign, and effected the safety of Beresford's corps. Soult destroyed his artillery and baggage, and hastily retreated through the mountain passes; but his army was again arrested at the river Cavado, and placed on the very brink of destruction, when the brave and skilful Dulong succeeded in effecting a passage at the Ponte Nova; the same daring officer opened, on the same day, a way for the further escape of the French across the Misarella by the Saltador.

In the pursuit of Massena, in 1810, it was important to the English to cross the Guadiana, and attack the French before Badajos could be put in a state of defence. Beresford was directed by Wellington to pass this river at Jerumina, where the Portuguese had promised to furnish pontons; but they neglected to fulfil their engagement, and the army had to wait till Capt. Squire, an able and efficient officer of engineers, could construct other means for effecting a passage. Every thing was done that genius could devise and industry execute; nevertheless, the operations of the army were greatly delayed—"*a delay,*" says the historian, "*that may be considered as the principal cause of those long and bloody operations which afterwards detained Lord Wellington more than a year on the frontiers of Portugal.*"

We might prolong these remarks by discussing the passages of the Ceira and Alva, and their influence on the pursuit of Massena; Wellington's passage of the Tagus, and his retreat from Burgos in 1812; the passage of the Adour and Garonne in 1814; and the failure of the mines to blow up the bridges of Saltador, Alcantara, &c.; but a sufficient number of examples, it is believed, has already been adduced to show the advantage of maintaining a properly organized and instructed body of sappers, miners, and pontoniers, and the fatal results attending the want of such troops, as a component part of an army organization.

It has already been remarked that the infantry of an army must always form the basis of the apportionment; and by the general rule laid down by military writers, the cavalry should be from one-fourth to one-sixth of the infantry, according to the character of the war; the artillery about two-thirds of the cavalry, or one-seventh of the infantry; and the engineers from one-half to three-fourths of the artillery,—say about two-thirds. The staff and

administrative corps must vary according to the nature of the organization, and the character of the theatre of war. The former ought to be from two to five in a thousand, and the latter from twenty-five to seventy-five,[40] as a general rule. These ratios would give for a good army organization;

Staff	5
Administrative service—pay, medical, commissary, quarter-master, etc.	65
Infantry	650
Cavalry	130
Artillery	90
Engineers	60
Total	1,000

In a broken country, and against savage and undisciplined foes, like the Indians in this country, the natives opposed to the English in India, to the French in Algeria, or to the Russians in Circassia, the cavalry, artillery, and engineers would be diminished, and the infantry and administrative corps proportionably increased; the former because light troops are always preferable against an undisciplined foe, and the latter because of the difficulty of moving and procuring supplies in new and uncultivated countries. The French forces in Algeria, in 1844, amounted to about sixty thousand men, in the following proportion:—

Staff	4.7
Administrative,etc.	112.3
Infantry	687.3
Cavalry,	86.6
Artillery	61.2
Engineers	47.9

1000 men.

[40]

This supposes the teamsters, wagon-masters, hospital-servants, &c., to be enlisted men, and not persons hired for the occasion as is done in our army.

In small peace establishments the relative proportion of infantry and cavalry should be much less than when prepared for the field, because troops for these two arms can be much more readily formed in case of emergency, than for those which require more scientific information, and technical skill and instruction. The staff and engineers are evidently the most difficult to be formed in case of war, and next to these the artillery and administrative corps.

In this country we can maintain, in time of peace, only the framework of an army, looking to our citizen soldiery to form, in case of need, the great mass of our military force. This is the starting point in our military system, and the basis of our army organization. Let us see whether this principle is carried out in practice.

For every thousand men in our present organization[41] we have,

For the staff	2
Administrative	20[42]
Infantry	513
Cavalry	150
Artillery	310
Engineers	5
	=======
	1000 men

[41]

These numbers are the real rather than the *nominal* proportions, many of our officers being called *staff*, who properly belong to one of the other

classes.

[42]

Much of the administrative duty in our army is done by unenlisted men, or by soldiers detached from their companies. Where such is the case, the ratio of this branch of the service ought to be no higher than is represented above.

We see from this table, that while our artillery is nearly six times as numerous as in ordinary armies, our staff is less by one-half, and our engineers not more than one-half what ought to be their proportion in a war establishment. To this excess of artillery over infantry and cavalry in our army in time of peace there is no objection, inasmuch as the latter could be more easily expanded in case of war than the artillery. But for a still stronger reason our staff and engineers should also be proportionally increased, instead of being vastly diminished, as is actually the case.

Experience in the first campaigns of the American Revolution strongly impressed on the mind of Washington the absolute necessity of forming a regular and systematic army organization. But so difficult was it to obtain properly instructed engineers, that he was obliged to seek his engineer officers in the ranks of foreign adventurers, and to make drafts from the other arms of service, and have them regularly instructed in the duties of engineer troops, and commanded by the officers of this corps. An order, in his own handwriting, giving the details of this temporary arrangement, is dated March 30th, 1779. Until men are enlisted for the purpose, companies of sappers and miners shall be formed by drafts from the line. "The duties of the companies of sappers and miners," he continues, "shall be under the direction of the engineers, to construct field-works of every kind, and all works necessary for the attack or defence of places, as circumstances may require. On a march in the vicinity of an enemy, a detachment of the companies of sappers and miners shall be stationed at the head of the column, directly after the vanguard, for the purpose of opening and mending the roads, and removing obstructions," &c. &c.

The great difficulties encountered by Washington in instructing his inexperienced forces in the more difficult branches of the art, made him the

more earnest, in after years, to impress on us how important it was for us *In peace to prepare for war.* The preparation here meant is not the keeping up, in time of peace, of a large standing army, ever ready to take the field; but rather the formation of a small body, educated and practised in all the scientific and difficult parts of the profession; a body which shall serve as the *cadre* or framework of a large army, capable of imparting to the new and inexperienced soldiers of the republic that skill and efficiency which has been acquired by practice. How far have we accomplished this object, and what will be the probable operations in case of another contest with a European power? New and inexperienced troops will be called into the field to oppose a veteran and disciplined army. From these troops we shall expect all the bravery and energy resulting from ardent patriotism and an enthusiastic love of liberty. But we cannot here expect much discipline, military skill, or knowledge of the several branches of the military art. The peaceful habits of our citizens tend but little to the cultivation of the military character. How, then, are we to oppose the hostile force? Must human blood be substituted for skill and preparation, and dead bodies of our citizens serve as epaulements against the inroads of the enemy? To some extent, we fear it must be the case; but not entirely so, for government has not altogether neglected to make preparation for such an event. Fortifications have been planned or erected on the most important and exposed positions; military materials and munitions have been collected in the public arsenals; a military school has been organized to instruct in the military sciences; there are regularly kept up small bodies of infantry and cavalry, weak in numbers, but capable of soon making good soldiers of a population so well versed as ours is in the use of the musket and the horse; an artillery force, proportionally much larger, is also regularly maintained, with a sufficient number of men and officers to organize and make good artillery-men of citizens already partially acquainted with the use of the cannon. But an acquaintance with infantry, cavalry, and artillery duties is not the only practical knowledge requisite in war. In the practical operations of an army in the field, rivers are to be crossed, bridges suddenly erected and suddenly destroyed, field-works constructed and defended, batteries captured and destroyed; fortifications are to be put in order and defended, or to be besieged and recaptured; trenches must be opened, mines sprung, batteries established, breaches made and stormed; trous-de-loup, abattis, palisades, gabions, fascines, and numerous other military implements and

machinery are to be constructed. Have our citizens a knowledge of these things, or have we provided in our military establishment for a body of men instructed and practised in this branch of the military art, and capable of imparting to an army the necessary efficiency for this service? Unfortunately this question must be answered in the negative; and it is greatly to be feared that the future historian will have to say of us, as Napier has said of the English:—"*The best officers and soldiers were obliged to sacrifice themselves in a lamentable manner, to compensate for the negligence and incapacity of a government always ready to plunge the nation into a war, without the slightest care of what was necessary to obtain success. Their sieges were a succession of butcheries; because the commonest materials, and the means necessary to their art, were denied the engineers*."[43]

[43]

The subjects discussed in this chapter are also treated by most authors on Military Organization and Military History, and by the several writers on Military Engineering. Allent, Vauban, Cormontaigne, Rocquancourt, Pasley, Douglas, Jones, Belmas, Napier, Gay de Vernon, may be referred to with advantage. Pasley, Douglas, Jones, and Napier, speak in the strongest terms of the importance of engineer troops in the active operations of a war, and of the absolute necessity of organizing this force in time of peace. A list of books of reference on Military Engineering will be given at the close of the following chapters.

While these pages are passing through the press, Congress has authorized the President to raise *one company* of engineer troops! This number is altogether too small to be of any use in time of war.

CHAPTER XIII.

PERMANENT FORTIFICATIONS.

Fortification is defined,—the art of disposing the ground in such a manner as to enable a small number of troops to resist a larger army the longest time possible. If the work be placed in a position of much importance, and its materials be of a durable character, it is called permanent; if otherwise, it receives the appellation of *field*, or *temporary*. Field-works are properly confined to operations of a single campaign, and are used to strengthen positions which are to be occupied only for a short period. Generally these works are of earth, thrown up by the troops in a single day. They are intimately connected with a system of permanent fortifications, but from the facility of their construction, no provision need be made for them before the actual breaking out of war. Indeed, they could not well be built before hostilities commenced, as their locality in each case must be determined by the position of the hostile forces.

Having already described the general influence of permanent fortifications as a means of national defence, we shall here speak merely of the principles of their construction. It is not proposed to enter into any technical discussion of matters that especially belong to the instruction of the engineer, but merely to give the nomenclature and use of the more important parts of a military work; in a word, such general information as should belong to officers of every grade and corps of an army.

The first species of fortification among the ancients was of course very simple, consisting merely of an earthen mound, or palisades. A wall was afterwards used, and a ditch was then added to the wall. It was found that a straight wall could be easily breached by the enemy's battering-rams; to remedy this evil, towers were built at short intervals from each other, forming a broken line of salient and re-entering parts. These towers or salient points gradually assumed a shape approximating to the modern bastion.

After the invention of gunpowder and the application of cannon to the attack and defence of places, it became necessary to arrange earthen ramparts behind the thin walls of the ancient works, for the reception of the new artillery. Moreover these walls were soon found inadequate to resist the missiles of the besiegers, and it became necessary to replace them by parapets of earth. In order to cover the retaining walls of these parapets from the besieging batteries, it was also found to be necessary to lower these walls as much as possible, and to raise the counterscarps. The traces or plans of the works, however, received no material change till about the close of the fifteenth century.

It is not known who first changed the ancient towers into bastions. Some attribute it to an Italian, and with considerable show of reason, for a bastion was built at Turin as early as 1461. Achmet Pacha, it is said, fortified Otranto in this way, in 1480, but whether the system was previously known among the Turks cannot be determined. Others attribute the invention to Ziska, the celebrated leader of the Hussites. It is most probable that the transition from the tower to the bastion was a very gradual one, and that the change was perfected in several countries at about the same time.

Fortifications, like other arts and sciences, greatly flourished in Italy under the Medicis, and that country furnished Europe with its most skilful engineers. Catharine of Medicis introduced into France many of her countrymen, distinguished in this profession; among these may be named Bellamat, Bephano, Costritio, Relogio, Vorganno, the two Marini, Campi, and Hieronimo, who built several important places and directed the sieges of others. These able foreigners were rivalled by some distinguished French engineers, who laid the foundation of the "*corps du Genie*" which has since become a school of military instruction for the world. Among the early French engineers may be distinguished Lafontaine De Serré, Feuquières, and St. Remy. Pedro Navarro had been appointed a member of this corps, but his attention was more specially directed to mining, and we do not learn that he distinguished himself in the construction of any fortification.

In Germany, in the beginning of the sixteenth century, Albert Durer distinguished himself as a writer on fortification; his book is remarkable as containing the germs of many of the improvements which were made by those who followed him. This is the more to be wondered at as he was not a

professed engineer. After him followed Spekel, a native of Strasburg, who died in 1589. His writings are valuable as showing the state of the art at that time, and the changes which he himself introduced. He was an engineer of much practical knowledge and experience, having assisted at the sieges of Malta, Golletta, Vienna, Jula, Nicosia, Famagusta, &c.

The first French engineer who wrote on fortification was Errard de Bar-le-Duc, who published near the close of the sixteenth century. As an engineer, he was rivalled by Chatillon, a man of distinguished merit. Errard fortified Amiens, built a part of the castle of Sedan, and a portion of the defences of Calais. Under the reign of Louis XIII., Desnoyers, Deville, Pagan, and Fabre were greatly distinguished. Deville published in 1628. He was a man of much learning and experience; but he is said to have adopted, both in his theory and practice, the principles of the Italian school, with most of its errors. Pagan began his military career while young, and became *maréchal de champ* at the age of 38, when, having the misfortune to become blind, he was compelled to relinquish his brilliant hopes. He was the ablest engineer of his age, and was also greatly distinguished in other branches of science. In his plans he inclined to the Dutch rather than the Italian school of fortification. He published in 1645.

At the close of the sixteenth century, the Dutch had been forced to resort to military defences to protect themselves against the aggressions of the Spaniards. As the Dutch were inferior in other military means, fortification became one of the vital resources of the country. Their works, however, thrown up in much haste, were in many respects defective, although well adapted to the exigencies of the time. Freytag, their principal engineer, wrote in 1630. Some of his improvements were introduced into France by Pagan. He was preceded by Marolois, (a cotemporary of Pagan,) who published in 1613.

In Germany, Rimpler, a Saxon, wrote on fortification in 1671. He was a man of great experience, having served at the sieges of Candia, Phillipsburg, Bonn, Riga, Bremen, Dansburg, Bommeln, &c. He fell at the siege of Vienna in 1683. His writings are said to contain the groundwork of Montalembert's system.

In Italy, after the time of Tartaglia, Marchi, Campi, &c., we find no great improvement in this art. Several Italians, however, distinguished themselves as engineers under the Spaniards. The fortifications of Badajos are a good example of the state of the art in Italy and Spain a that epoch. The citadel of Antwerp, built by two Italian engineers, Pacciotti and Cerbelloni, in 1568, has become celebrated for the siege it sustained in 1832.

The age of Louis XIV. effected a great revolution in the art of fortification, and carried it to such a degree of perfection, that it has since received but slight improvement. The years 1633 and 1634 are interesting dates in the history of this art, as having given birth respectively to Vauban and Coehorn. The former was chief engineer of France under Louis XIV., and the latter held a corresponding position under the Dutch republic. Coehorn's ideas upon fortification are conceived with an especial view to the marshy soil of his own country, and, although well suited to the object in view, are consequently of less general application than those of his more distinguished cotemporary and rival. The best specimens of his mode of construction that exist at the present day, are the fortresses of Manheim, Bergen-op-Zoom, Nimiguen, and Breda.

Coehorn was followed in Holland by Landsberg, an able and practical engineer, who to much reading added extensive experience, having himself served at sixteen sieges. His system was in many respects peculiar, both in trace and relief; it dispensed with the glacis, and all revertments of masonry. His plans could be applied only to marshy soils. The first edition of his work was published in 1685.

But the career of Vauban forms the most marked and prominent era in the history of fortification; it constitutes the connecting link between the rude sketches of the earlier engineers, and the well-established form which the art has since assumed. In his earlier works we find many of the errors of his predecessors; but a gradual change seems to have been wrought in his mind by reflection and experience, and these faults were soon remedied and a new and distinct system developed. Vauban has left no treatise upon his favorite art, and his ideas upon fortification have been deduced from his constructions, and from detached memoirs left among his papers. The nature of his labors, and the extent of his activity and industry, may be imagined from the fact that he fought one hundred and forty battles,

conducted fifty-eight sieges, and built or repaired three hundred fortifications. His memoirs, found among his manuscript papers, on various military and political subjects, are numerous, and highly praised even at the present day. But his beautiful and numerous constructions, both of a civil and military character, are real monuments to his genius. The best illustrations of his principles of fortification occur at Lille, Strasbourg, Landau, Givet, and Neuf-Brisack. His writings on mines, and the attack and defence of places, are, by the profession, regarded as classic. His improvements in the existing method of attack gave great superiority to the arms of his countrymen, and even enabled him to besiege and capture his rival Coehorn, in his own works. He died in 1707, and was soon succeeded by Cormontaigne.

The latter did not attempt the introduction of any new system, but limited himself to improving and perfecting the plans of his illustrious predecessors. His improvements, however, were both extensive and judicious, and are sufficient to entitle him to the place he holds as one of the ablest military engineers the world has ever produced. His works on the subject of fortification, besides being elegantly written, contain the most valuable information of any works we have. His most admired constructions are to be found at Metz, Thionville, and Bitche. The beautiful crown works of Billecroix, at Metz, are perfect models of their kind. Cormontaigne died in 1750.

Cotemporary with him were Sturin and Glasser. The former deviated but slightly from the systems of his predecessors, but the latter invented several ingenious improvements which gave him great reputation.

Next follows Rosard, a Bavarian engineer; and Frederick Augustus, king of Poland, who devoted himself particularly to this art. The former casemated only the flanks of his works, but the latter introduced casemate fire more extensively than any one who had preceded him.

In France, Belidor and De Filey published about the middle of the last century. They were both able engineers but their systems were inferior to that of Cormontaigne.

In 1767 De la Chiche introduced a system of fortification in many respects original. He raised his covered-ways so as to conceal all his masonry, and

casemated a great portion of his *enceinte*. For exterior defence, he employed direct fire from his barbettes, and curvated fire from his casemates; the direct fire of the latter secured his ditches.

Next to De la Chiche follows Montalembert, who published in 1776. He was a man of much experience and considerable originality, but of no great ability as an engineer. Most of his ideas were derived from De la Chiche and the German school of Rimpler. His plans have generally been rejected by his own countrymen, but they still have advocates among the Germans.

General Virgin, a distinguished Swedish engineer, wrote in 1781. His idea of strongly fortifying the smaller towns to the comparative neglect of the larger cities, constitutes one of the principal novelties in his system.

In 1794, Reveroni devised a system in which the casemates of Montalembert were employed, but his guns were so arranged as to be employed in barbette while the besiegers were at a distance, and afterwards to be used for casemated fire. The casemate gun-carriage, which formed a part of his invention, was ingenious, but never much employed in practice.

Bousmard, a French emigrant, published in 1790. He adopted the general trace of Vauban, but introduced modifications in the details essentially different from those of Cormontaigne. Some of these modifications are very valuable improvements, while others are of a more doubtful character. Bousmard is, on the whole, a very able writer, and his works should be found in the library of every military engineer.

Carnot's celebrated treatise was published in 1810. He was evidently a man of genius, and during his career at the head of the War Department of France, numerous and very important improvements were made in the several branches of the military art, and especially in strategy. His work on fortification exhibits much originality and genius, but it is doubtful whether it has very much contributed to the improvement of this art. His ideas have been very severely, and rather unfairly criticised by the English, and particularly by Sir Howard Douglas.

Chasseloup de Laubat early distinguished himself as an engineer of much capacity and talent. He followed Napoleon in nearly all his campaigns, and conducted many of his sieges. He remodelled the fortifications of Northern

Italy and of the Lower Rhine. He published in 1811. The improvements which he introduced are numerous and valuable, and he probably contributed more to advance his art, and to restore the equilibrium between attack and defence, than any other engineer since Cormontaigne. After the fall of Napoleon and the partition of his empire, the allies mutilated or destroyed the constructions of Chasseloup, so that, it is believed, no perfect specimen of his system remains.

The cotemporaries of Chasseloup were mostly engaged in active field service and sieges, and few had either leisure or opportunity to devote themselves to improvements in permanent fortification.

Choumara published in 1827. His system contains much originality, and his writings give proof of talent and genius. He has very evidently more originality than judgment, and it is hardly probable that his system will ever be generally adopted in practice.

The Metz system, as arranged by Noizet, as a theoretical study, is undoubtedly the very best that is now known. It, however, requires great modifications to suit it to different localities. For a horizontal site, it is probably the most perfect system ever devised. It is based on the system of Vauban as improved by Cormontaigne, and contains several of the modifications suggested by modern engineers. It is applied in a modified form to the new fortifications of Paris.

Baron Rohault de Fleury has introduced many modifications of the ordinary French system in his new defences of Lyons. We have seen no written account of these works, but from a hasty examination in 1844, they struck us as being too complicated and expensive.

The new fortifications of Western Germany are modifications of Rempler's system, as improved by De la Chiche and Montalembert. It is said that General Aster, the directing engineer, has also introduced some of the leading principles of Chasseloup and Carnot.

The English engineers have satisfied themselves with following in the track of their continental neighbors, and can offer no claims to originality.

Of the system of fortification now followed in our service we must decline expressing any opinion; the time has not yet arrived for subjecting it to a

severe and judicious criticism. But of the system pursued previous to 1820, we may say, without much fear of contradiction, that a worse one could scarcely have been devised. Instead of men of talent and attainments in military science, most of our engineers were then either foreigners, or civilians who owed their commissions to mere political influence. The qualifications of the former were probably limited to their recollection of some casual visit to two or three of the old European fortresses; and the latter probably derived all their military science from some old military book, which, having become useless in Europe, had found its way into this country, and which they had read without understanding, and probably without even looking at its date. The result was what might have been anticipated—a total waste of the public money. We might illustrate this by numerous examples. A single one, however, must suffice. About the period of the last war, eight new forts were constructed for the defence of New York harbor, at an expense of some two millions of dollars. Six of these were *circular*, and the other two were *star forts*—systems which had been discarded in Europe for nearly two thousand years! Three of these works are now entirely abandoned, two others are useless, and large sums of money have recently been expended on the other three in an attempt to remedy their faults, and render them susceptible of a good defence. Moreover, a number of the works which were constructed by our engineers before that corps was made to feel the influence of the scientific education introduced through the medium of the Military Academy—we say, a considerable number of our fortifications, constructed by engineers who owed their appointment to political influence, are not only wrong in their plans, but have been made of such wretched materials and workmanship that they are already crumbling into ruins.

A fortification, in its most simple form, consists of a mound of earth, termed, the *rampart*, which encloses the space fortified; a *parapet*, surmounting the rampart and covering the men and guns from the enemy's projectiles; a *scarp wall,* which sustains the pressure of the earth of the rampart and parapet, and presents an insurmountable obstacle to an assault by storm; a wide and deep *ditch*, which prevents the enemy from approaching near the body of the place; a *counterscarp wall*, which sustains the earth on the exterior of the ditch; a *covered way*, which occupies the space between the counterscarp and a mound of earth called a *glacis*,

thrown up a few yards in front of the ditch for the purpose of covering the scarp of the main work.

The work by which the space fortified is immediately enveloped, is called the *enceinte*, or *body of the place*. Other works are usually added to the enceinte to strengthen the weak points of the fortification, or to lengthen the siege by forcing the enemy to gain possession of them before he can breach the body of the place: these are termed *outworks*, when enveloped by the covered way, and *advanced works*, when placed exterior to the covered way, but in some way connected with the main work; but if entirely beyond the glacis, and not within supporting distance of the fortress, they are called *detached works*.

In a bastioned front the principal outwork is the *demi-lune*, which is placed in front of the curtain; it serves to cover the main entrance to the work, and to place the adjacent bastions in strong re-enterings.

The *tenaille* is a small low work placed in the ditch, to cover the scarp wall of the curtain and flanks from the fire of the besieger's batteries erected along the crest of the glacis.

The *places of arms*, are points where troops are assembled in order to act on the exterior of the work. The *re-entering places of arms*, are small redans arranged at the points of junction of the covered ways of the bastion and demi-lune. The *salient places of arms* are the parts of the covered way in front of the salients of the bastion and demi-lune.

Small permanent works, termed *redoubts*, are placed within the demi-lune and re-entering places of arms for strengthening those works. Works of this character constructed within the bastion are termed *interior retrenchments;* when sufficiently elevated to command the exterior ground, they are called *cavaliers.*

Caponniers are works constructed to cover the passage of the ditch from the tenaille to the gorge of the demi-lune, and also from the demi-lune to the covered way, by which communication may be maintained between the enceinte and outworks.

Posterns are underground communications made through the body of the place or some of the outworks.

Sortie-passages are narrow openings made through the crest of the glacis, which usually rise in the form of a ramp from the covered way, by means of which communication may be kept up with the exterior. These passages are so arranged that they cannot be swept by the fire of the enemy. The other communications above ground are called *ramps, stairs,* &c.

Traverses are small works erected on the covered way to intercept the fire of the besieger's batteries.

Scarp and *counterscarp* galleries are sometimes constructed for the defence of the ditch. They are arranged with loop-holes, through which the troops of the garrison fire on the besiegers when they have entered the ditch, without being themselves exposed to the batteries of the enemy.

In sea-coast defences, and sometimes in a land front for the defence of the ditch, embrasures are made in the scarp wall for the fire of artillery; the whole being protected from shells by a bomb-proof covering over head: this arrangement is termed a *casemate*.

Sometimes double ramparts and parapets are formed, so that the interior one shall fire over the more advanced; the latter in this case is called *a faussebraie*.

If the inner work be separated from the other it is called a *retrenchment*[44] and if in addition it has a commanding fire, it is termed, as was just remarked, a *cavalier*.

[44]

The term *retrenchment* implies an interior work, which is constructed within or in rear of another, for the purpose of strengthening it; the term *intrenchment*, on the contrary, implies an independent work, constructed in the open field, without reference to any other adjoining work.

The *capital* of a bastion is a line bisecting its salient angle. All the works comprehended between the capitals of two adjacent bastions is termed a *front*: it is taken as the unit in permanent fortification.

Fig. 39 represents the ground plan of a modern bastioned front, of a regular and simple form, on a horizontal site.

A, A, A—Is the enceinte, or body of the place.

B—The bastions.
C—The main ditch.
D—The covered ways.
E—The re-entering places of arms.
F—The salient places of arms.
G—The demi-lune.
H—The demi-lune ditch.
J—The demi-lune redoubt.
L—The ditch of the demi-lune redoubt.
M—The redoubt of the re-entering places of arms.
N—The ditches of the redoubts.
O—The tenaille.
P—The double caponier.
a—The traverses.
b—The sortie-passages.
c—Stairs.
d—Cut in the demi-lune to flank the redoubt of the re-entering place of arms.

Fig. 40 represents a section through the line *mn'* of the preceding figure.

A—Is the rampart.

B—The parapet.
C—The ditch.
D—The scarp wall.
E—The counterscarp wall.
F—The glacis.
G—The covered way.

H—The terre-plain.
J—The parade.

Sometimes half embrasures are cut in the earthen parapet of a fort, so as to sink the gun below the crest, and thus more effectually cover the men from the enemy's fire.

But guns in embrasure have a far less extended field of fire than when mounted in barbette; moreover, the embrasures present openings through which an enemy may penetrate in an assault. Owing to these objections, they are employed only for the protection of particular points; that is, where it is important to cover the artillerists from the enemy's fire, or where the guns are to be used merely to protect a ditch, or to enfilade a road, &c. The bottom of the embrasure is called the *sole*, the sides are called *cheeks*, and the mass of earth between two embrasures, the *merlon*. Embrasures may be made either direct or oblique, according as the fire is required to be perpendicular or oblique to the parapet.

A *coverport* is a small outwork of any convenient form, erected immediately in front of a gateway, to screen it from the enemy's fire.

A *counterguard* is a more extensive work, constructed in front of a part of the fortress itself, or of some other outwork of greater importance, which it is intended to cover. These are sometimes called *coverfaces*, from their situation and object; but the former term is most commonly used.

Sometimes outworks, called *tenaillons*, consisting of one long and one short face, are placed on each side of the demi-lune of a front of fortification, for the purpose of prolonging the siege. (Fig. 41.)

Small, or *demi*-tenaillons, are frequently so arranged as to cover only one-half of the demi-lune, and then a *bonnet* constructed in front of the salient of the demi-lune. (Fig.42.) In this case the bonnet is flanked by the short faces of the demi-tenaillons; these short faces are themselves flanked by the demi-lune, while the bastions flank the long faces.

A *horn-work* consists of a front of fortification, and two wings resting on the faces of bastions of a front of the fortress. It sometimes has also a demi-lune or bonnet, as in the case of demi-tenaillons. (Fig. 43.)

A *crown-work* consists of two fronts of fortification, and two wings. (Fig. 44.) It is sometimes made *double*, and even *triple*.

These works are also employed as advanced works, and placed entirely in front of the glacis. They have generally been added to a fortress for the purpose of occupying some important piece of ground not included within the limits of the main work. They may be constructed with covered ways, and sometimes it may be found advantageous to secure them by retrenchments.

A *detached work* may be made in any form deemed best suited to the site. Being but remotely connected with the fortress, the latter will exercise but slight influence on the character of its plan or construction. They are usually of limited extent and slight relief, partaking much of the nature of field-works.[45]

[45]

The general principles of permanent fortification may be best learned from the writings of Cormontaigne, St. Paul de Noizet, and Laurillard-Fallot. A list of valuable books of reference on the several branches of military engineering will be given at the close of the next chapter.

CHAPTER XIV.

FIELD-ENGINEERING.

Field-Engineering includes the making of military reconnaissances, temporary fortifications, and military roads; the planning and construction of military bridges; the attack and defence of military works;—in fine, all the various duties of engineer troops, either in the operations of a campaign, or in the dispositions on the battle-field.

Military reconnaissance.—By this term is meant an examination of a portion of the theatre of war, to ascertain its military character and resources. If the examination be made of a large district of country, and for an entire campaign, the reconnaissance is *general*; if made for collecting detailed information respecting a proposed line of march, the passage of a river, the position of an enemy, &c., it is termed *special*.

In making a general reconnaissance, great care should be taken to collect accurate information respecting the general topography of the country; the character of the mountains, forests, and water-courses; the nature of the roads, canals, and railways; the quality of the soil, and the amount of provisions and forage it produces; the population and character of the cities, towns, and villages, the commercial and manufacturing resources of every part of the country, and the means of transportation to be found in each district. The plan of military operations will be based on the information thus obtained, and any serious error in the reconnaissance may involve the results of the campaign, and even the fate of the war.

In a special reconnaissance, not only accurate but minute information will be required: the character of the roads must be given in detail; the nature of the water-courses, their depth and velocity; the position and character of bridges, and fords;—in fine, a full description of all obstacles to be encountered, and the means that can be made available for overcoming these obstacles.

A reconnoitring officer may usually derive much valuable information from the published maps and descriptions of the country to be examined; additional matters of detail may be obtained from woodsmen, hunters, and fishermen; and also from the innkeepers and local authorities of the district. But the officer should always verify this information, so far as practical, by personal examination. In making a reconnaissance in the vicinity of an enemy, he must be supported by a strong escort of mounted troops, and in all his operations the greatest precaution will be requisite to ensure success.

Some simple instrument, such as a pocket sextant, or compass, will be sufficient to enable the reconnoitring officer to measure, with considerable accuracy, the height of mountains, the width of streams, &c., and an ordinary scale and dividers will enable him to make a suitable military sketch.

Temporary Fortification.—It has been stated in the preceding chapter that temporary fortifications are properly confined to the operations of a single campaign, and are used to strengthen positions which are to be occupied only for a short period; and that they are usually made of earth, thrown up by the troops in a single day. Temporary fortifications, as a part of field-engineering, may therefore be regarded rather as an *arm* than an *art*. The principles of their construction are derived, of course, from the theory of permanent fortification, but in applying these principles to practice in the field, much greater latitude is allowed than in the exact scientific arrangement of permanent works.

The purpose of field-works (or intrenchments, as they are commonly called) is to arrest, or at least to impede, the march of the attacking foe; to shelter the defensive troops from the missive weapons of the assailants, and to detain them in a position where they will be exposed to the fire of the defensive force. The numerical and positive strength of the assailed may be much less than that of the assailant, and yet an equilibrium exist; the material obstacles compensating for the difference in numbers. Intrenchments, though inert masses, must therefore be regarded as most valuable and important accessaries in the defence of a position.

Intrenchments consist either of *lines* of works made to cover extended positions, or of *detached* works designed simply to defend the ground they

occupy. The former generally present a front against the enemy in but one direction, while the latter are usually closed on all their sides.

The following figures have been employed for the plan of simple intrenchments, viz.: the polygon, redan, lunette, mitre, star-fort, and bastion.

Square or *polygonal redoubts* are the most common forms given to field-works, on account of the ease of their construction. But they have many defects. There is a sector without fire in front of each salient, and the ditches are without protection. The latter objection also holds good against all circular works.

The *redan* (Fig. 45) is frequently used to cover a point in rear, as a bridge, a ford, or a defile. When used alone, its gorge should be closed by palisades. Its ditches are unprotected.

The *lunette* (Fig. 46) has nearly the same defects as the redan.

The *mitre*, or *priest-cap,* (Fig. 47,) may be employed with advantage when a cross-fire is required on the capital of the work. The *star-fort* has all the defects, without the merit of simplicity, which belong to the polygonal redoubt.

The *bastion-fort* (Fig. 48) more fully satisfies the conditions of a good defence than any other plan; but it is less simple and easy of execution. It is usually composed of four or five fronts, but it may be applied to a polygon of any number of sides.

For the details of the construction of these several works, we must refer to the special treatises on field-fortification.

Lines of intrenchments may be made either continuous or with intervals. In adopting either plan, the engineer should avail himself of all the natural obstacles presented by the position, so as to diminish the labor of erecting artificial means of defence.

The simplest arrangement for a continuous intrenchment is the *cremaillière* or indented line. When applied to an irregular site, or used to connect together distant and detached works, the indented line may be regarded as a good disposition. Mitres and redans, connected by straight curtains, are

sometimes employed, as also a combination of large and small redans, forming alternate salient and re-entering angles. A continuous line of bastions is preferable to any other arrangement, when there is plenty of time for their construction.

Lines with intervals are frequently formed of alternate lunettes and square redoubts. Other detached works may be employed in the same way. This manner of intrenching a position has several advantages, with disciplined troops. The first shock of the assailant is sustained by the detached works, and when he attempts to penetrate in the intervals, his flanks become exposed to a deadly cross fire. These intervals also allow the assailed to act on the offensive, by charging the enemy at the opportune moment. But with raw and militia forces it will be safer to resort to continuous lines. If cavalry form any part of the defensive force, it will be absolutely necessary to leave intervals through which these troops may charge.

A vertical section of all intrenchments is of the same general form; the dimensions will, of course, vary with the nature of the soil, and the time and means employed in their construction. The minimum dimensions that can be used with any considerable advantage are given in Fig. 49.

In laying out field-works advantage should be taken of all available artificial obstacles, such as hedges, walls, houses, outbuildings, &c. A thickset hedge may be rendered defensible by throwing up against it a slight parapet of earth. Stone fences may be employed in the same way. Walls of masonry may be pierced with loop-holes and arranged for one or two tiers of fire. The walls of houses are pierced in the same manner, and a projecting wooden structure, termed a *machicoulis gallery*, is sometimes made from the floor of the second story, to enable the assailed to fire down upon their opponents. This arrangement is frequently employed to advantage in wooden blockhouses against a savage foe; but it is of little avail when exposed to the fire of artillery. Some have proposed galleries of this description in permanent works of masonry, but the project is too obviously absurd to merit discussion.

In addition to the parapet of an intrenchment, a good engineer will always find time and means for constructing other artificial obstacles, such as

trous-de-loup, abattis, palisades, stockades, fraises, chevaux-de-frise, crows'-feet, mines, &c.

Trous-de-loup are pits dug in the earth in the form of an inverted truncated cone, some six feet in diameter, and about the same number of feet in depth. They are usually placed a few yards in front of the ditch, and concealed by some slight covering.

Abattis are tops and large limbs of trees arranged along the glacis of a work; the ends of the branches are lopped off and sharpened.

Palisades are stakes some eight or ten feet long, with one end fastened in the ground and the other made sharp. They are placed in juxtaposition and connected together by horizontal riband-pieces. This arrangement is frequently placed at the foot of the counterscarp. When the timbers are large and the work is intended as a part of a primary defence, it is called a *stockade*; when the stakes are placed at the foot of the scarp, either horizontally or inclined, they receive the name of *fraises*.

A *cheval-de-frise* consists of a horizontal piece of timber armed with wooden or iron lances, which project some eight or ten feet. It is much employed against cavalry, and on rocky soils serves as a substitute for palisades.

Crows'-feet are small wooden or iron forms filled with sharp spikes. They are thrown, with their points upward, on ground which is to be passed over by cavalry.

Mines are sometimes used in connection with intrenchments, but more commonly in the attack and defence of permanent works. They will be noticed further on.

Field-works which are to be occupied for a considerable length of time will usually have their steeper slopes revetted, and be arranged with scarp and counterscarp, galleries, traverses, blindages, &c. Such works hold an intermediary rank between temporary and permanent fortification.

As examples of the importance of field fortifications and of the manner of organizing them, the reader is referred to the celebrated battle of Fontenoy, in 1745, where the carefully-arranged intrenchments of Marshal Saxe

enabled the French to repel, with immense destruction, the attacks of greatly superior numbers; to the battle of Fleurus, in 1690, where the Prince of Waldeck exposed himself to a most disastrous defeat "by neglecting the resources of fortification and other indispensable precautions;" to the battle of Malplaquet, in 1709, where Marshal Villars, by neglecting to occupy and intrench the farm that closed the passage between the woods of Sars and Lanière, exposed himself to a disastrous defeat; to the operations of 1792, where General Custine, by neglecting to intrench the heights that covered Bingen, as the engineers had recommended, exposed himself to those terrible disasters which forced him to a precipitate retreat; to the works of Wervike, which, by a vigorous resistance on the 10th of September, 1793, saved the Dutch army from total destruction; to the intrenched camp of Ulm, in 1800, which for six weeks held in check the victorious army of Moreau; to the intrenched lines of Torres Vedras, in 1810, which saved from destruction the English army of Wellington; to the field-defences of Hougomont, which contributed so much to the victory of Waterloo, &c.

Military communications.—The movements of armies are always much embarrassed by forests, marshes, and water-courses, and nothing contributes more to the dispatch of military operations than the means of opening practical and easy communication through these various obstacles.

It is not necessary here to enter into any detailed discussion of the manner of constructing military communications through forests or marshes. In a new country like ours, where almost every one has had some experience in road-making, no very great technical knowledge is required for the construction of temporary works of this character; but much professional skill and experience will be requisite for the engineers who make the preliminary reconnaissances, and fix the location of these roads.

Water-courses may be crossed by means of fords, on the ice, or by ferries and bridges. When temporary bridges or ferries are constructed by the army in the field, they are classed under the general head of *military bridges*, or more properly, *pontoniering*.

Where the depth of the stream is not great, the current slight, and the bottom smooth and hard, the passage may be effected by *fording*. If the bottom be of mud, or large stones, the passage will be difficult and

dangerous, even where the depth and current are favorable. Under favorable circumstances infantry can ford a stream where the depth is not greater than four feet; cavalry to a depth of four or five feet; but artillery, and engineer trains, cannot go to a depth of more than two and a half feet, without greatly exposing their ammunition and military stores The fords should be accurately staked out before the passage is attempted, and ropes ought to be stretched across the stream, or cavalry and small boats stationed below, to prevent the loss of life.

Ice may be crossed by infantry, in small detachments. Its strength may be increased by covering it with boards, or straw, so as to distribute the weight over a greater surface. By sprinkling water over the straw, and allowing it to freeze, the mass may be made still more compact. But large bodies of cavalry, and heavy artillery, cannot venture on the ice unless it be of great thickness and strength. An army can never trust, for any length of time, to either fords or ice; if it did a freshet or a thaw would place it in a most critical state. Military bridges will, therefore, become its only safe reliance for keeping open its communications.

Military bridges are made with trestles, rafts, boats, and other floating bodies. Rope bridges are also sometimes resorted to by troops for passing rivers.

Trestle bridges are principally used for crossing small streams not more than seven or eight feet in depth: they also serve to connect floating bridges with the shore, in shallow water. The form of the trestle is much the same as that of an ordinary *carpenter's horse,* i.e., a horizontal beam supported by four inclined legs. These trestles are placed in the stream, from twelve to twenty feet apart, and connected by string-pieces, (or *balks* as they are termed in technical language,) which are covered over with plank. The action of the current against the bridge may be counteracted by anchors and cables, or by means of boxes or baskets attached to the legs of the trestles, and filled with stones. A more substantial form may be given to the bridge by substituting for the trestles, piles, or the ordinary framed supports so much used in the newer parts of our country.

For examples of the use of bridges of this description we would refer to Cæsar's celebrated bridge across the Rhine; the passage of the Scheldt in

1588 by the Spaniards; the passage of the Lech in 1631 by Gustavus Adolphus; the passage of the Danube in 1740 by Marshal Saxe; the great bridge across the Var during Napoleon's Italian campaigns; the passage of the Lech in 1800 by Lecourbe; the bridges across the Piava, the Isonso, &c., in the subsequent operations of the army in Italy; the celebrated passage of the Danube at the island of Lobau in 1809; the passage of the Agueda in 1811 by the English; the passages of the Dwina, the Moscowa, the Dneiper, the Beresina, &c., in the campaign of 1812; the repairing of the bridge near Dresden, and the passage of the Elbe in 1813, &c.

Rafts formed of timbers, casks, barrels, &c., are frequently used as military bridges. They may be made to bear almost any weight, and will answer for the passage of rivers of any depth and width, provided the current be not rapid.

Where the bridge is to be supported by rafts made of solid timbers, these timbers should be first placed in the water, to ascertain their natural position of stability, and then the larger ends cut away on the under side, so as to present the least possible resistance to the action of the current. They are afterwards lashed together by strong rope or withe lashing, or fastened by cross-pieces let into the timbers, and held firm by bolts, or wooden pins. These rafts are kept in place by anchors and cables placed up and down stream. The roadway is formed in nearly the same manner as for a bridge supported on trestles. Empty casks, and other floating bodies, may be substituted in place of logs in the construction of rafts.

For examples of the use of rafts in the construction of military bridges, we would refer to the passage of the Seine in 1465 by Count Charolais; the passage of the Meuse in 1579, by Alexander Farnése; the passage of the Vistula in 1704, the Borysthenese in 1709, and the Sound in 1718, by Charles XII.; the passage of the Adige in 1796; the passage of the Po in 1807; and the subsequent military operations in the Spanish Peninsula.

Military bridges are frequently made of *boats*, and the ordinary river-craft found in the vicinity of the intended passage. Flat-bottomed boats are the most suitable for this purpose, but if these cannot be obtained, keel boats will serve as a substitute. When these water-craft are of very unequal sizes, (as is frequently the case,) two smaller ones may be lashed together to form

a single support; they can be brought to the same level by means of stone ballast. The gunwales must be suitably arranged for supporting the balks, or else frameworks should be erected for this purpose from the centre of the boat. The arrangement of the roadway, anchors, &c., is the same as before.

A *bridge-equipage* made to follow an army in its movements in the field, is generally composed of light skiffs or batteaux, and the necessary timbers, planks, anchors, &c., for forming the roadway, and keeping the bridge in its position. All these articles are constructed especially for this purpose. All the wood-work should be of tough and well-seasoned timber, so as to impose no unnecessary weight on the wagon trains. The bateaux should also be made of strong and light materials. For convenience in transportation, these boats are sometimes made with hinges so as to fold up. The ribs are usually of oak, and the sides and bottom of pine. Instead of plank, a covering of tin, copper, India-rubber, &c., has sometimes been substituted. Floating supports of this character are often made in compartments, so as to prevent their sinking when injured by the enemy's projectiles. Indian-rubber pontons may be folded up into a small space, and their slight weight renders them convenient for transportation.

On navigable streams a part of the bridge resting on one or two bateaux should be so arranged that it can be shipped out of its place, forming a *draw* for the passage of river-craft. Indeed, it would be well, even where the river is not navigable, to form a draw for the passage of trees, and other floating bodies, sent down by the enemy against the bridge.

An ordinary bridge-equipage of bateaux, or light pontons, for crossing a river of from three to four hundred yards in width, and of moderate current, will require a train of from sixty to eighty wagons.[46] Under favorable circumstances, and with a well-instructed corps of pontoniers, the bridge may be thrown across the river, and prepared for the passage of an army in a few hours at most.[47] After the troops have passed over, the bridge may be taken up, and replaced on the wagons in from a quarter to half an hour.

[46]

The number of wagons in a ponton train will be greatly diminished if it be found that Indian-rubber boats may be used as supports for the bridge. The

engineer department of our army are making experiments to determine this point.

[47]

In 1746, three bridges of bateaux were thrown across the Po, near Placentia, each fifteen hundred feet in length, and entirely completed in eight hours. In 1757, two bridges of bateaux were thrown across the Rhine, at Wesel, in half an hour; again, in the same year, a third bridge was thrown across this river near Dusseldorf, in six hours. In 1841, Col. Birago, of the Austrian army, arrived on the bank of the Weisgerben arm of the Danube, with his bridge-equipage, at a round trot, and immediately began the construction of his bridge, without any previous preparation or examination. In less than three-quarters of an hour the bridge was completed, and three loaded four-horse wagons passed over on a trot, followed by a column of infantry.

The following examples will serve to illustrate the use of different kinds of boat-bridges in military operations:—the passage of the Rhine, in 1702, by Villars; the passage of the Dnieper and the Bog, in 1739, by the Russians; the passage of the Danube, in 1740, by Marshal Saxe; the passage of the Rhine, near Cologne, in 1758, by the Prince of Clermont; the passage of the Rhine, in 1795, by Jourdan; the passage of the Rhine, at Kehl, in 1796, by Moreau; and again the same year, at Weissenthurn, and at Neuwied, by Jourdan; the bridges across the Rhine, at the sieges of Kehl and Huninguen, in 1797; the passage of the Limmat, in 1799, by Massena; the passages of the Mincio, the Adige, the Brenta, the Piava, &c., in 1800; the passages of these rivers again in 1805; the passages of the Narew, in 1807, by the Russians; the several passages of the Danube, in 1809, by the French and Austrian armies; the passages of the Tagus and Douro, in 1810, by the English; the passages of the Niemen, the Dwina, the Moskwa, and the Beresina, in 1812, by the French; and of the great rivers of Germany and France, in 1813 and 1814.

A floating body, propelled from one bank to the other by the current of the stream, is termed a *flying-bridge.* The usual mode of establishing a ferry of this kind, is to attach the head of the boat by means of a cable and anchor to some point near the middle of the stream. By steering obliquely to the current, the boat may be made to cross and recross at the same point. A

single passage may be made in the same way, by the action of the current without the cable and anchor, but the boat in this case will be carried some distance down the stream. Rowboats are employed for crossing over infantry by successive debarkations; but this process is too slow for the passage of a large force; it may very well be resorted to as auxiliary to other means.

Steam craft are so common at the present day on all navigable streams, that an army in the field will frequently be able to avail itself of this means of passing the larger rivers. But, in a hostile country, or in one already passed over by the enemy, it will not be safe to rely with confidence upon obtaining craft of this character. A well-organized army will always carry in its train the means of effecting a certain and speedy passage of all water-courses that may intercept its line of march.

Flying-bridges or rowboats were employed in the passage of the Dwina, in 1701, by the Swedes; the passage of the Po, in 1701, by Prince Eugene; the passage of the Rhine, at Huninguen, in 1704; Jourdan's passage of the Rhine in 1795; Moreau's passage in 1796; the sieges of Kehl and Huninguen in 1797; Massena's passage of the Limmat, and Soult's passage of the Linth, in 1799; the passage of the Rhine, at Lucisteig in 1800; the passage of the Po, by the French, just before the battle of Marengo; and others in Italy, Germany, and Spain, in the subsequent campaigns of Napoleon.

Military bridges have sometimes been formed of ropes, cables stretched across the stream, and firmly attached at each end to trees, or posts let into the earth. If the shore is of rock, rings with staples let into the stone form the best means for securing the ends of the main ropes. Plank are laid on these cables to form the roadway. The ropes forming the "side-rail" of the bridge are passed over trestles at each shore, and then fastened as before. Short vertical ropes attach the main supports to these side ropes, in order that they may sustain a part of the weight passing over the bridge. Constructions of this character are fully described in Douglas's Essay on Military Bridges. For example, see the passage of the Po, near Casal, in 1515, by the Swiss; the bridge thrown over the Clain by Admiral Coligni, at the siege of Poitiers, in 1569; the operations of the Prince of Orange against Ghent and Bruges, in 1631; the passage of the Tagus, at Alcantara, in 1810,

by the English; the bridge constructed across the Zezere, by the French, in 1810; the bridge thrown across the Scarpe, near Douai, in 1820; the experiments made at Fêre in 1823, &c.

The passage of a river in the presence of an enemy, whether acting offensively or in retreat, is an operation of great delicacy and danger. In either case the army is called upon to show the coolest and most determined courage, for its success will depend on its maintaining the strictest discipline and good order.

In the case of a retreat the bridge should be covered by field intrenchments, called a *tête de pont*, and defended by a strong guard. If the river be of moderate width, the enemy may be kept at a distance by heavy batteries on the opposite shore. As soon as the passage is effected by the main body, the bridge, if permanent, will be blown up, or otherwise destroyed by the miners, and if floating, will be swung round to the other shore. The rear-guard will pass over in rowboats, or the end pontons detached for that purpose. An army retreating in the face of an enemy should never rely upon one single bridge, no matter what may be its character: for the slightest accident happening to it might expose the whole army to inevitable destruction.

The passage of a river by main force, against an enterprising and active enemy on the opposite shore, is always an operation of the greatest difficulty, and not unfrequently accompanied with the most bloody results.

The most effectual method of accomplishing this object is by stratagem. Demonstrations are made at several points at the same time: bodies of troops are thrown across, after nightfall, in rowboats or by flying-bridges, to get possession of the opposite bank. The vanguard of light cavalry may cross by swimming. The pontoniers should have their bridge equipage in readiness near the intended point of passage, so that it can be thrown across with the greatest possible rapidity, while the advanced guards are still able to keep the enemy at a distance. Under favorable circumstances the pontoniers will have the bridge in readiness for the passage of the army before the enemy can collect his troops upon the threatened point.

Cannon-balls and hollow shot are the most effectual means for destroying an enemy's bridge when our batteries can be planted within reach. When

this cannot be done, we must resort to fire-boats, floating rafts, &c., to accomplish our object. Operations of this kind carried on in the night, are most likely to succeed.

To protect bridges from the action of these floating bodies, stockades, or floating chevaux-de-frise are constructed across the stream at some distance above the bridge; strong cables, or chains stretched directly across the river, or with an angle up stream, may be used in place of stockades, or in conjunction with them. Guards should be stationed above the bridge, with boats, ropes, grapnels, &c., for the purpose of arresting all floating bodies and drawing thorn ashore, or directing them safely through the *draw* in the bridge arrangement.

The troops especially charged with the construction and management of the various kinds of military bridges, are denominated *pontoniers*. The duties of these troops are arduous and important, and, in a country like ours, intersected by numerous water-courses, the success of a campaign will often depend upon their skill and efficiency.

Sapping.—This is a general term applied to the operations of forming trenches, along which troops may approach a work without being exposed to the fire of the besieged.

In addition to the ordinary sapping-tools, such as shovels, picks, gabion-forks, &c., used in constructing trenches, there will also be required a considerable amount of sapping materials, such as gabions, fascines, sap-fagots, sandbags, &c.

The *gabion* is a cylindrical basket of twigs, about two feet in diameter, and some three feet in length, and without a bottom. It is made by driving into the ground, in a circular form, a number of small pickets about an inch in diameter, and of the length required for the gabion. Twigs are wattled between the pickets like ordinary basket-work, and fastened at the ends by withs or packthread. Gabions are used in forming saps, batteries, blindages, powder-magazines, and in revetting the steep slopes of field-works.

The *fascine* is a bundle of twigs closely bound up, from nine to twelve inches in diameter, and from ten to fifteen or twenty feet in length. The largest are sometimes called *saucissons*. In making a fascine, straight twigs

about the thickness of a man's finger are laid side by side, and firmly compressed together by a strong rope or chain attached to the extremities of two levers. While held in this position the twigs are firmly bound together by withs or cords. Fascines are used in constructing trenches, batteries, &c., and for filling up wet ditches.

The *sap-fagot* is a strong fascine about ten inches in diameter and two feet in length, with a picket inserted through the middle. It is used in the double sap in connection with gabions.

Sand-bags are usually made of coarse canvass. When filled with earth they are some six or eight inches in diameter, and from eighteen inches to two feet in length. From their perishable nature, they are used only when other materials cannot be procured, and where it is important to place the troops speedily under cover from the enemy's fire.

Bales of wool, cotton, hay, straw, &c., may be employed in sapping for the same purposes as the above materials, when they can be procured in sufficient quantity. Pork and flour barrels, which are usually in abundance in a camp, are frequently filled with sand and used for forming magazines, blindages, &c., in field-works.

A trench constructed in ordinary soil beyond the range of the enemy's grape, is called a *simple sap*, or ordinary trench. The earth is thrown up on the side towards the place besieged, so as to form a kind of parapet to cover the men in the trench. The labor is here executed under the supervision of engineer soldiers, by working parties detached from the other arms. Fig. 50 represents a vertical section of a simple sap.

When within range of the enemy's grape, the *flying sap* is resorted to in order to place the workmen speedily under cover. In this operation, gabions are placed in juxtaposition on the side towards the besieged work, and filled with all possible speed by the workmen. Three rows of fascines are usually placed on the top of the gabions to increase the height. The most difficult part of the flying sap is executed by engineer troops, and the trench is completed by the ordinary working parties. Fig. 51 represents a section of this sap.

The *full-sap* is employed when the works of the besiegers are within range of musketry, or when the grape fire of the besieged is so deadly that the flying sap can no longer be used. This is a difficult operation, and unless executed with great care and by well-instructed engineer troops, the construction of the trench will be attended with an immense loss of life. The work must be executed under cover of a *sap-roller,* which is a cylindrical mass of fascines, wool, or cotton, some two feet in diameter. On very smooth ground a ball-proof shelter on wheels might be used as a substitute. The sap-roller being placed along the line of the trench so as to cover the sapper in front, who is armed with a musket-proof headpiece and cuirass, this sapper commences the sap by placing a gabion on the line of the proposed trench and fills it with earth, working on his hands and knees. Having filled the first gabion, he pushes forward the sap-roller and places a second one next the first, stopping the open joint between the two with a stop-fagot. The second gabion being filled in the same manner as the first, others are successively established. When the first sapper has advanced a few feet, he is followed by a second, also in defensive armor, who increases the excavation and embankment; this sapper is then followed in the same way by a third and a fourth, after which the trench will be sufficiently advanced to be turned over to the ordinary workmen. The sap-fagots may be removed when the embankment becomes thick enough to resist grape. Fig. 52 represents a plan and section of a full-sap.

When the direction of the trench is such that the men are exposed on both sides, it will be necessary to throw up an embankment both to the right and left. This operation is called the *double sap,* and is executed by two parties of sappers, working side by side. In this sap it will be necessary to frequently change the direction of the trench, or to throw up traverses, in order to cover the men at a distance from the sap-roller. Wing-traverses, on the side of the trench which is least exposed, some times serve the same purpose as a double sap.

Mines.—By *mining*, as a military term, we understand the operations resorted to for the demolition, with powder, of a military structure of any description. The term *mine* is applied both to the excavation charged with powder for the purpose of producing an explosion, and to the communications which lead to this excavation.

The place in which the charge of powder is lodged is called the *chamber*, the communication by which this place is reached the *gallery*, and the excavation made by the explosion is termed the *crater*.

The form of the crater caused by an explosion in ordinary soils is assumed to be a truncated cone, the diameter, *c d*, (Fig. 53,) of the lower circle being one-half the diameter, *a b*, of the upper circle. This form has never been ascertained to be exactly correct, but the theoretical results deduced from a mathematical discussion of this figure have been fully verified in practice. The radius, *p b*, of the upper circle is termed the *crater radius*; the line *o p*, drawn from the centre of the charge perpendicular to the surface where the explosion takes place, is termed the *line of least resistance*; the line *o b*, drawn from the centre of the powder to any point in the circumference of the upper circle, is termed the *radius of explosion*.

When the crater radius is equal to the line of least resistance, the mine is termed *common*; when this radius is greater than the line of least resistance, the mine is termed *overcharged*; and when the radius is less, *undercharged*. A mine of small dimensions, formed by sinking a shaft in the ground, is termed a *fougasse*. The term *camouflet* is applied to a mine used to suffocate the enemy's miner, without producing an explosion. Small mines made in rock or masonry, merely for the purpose of excavation, without any considerable external explosion, are called *blasts*.

From experiments made on common mines, whose line of least resistance did not exceed fifteen feet, it has been ascertained that the tenacity of the earth is completely destroyed around the crater to a distance equal to the crater radius, and that empty galleries would be broken in at once and a half that distance. It has also been proved by experiment, that the crater radius in overcharged mines may be increased to six times the line of least resistance, but not much beyond this; that within this limit the diameter of the crater increases nearly in the ratio of the square roots of the charge; and that empty galleries may be destroyed by overcharged mines at the distance of four times the line of least resistance.

By means of the deductions of physico-mathematical theory, and the results of experiments, rules have been determined by which the miner can

calculate, with much accuracy, the charge necessary to produce a required result in any given soil.

In the earlier stages of the history of this art, mines were only used to open breaches and demolish masses of masonry; but in later times they have been employed as important elements in the attack and defence of places.

An isolated wall, only two or three feet thick, may readily be demolished by exploding one or two casks of powder placed in contact with its base. If the wall be five or six feet thick, the charges should be placed under the foundation. For walls of still greater thickness it will be best to open a gallery to the centre of the wall, a foot or two above its base, and place the powder in chambers thus excavated. Revetment walls may be overturned by placing the charges at the back of the wall, about one-third or one-quarter of the way up from the base. If placed too near the base, a breach will be made in the wall without overturning it.

To demolish a bridge of masonry the powder should be lodged in chambers excavated in the centre of the piers. When there is not time for excavating these chambers in the piers, a trench may be cut over the key of the arch, in which the powder is placed and exploded; or, the casks of powder may be suspended immediately under the arch, with the same results. Where a saving of powder is of consequence, small chambers may be excavated in the haunches of the arch, and the mine carefully *tamped* before firing it.

Bridges of wood may be destroyed by suspending casks of powder under the principal timbers, or attaching them to the supports.

Palisading, gates, doors, &c., may be destroyed in the same way, by suspending casks or bags of powder against their sides; or still more effectually, by burying the charges just beneath their base.

To demolish a tower, magazine, or house, of masonry, place charges of powder under the piers and principal walls of the building. In wooden structures the powder should be placed under, or attached to the principal supports. Where time is wanting to effect these arrangements, a building may be blown down by placing a large mass of powder in the interior. The powder may be economized, in this case, by putting it in a strong case,

which should be connected with the walls of the building on all sides by wooden props.

Special treatises on military mining contain full instructions for regulating the size and position of the charge for the various cases that may be met with in the practical operations of field-engineering.

As applied to the attack and defence of a fortified place, mines are divided into two general classes—*offensive* and *defensive* mines. The former are employed by the besiegers to overthrow the scarps and counterscarps of the place, to demolish barriers, palisades, walls, and other temporary means of defence, and to destroy the mines of the besieged. The latter are employed by the opposite party to blow up the besiegers' works of attack, and to defend the passage of ditches against an assault. Small mines called *fougasses* may be employed for the last named object. The *shell-fougasse* is composed of a wooden box filled with one or more tiers of shells, and buried just below the surface of the earth. Sometimes a quantity of powder is placed under the shells, so as to project them into the air previous to their explosion. The *stone fougasse* is formed by making a funnel-shaped excavation, some five or six feet deep, and placing at the bottom a charge of powder enclosed in a box, and covered with a strong wooden shield; several cubic yards of pebbles, broken stone, or brickbats, are placed against the shield, and earth well rammed round, to prevent the explosion from taking place in the wrong direction. These mines are fired by means of powder hose, or by wires connected with a galvanic battery.

The defensive mines employed to blow up the besiegers' works, are generally common mines with the lines of least resistance seldom greater than fifteen feet. All the main galleries and principal branches of mines for a permanent fortification are constructed at the same time with the other portions of the work, leaving only the secondary branches, chambers, &c., to be made during the siege. For the general arrangement of these galleries, and the precautions necessary for their protection from the operations of the besiegers, reference must be made to treatises specially devoted to the discussion of this subject.

Mines can seldom be employed with advantage in works of slight relief, and liable to an assault. But if judiciously arranged in the plan of their

construction, and well managed during the operations of the siege, they contribute very materially to the length of the defence.

Attack and defence.—This subject admits of two natural divisions: 1st, of intrenchments, and 2d, of permanent works.

I. Intrenchments maybe attacked either by *surprise*, or by *open force*. In either case the operations should be based on exact information of the strength of the works and the number and character of the garrison—information that can be obtained from spies, deserters, and prisoners, and confirmed by examinations or reconnaissances made by officers of engineers. By these means a pretty accurate knowledge may be obtained of the natural features of the ground exterior to the works; their weak and strong points; and their interior arrangements for defence.

In an attack by surprise, the troops should consist of a storming party and a reserve of picked men. The attacking column is preceded by a company of sappers armed with axes, shovels, picks, crowbars, &c.; bags of powder are also used for blowing down gates, palisades, &c. All the operations must be carried on with the utmost dispatch. The time most favorable for a surprise is an hour or two before day, as at this moment the sentinels are generally less vigilant, and the garrison in a profound sleep; moreover, the subsequent operations, after the first surprise, will be facilitated by the approach of day. Under certain circumstances, it may be advisable to make false attacks at the same time with the true one, in order to distract the attention of the garrison from the true point of danger. But false attacks have, in general, the objection of dividing the forces of the assailants as well as of the assailed. In all attacks by surprise, secrecy is the soul of the enterprise.

In an open assault, if artillery be employed, the troops should be drawn up in a sheltered position, until the fire of the works is silenced, and breaches effected in the parapet. But if the bayonet alone be resorted to, the troops are immediately brought forward at the beginning of the assault. The attack is begun by a storming party of picked men: they are preceded, as before, by a body of sappers, provided with necessary means for removing obstacles, and followed by a second detachment of engineers, who will widen the passages, and render them more accessible to the main body of troops who now advance to the assistance of the storming party. If the

assailants should be arrested at the counterscarp by obstacles which must be removed before any farther progress can be made, the infantry troops of the detachment display and open a fire upon the assailed, in order to divert their fire from the sappers. A few pieces of light artillery, on the flanks of the column, may sometimes be employed for this purpose with great advantage.

The storming party should always be provided with scaling-ladders, planks, fascines, &c., for crossing the ditch, and mounting the scarp. If the counterscarp be revetted with masonry, the troops must either descend by ladders, or fill up the ditch with fascines, bales of straw, bundles of wool, &c.: if not revetted, a passage for the troops into the ditch will soon be formed by the shovels of the sappers. When the ditch is gained, shelter is sought in a dead angle till the means are prepared for mounting the scarp, and storming the work. If the scarp be of earth only, the sappers will soon prepare a passage for the escalade; but if revetted with masonry, the walls must be breached with hollow shot, or scaled by means of ladders.

In the defence, the strictest vigilance should be at all times exerted to guard against a surprise: sentinels are posted on all the most commanding points of the work; all the avenues of approach are most thoroughly guarded; and patroles are constantly scouring the ground in all directions. At night all these precautions are redoubled. Light and fire-balls are thrown out in front of the work to light up the ground, and discover the movements and approach of the enemy. Each man should have his particular post assigned to him, and be thoroughly instructed in the duties he will have to perform. All auxiliary arrangements, such as palisades, abattis, &c., should be defended with the utmost obstinacy; the longer the enemy is held in check by these obstacles, the longer will he be exposed to the grape and musketry of the main work. When he assaults the parapet, he will be opposed by the bayonet in front and a well-aimed fire in flank. While in the ditch, or as he mounts the scarp, hollow projectiles, incendiary preparations, stones, logs, &c., will be rolled down upon his head. But when the assaulting column has gained the top of the scarp, the bayonet forms the most effective means of resistance.

The measures resorted to in the attack and defence of the larger class of field-works, will necessarily partake much of the nature of the operations employed in the attack and defence of permanent fortifications.

II. The attack and defence of a fortress may be carried on either by a regular siege, or by irregular operations and an assault. The latter plan has sometimes been adopted when the works of the place were weak and improperly defended; where the time and means were wanting for conducting a regular siege; or where the assailants were ignorant of the means proper to be resorted to for the reduction of the fortress. Such operations, however, are usually attended by an immense sacrifice of human life, and the general who neglects to employ all the resources of the engineer's art in carrying on a siege, is justly chargeable with the lives of his men. In the siege of Cambrai, Louis XIV., on the solicitation of Du Metz, but contrary to the advice of Vauban, ordered the demi-lune to be taken by assault, instead of waiting for the result of a regular siege. The assault was made, but it was unsuccessful, and the French sustained great losses. The king now directed Vauban to take the demi-lune by regular approaches, which was done in a very short time, and with a loss of *only five men!* Again, at the siege of Ypres, the generals advised an assault before the breaches were ready. "You will gain a day by the assault," said Vauban, "but you will lose a thousand men." The king directed the regular works to be continued, and the next day the place was taken with but little loss to the besiegers.

But a work may be of such a character as to render it unnecessary to resort to all the works of attack which would be required for the reduction of a regular bastioned fort, on a horizontal site. For example: the nature of the ground may be such as to enable the troops to approach to the foot of the glacis, without erecting any works whatever; of course, all the works up to the third parallel may in this case be dispensed with without any violation of the rules of a siege. Again, the point of attack may be such that the other parts of the place will not flank the works of approach; here a single line of *boyaux* and short parallels may be all-sufficient.

But for the purpose of discussion, we will here suppose the place besieged to be a regular bastioned work on a horizontal site, (Fig.54.)

The operations of the siege may be divided into three distinct periods.

1st. The preliminary operations of the attack and defence previous to the opening of the trenches.

2d. The operations of the two parties from the opening of the trenches to the establishment of the third parallel.

3d. From the completion of the third parallel to the reduction of the place.

First period. The object of the *investment of the place* is to cut off all communication between the work and the exterior, thus preventing it from receiving succors, provisions, and military munitions, and also to facilitate a close reconnoissance of the place by the engineers, who should always accompany the investing corps, and pursue their labors under its protection. This corps should be composed chiefly of light troops—cavalry, light infantry, horse artillery, "brigades of engineers and mounted sappers,"—who march in advance of the besieging army, and, by a sudden movement, surround the work, seize upon all the avenues of approach, and carry off every thing without the work that can be of service either to the garrison or to the besiegers. To effect this object, the enterprise must be conducted with secrecy and dispatch.

The investing corps is now distributed around the work in the most favorable positions for cutting off all access to it, and also to prevent any communication with the exterior by detachments from the garrison, and even single individuals are sent out to give intelligence to a succoring army or to reconnoitre the operations of the besieging corps. These posts and sentinels, called the *daily cordon*, are placed some mile or mile and a half from the work, and beyond the reach of the guns. But in the night-time these posts are insufficient to accomplish their object, and consequently as soon as it is dark the troops move up as close to the work as possible without being exposed to the fire of musketry. This arrangement constitutes the *nightly cordon*.

By the time the main army arrives the reconnoissance will be sufficiently complete to enable the chief engineer to lay before the general the outline of his plan of attack, so as to establish the position of his dépôts and camp. These will be placed some two miles from the work, according to the nature of the ground. As they occupy a considerable extent of ground around the work, it will generally be necessary to form intrenchments strong enough to prevent succors of troops, provisions, &c., from being thrown into the place, and also to restrain the excursions of the garrison. The works thrown

up between the camp and besieged place are termed the *line of countervallation*, and those on the exterior side of the camp form the *line of circumvallation*. These lines are generally about six hundred yards apart. It is not unusual in modern warfare to dispense with lines of circumvallation, (except a few detached works for covering the parks of the engineers and artillery,) and to hold the succoring army in check by means of an opposing force, called the *army of observation*.

The measures of defence resorted to by the garrison will, of course, be subordinate, in some degree, to those of attack. As soon as any danger of an investment is apprehended, the commanding general should collect into the place all the necessary provisions, forage, military munitions, &c., to be found in the surrounding country; all useless persons should be expelled from the garrison; a supply of timber for the works of the engineers and artillery, fascines, gabions, palisades, &c., prepared; all ground within cannon range around the work levelled; hedges and trees cut down; holes filled up; temporary buildings demolished or burnt; and all obstacles capable of covering an enemy and interrupting the fire of the work, removed.

During this period the engineer troops and working parties detached from the other arms will be most actively employed. As soon as the investing corps makes its appearance, bodies of light troops are thrown out to cut off reconnoitring parties, and, if possible, to draw the enemy into ambush. To facilitate these exterior operations, and to prevent a surprise, several guns of long range are placed on the salients of the bastions and demi-lunes, and others, loaded with grape, in the embrasures of the flanks, so as to sweep the ditches. About one-third of the garrison may be employed in exterior operations, and the other two-thirds in arranging the means of defence in the interior.

Second period.—As soon as the engineers have completed their reconnaissances and determined on the front of attack, and all the other preparations are made, the general will direct the opening of the trenches. The ground being previously marked out, battalions of light troops, termed *guards of the trenches*, as soon as it is dark, are placed about thirty yards in front of the first parallel, (A. Fig. 54,) with smaller sections, and sentinels about the same distance further in advance. These guards lie down, or

otherwise conceal themselves from the fire of the work. The engineer troops and detachments of workmen being first marched to the dépôts and supplied with all the necessary tools for carrying on the work, now commence their labors under the protection of these guards. By daybreak the construction of the first parallel, and the trenches connecting it with the dépôts, will be sufficiently advanced to cover the men from the fire of the place; the guards will therefore be withdrawn, and the workmen continue their labors during the day to give the trenches the proper size and form.

The *parallels* are the long lines of trench which envelop the besieged work, and serve both as covered ways for the circulation of the besiegers, and as means of defence against sorties from the garrison; they are therefore arranged with banquettes for musketry fire. The boyaux are trenches run in a zigzag direction along the capitals of the front of attack, and are intended exclusively for the circulation of the troops; they have no banquettes. The first parallel is about six hundred yards from the place, and consequently beyond the reach of grape. It is constructed by the *simple sap*. After the first night, the guards, instead of advancing in front of the work, are placed in the trenches.

The second parallel (B) is made some three hundred or three hundred and fifty yards from the place, and being much exposed to grape, the *flying-sap* is employed in its construction. Batteries (H) are established between the first and second parallels to silence the fire of the demi-lunes of the collateral bastions, and others (I) near the second parallel, to enfilade the faces of the front of attack. These are armed in part with mortars and in part with heavy siege-pieces.

The works are now gradually pushed forward to the third parallel, (C), which is constructed about sixty yards from the salients of the place. As the operations of the besiegers are here greatly exposed to musketry fire, the trenches are constructed by the *full-sap*. The third parallel, having to contain the guards of the trenches, and being of less development than the two preceding, is made much wider. The second parallel now contains the reserve, and the first parallel becomes the dépôt of materials. *Demi-parallels* (G) are frequently established between the second and third, to be occupied by detachments of guards.

The operations of defence during this period are so directed as to harass the workmen in the trenches and retard the advance of the works of attack. Garrison pieces of long range and large howitzers are brought forward on the salients of the bastions and demi-lunes of attack, so as to fire in ricochet along the capitals on which the boyaux must be pushed: light and fire-balls are thrown out as soon as it becomes dark, to light up the ground occupied by the besiegers, thus exposing them to the fire of the work and to the attacks of the sortie parties. These parties are composed of light troops who charge the guards and compel the workmen to abandon their sapping tools and stand upon the defence. They are most effective when the besiegers commence the second parallel, as the guards in the first parallel are not so immediately at hand to protect the workmen. When the sortie detachment has driven these workmen from the trenches, instead of pursuing them into the first parallel, it will display itself in battle order to cover the engineer troops, (who should always accompany the detachment in this enterprise,) while they fill up the trenches and destroy the implements of the besiegers. When the guards of the trenches appear in force, the detachment will retire in such a way, if possible, as to draw the enemy within range of the grape and musketry of the collateral works. These sorties, if successful, may be frequently repeated, for they tend very much to prolong the siege. The best time for making them is an hour or two before day, when the workmen and guards are fatigued with the labors of the night. While the besiegers are establishing their enfilading batteries, a strong fire of solid shot and shells will be concentrated on the points selected for their construction. The garrison will also labor during this period to put the work into a complete state of defence: constructing all necessary palisadings, traverses, blindages, barriers; and strengthening, if necessary, the covering of the magazines.

Third period.—After the completion of the third parallel, the crowning of the covered way may be effected by storm, by regular approaches, or (if the work is secured by defensive mines) by a subterranean warfare.

In the first case stone mortar-batteries are established in front of the third parallel, which, on a given signal, will open their fire in concert with all the enfilading and mortar batteries. When this fire has produced its effect in clearing the outworks, picked troops will sally forth and carry the covered way with the bayonet, sheltering themselves behind the traverses until the sappers throw up a trench some four or five yards from the crest of the

glacis, high enough to protect the troops from the fire of the besieged. It may afterwards be connected with the third parallel by boyaux.

When the covered way is to be crowned by regular approaches, a *double sap* is pushed forward from the third parallel to within thirty yards of the salient of the covered way; the trench is then extended some fifteen or twenty yards to the right or left, and the earth thrown up high enough to enable the besiegers to obtain a plunging fire into the covered way, and thus prevent the enemy from occupying it. This mound of earth is termed a *trench cavalier*, (O). Boyaux are now pushed forward to the crowning of the covered way and the establishing of breach batteries, (J). Descents are then constructed into the ditches, and as soon as these batteries have made a breach into the walls of the bastions and outworks, the boyaux are pushed across the ditches and lodgments effected in the breaches. The demi-lune is first carried; next the demi-lune redoubt and bastion; and lastly, the interior retrenchments and citadel. In some cases the breaches are carried by assault, but the same objection is applicable here as in the storming of the covered way; *time is gained, but at an immense expense of human life.*

If the place is defended by mines it will be necessary for the besiegers to counteract the effects of these works by resorting to the slow and tedious operations of a subterranean warfare. In this case a fourth trench is formed in front of the third parallel; shafts are sunk in this, about six yards apart, for establishing overcharged mines; as soon as the galleries of the besieged are destroyed by the explosion of these mines, the covered way is attacked by storm; other mines are established on the *terre-plain* of the covered way to destroy the entrance to the galleries, and thus deprive the besieged of the use of their entire system of mines.

The measures of defence during this period must embrace every thing calculated to retard the works of the besiegers. This may be most effectually accomplished by maintaining a constant fire of grape and musketry on the heads of the sap, and throwing grenades, shells, &c., into the trenches, to harass and destroy the workmen. As the musketry fire of the besiegers now becomes very destructive to the artillerists at the guns, strong musket-proof blinds are arranged to mask the mouths of the embrasures when the guns are not in battery, and also sloping blindages to cover the men when serving at the pieces. The possession of the outworks should be disputed inch by

inch, and when the besiegers have reached the ditch of the body of the place, sorties, and every species of projectile, should be employed to drive off the sappers, and to retard the construction of their works. In fine, all the resources of the engineer's art should be put in requisition for the defence of the breach, and the final assault should be vigorously resisted by the bayonet, and by a well-sustained fire from all the collateral works.

With respect to the relative strength of the opposing forces it may be well to remark, that if the fortress is properly constructed the garrison will be able to resist a besieging army *six times* as numerous as itself. Such is the estimate of the best engineers.[48]

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A good knowledge of the several subjects discussed in this chapter may be derived from the writings of Vauban, Cormontaigne, and Noizet de St. Paul, on the attack and defence of places and field fortification ; the several *manuels* used in the French service on sapping, mining, and pontoniering; Col. Pasley's experiments on the operations of a siege, sapping, mining, &c.; Douglas's work on military bridges; Macauley's work on field fortification; and Professor Mahan's *Treatise on Field Fortification.* This last is undoubtedly the very best work that has ever been written on field fortification, and every officer going into the field should supply himself with a copy.

The following are recommended as books of reference on subjects discussed in the three preceding chapters.

Mémorial pour la fortification permanente et passagère. Cormontaigne.

Défense des places. Cormontaigne.

Attaque des places. Cormontaigne.

Attaque des places. Vauban.

Traité des mines. Vauban.

Mémorial pour la castrametation et la fortification passagère. Lafitte-Clavé.

Exercice sur les fortifications. Davigneau.

Mémorial de l'officier du genie. A periodical of rare merit, containing most valuable military and scientific matter. It is conducted by officers of the French corps of engineers. It has already reached its fourteenth number, each number forming a volume.

Traité complet de fortification. Noizet de St. Paul.

Traité d'art militaire et de la fortification. Gay de Vernon.

Art de la guerre. Rogniat.

Essai général de fortification, &c. Bousmard.

Aide-mémoire portatif à l'usage des officiers du génie. Laisné. A very valuable and useful book.

Aide-mémoire de l'ingénieur militaire. Grivet.

Cours d'art militaire. Laurillard Fallot.

Cours de fortification, &c. Lavart.

Le livre de la guerre. Perrot.

Journaux des siéges dans la péninsule. Belmas.

Journal of Sieges in Spain. John Jones.

Both of the above are works of great value.

Cours d'art militaire et de fortification militaire. François.

Architettura militare. Marchi.

Essai sur la fortification. Baltard.

La fortification. Bar-le-Duc.

Elémens de fortification. Bellaire.

La science des ingénieurs. Bélidor.

L'art universel des fortifications. Bitainvieu.

Nouvelle manière de fortifier les places. Blondel.

Les sept siéges de Lille. Brun Lavaine.

Défense des places fortes. Carnot.

Mémoire sur la fortification. Carnot.

Défense de Saragosse. Cavallero.

Mémoires sur la fortification. Choumara.

Nouvelle fortification. Coehorn.

Théorie de la fortification. Cugnot.

Des fortifications, &c. &c. Darçon.

Rélation de la défense de Dantzik. D'Artois.

Les fortifications. Deville.

Péribologie. Dilich.

De la fortification permanente. Dufour. A work of merit.

Essai sur la défense des états par les fortifications. Duviviet.

Attaque et défense des places du camp de St. Omer.

L'école de la fortification. Fallois.

Introduction à la fortification. De Fer.

Précis de la défense de Valenciennes. Ferrand.

Traité théorique, &c. Foissac-Latour.

Examen detaillé, &c. Foissac-Latour.

Les ouvrages militaires de Fosse.

Instruction sur la fortification, &c. Gaillard.

Mémoires pour l'attaque et défense d'une place. Goulon.

Siége of Peschiera. Henin.

Journal du siége de Philisbourg.

Précis du siége de Dantzick. Kirgener.

Deuxième défense de Badajos. Lamare.

Fortification, et l'attaque et défense des places. Lebloud.

Œuvres de Lefebvre.

L'architecture des forteresses. Mandar.

Traité sur l'art des siéges. Mazeroy.

La sûreté des états par le moyen des forteresses. Maigret.

Défense d'Ancone. Mangourit.

Fortification. Marolois.

Siege de Turin. Mengin.

Recherches sur l'art défensif, &c. Michaloz.

La fortification de campagne, &c. Miller.

L'art défensif, &c. Montalembert.

Journaux des siéges de Flandre.

Relations des siéges en Europe, &c. Musset-Fathay. A very valuable and interesting work.

Relation du siége de Metz.

Relation du siége d'Anvers.

Les siéges de Jaffa et de St. Jean d'Acre.

Les siéges de Saragosse et de Tortose. Rogniat.

Siége de Dantzick. Sainte-Susanne.

Mémoire sur la fortification permanente.—Séa.

Le siége de Constantine.

Elémens de fortification. Trincano.

Des places fortes. Valazé.

*Essay on Military Bridges.*Douglas. A valuable work.

Guide du pontonier. Drieu.

Mémoire sur la guerre souterraine. Contèle.

Traité des mines. Etienne.

Traité de l'art du mineur. Geuss.

Traité de fortification souterraine. Gillot.

Traité pratique et théorique des mines. Lebrun.

Nouveau traité des mines, &c. Prudhomme.

Manuel du sapeur. Used in the French service.

Manuel du mineur. " ""

Manuel du pontonier. " ""

Essay on Field Fortifications. Pleydell.

Elements of Field Fortifications. Lochee.

Rélation du siége de Grave et Mayence.

Siéges de Génes. Thiébault.

Traité de fortification souterraine. Mouze.

Militairische Mittheilungen. Xilander.

Die Befestigung der Statten. Hauser.

Abhandlung über die Befestigungskunst,&c. Hauser

Versuch über die Verschanzungskunst. Muller.

Course of Elementary Fortification. Pasley. This is a work of much detail—useful, no doubt, to an uneducated engineer soldier, but to an officer at all acquainted with his profession, it must seem ridiculously minute.

To the above list might be added a long list of books on that branch of the engineer's art called *constructions*; but as this part of the profession is, in some degree, common both to the civil and military engineer, it is not

deemed necessary to include works of this character in a list of books strictly military.

CHAPTER XV

MILITARY EDUCATION APPOINTMENT AND PROMOTION.

With the Romans, six years' instruction was required to make a soldier; and so great importance did these ancient conquerors of the world attach to military education and discipline, that the very name of their army was derived from the verb *to practise.*

Modern nations, learning from experience that military success depends more upon skill and discipline than upon numbers, have generally adopted the same rule as the Romans; and nearly all of the European powers have established military schools for the education of their officers and the instruction of their soldiers.

France, which has long taken the lead in military science, has six military schools for the instruction of officers, containing in all more than one thousand pupils, and numerous division and regimental schools for the sub-officers and soldiers.

Prussia maintains some twelve general schools for military education, which contain about three thousand pupils, and also numerous division, brigade, garrison, and company schools for practical instruction.

Austria has some fifty military schools, which contain in all about four thousand pupils.

Russia has thirty-five engineer and artillery technical schools, with about two thousand pupils; twenty-five military schools for the noblesse, containing eight thousand seven hundred pupils; *corps d'armee*schools, with several thousand pupils; regimental schools, with eleven thousand pupils; and brigade-schools, with upwards of one hundred and fifty-six thousand scholars;—making in all about two hundred thousand pupils in her military schools!

England has five military schools of instruction for officers, number of pupils not known; a military orphan school, with about twelve thousand pupils; and numerous dépôt and regimental schools of practice.

The smaller European powers—Belgium, Sardinia, Naples, Spain, Portugal, Denmark, Sweden, Wurtemberg, Bavaria, Baden, have each several military schools, with a large number of pupils.

It is seen from these statistics, that the European powers are not so negligent in educating their officers, and in instructing and disciplining their soldiers, as some in this country would have us believe.

Washington, Hamilton, Knox, Pickering, and others, learning, by their own experience in the war of the American revolution, the great necessity of military education, urged upon our government, as early as 1783, the importance of establishing a military academy in this country, but the subject continued to be postponed from year to year till 1802. In 1794, the subaltern grade of *cadet* was created by an act of Congress, the officers of this grade being attached to their regiments, and "furnished at the public expense with the necessary books, instruments, and apparatus" for their instruction. But this plan of educating young officers at their posts was found impracticable, and in his last annual message, Dec. 7th, 1796, Washington urged again, in strong language, the establishment of a military academy, where a regular course of military instruction could be given. "Whatever argument," said he, "may be drawn from particular examples, superficially viewed, a thorough examination of the subject will evince that the art of war is both comprehensive and complicated; that it demands much previous study; and that the possession of it in its most improved and perfect state is always of great moment to the security of a nation."

The subject was however postponed from time to time, till March, 1802, when a bill was passed establishing the *Military Academy*. It was at first on a small scale, and its course of instruction meager and deficient. It gradually became enlarged, but lingered along, with no great improvement, till 1817, when Capt. Patridge was dismissed from the superintendency, and Col. Thayer put in charge. From this period we date the commencement of the success and reputation which the Military Academy has since enjoyed.

This institution, as now organized, consists of one cadet from each congressional district, and a few at large, making an average of two hundred and thirty-seven. The course of instruction is four years, after which time the cadet is sent to his regiment or corps, with higher rank if there are vacancies, but if there are no vacancies, he goes as a cadet, with the brevet rank of the next higher grade.

The examination for admission to the institution is a very limited one, being confined to the elementary branches of an English education.

The annual course at the academy is divided into two distinct periods, the first extending from June till September, and the second from September to the following June. During the first period, the cadets leave their barracks and encamp in tents, and are made subject to the police and discipline of an army in time of war. In addition to the thorough and severe course of practical exercises and drills in the different arms during these three summer months of each year, they are made to perform the same tours of guard-duty, night and day, as is required of the common soldier in time of actual war. This continues till the first of September of each year, when the cadets return to their barracks, and for the remaining nine months devote themselves to the prescribed course of scientific and military studies, intermixed with military exercises and practical operations in the laboratory and on the field.

To test the progress of the cadets in their studies, there are held semi-annual public examinations. These examinations are strict and severe, and all who fail to come up to the fixed standard are obliged to withdraw from the institution, to allow some one else from the same district to make the trial.

During their course of studies the cadets, as warrant-officers of the army, draw pay barely sufficient to defray their necessary expenses. The allowance to each is twenty-six dollars per month, but none of this is paid to the cadet, but is applied to the purchase of books, fuel, lights, clothing, board, &c.

This institution furnishes each year to the army about forty subaltern officers, thoroughly instructed in all the theoretical and practical duties of their profession. After completing this course, the cadet is usually promoted

from the grade of warrant-officer to that of a commissioned officer, and is immediately put on duty with his regiment or corps.

This system of appointment to the army has produced the most satisfactory results, and has received the commendation of our best military men, and the approbation of all our presidents and most able statesmen. Nevertheless, it has occasionally met with strong opposition; this opposition springing in part from a want of proper information respecting the character and working of the system, and in part from the combined efforts of those who from negligence or incapacity have failed to pass their examinations for promotion, and of those who, from a conscious want of qualifications or merit, feel assured that they cannot obtain commissions in the army so long as this system of merit, as fixed by examination, shall exist. Hence the effort to destroy the Military Academy and to throw the army entirely open to *political* appointment.

Several legislative bodies, acting under these combined influences, have passed resolutions, giving various objections to the Military Academy, and recommending that it be abolished. The objections made by the legislatures of Tennessee, Ohio, Connecticut, New Hampshire, and Maine, are mostly founded on false information, and may be readily answered by reference to the official records of the War-office. But it is not the present object to enter into a general discussion of the charges against that institution, except so far as they are connected with the importance of military education, and the rules of military appointment and promotion.

It has been alleged by many of the opponents of the West Point Academy, that military instruction is of little or no advantage to a general;—that in the wars of Napoleon, and in the American Revolution, and the American war of 1812, armies were generally led to victory by men without a military education, and unacquainted with military science;—and that in the event of another war in this country, we must seek our generals in the ranks of civil life, rather than among the graduates of our Military Academy.

The objection here made to military education will hold with equal force against education in any other profession. We sometimes find men who have become eminent in the pulpit and at the bar, or in medicine and the sciences, without ever having enjoyed the advantages of an education in

academic or collegiate halls, and perhaps even without that preliminary instruction usually deemed necessary for professional pursuits. Shall we therefore abolish all our colleges, theological seminaries, schools of law and medicine, our academies and primary schools, and seek for our professional men among the uneducated and the ignorant? If professional ignorance be a recommendation in our generals, why not also in our lawyers and our surgeons? If we deem professional instruction requisite for the care of our individual property and health, shall we require less for guarding the honor and safety of our country, the reputation of our arms, and the lives of thousands of our citizens?

But in reality, were not these men to whom we have alluded eminent in their several professions *in spite of,* rather than *by means of* their want of a professional education? And have not such men, feeling the disadvantages under which they were forced to labor, been almost without exception the advocates of education in others?

But is it true that most of the generals of distinction in the more recent wars were men destitute of military education,—men who rose from the ranks to the pinnacle of military glory, through the combined influence of ignorance of military science and contempt for military instruction? Let us glance at the lives of the most distinguished of the generals of the French Revolution, for these are the men to whom reference is continually made to prove that the Military Academy is an unnecessary and useless institution, the best generals being invariably found in the ranks of an army, and *not* in the ranks of military schools. Facts may serve to convince, where reasoning is of no avail.

Napoleon himself was a pupil of the military schools of Brienne and Paris, and had all the advantages of the best military and scientific instruction given in France.

Dessaix was a pupil of the military school of Effiat, with all the advantages which wealth and nobility could procure. Davoust was a pupil of the military school of Auxerre, and a fellow-pupil with Napoleon in the military school of Paris. Kleber was educated at the military school of Bavaria. Eugene Beauharnais was a pupil of St. Germain-en-Loye, and had for his military instructor the great captain of the age. His whole life was devoted

to the military art. Berthier and Marmont were both sons of officers, and, being early intended for the army, they received military educations. Lecourbe had also the advantages of a military education before entering the army. Pichegru and Duroc were pupils of the military school of Brienne. Drouet was a pupil of the artillery school. Foy was first educated in the college of Soissons, and afterwards in the military schools of La Fère and Chalons. Carnot, called the "Organizer of French victory," received a good early education, and was also a pupil of the engineer school of Mézières.

Several of the distinguished French generals at first received good scientific and literary educations in the colleges of France, and then acquired their military instruction in the subordinate grades of the army; and by this means, before their promotion to responsible offices, acquired a thorough practical instruction, founded on a basis of a thorough preliminary education. Such was Suchet, a pupil of the college of Lisle-Barbe; Lannes, a pupil of the college of Lectoure; and Mortier, who was most carefully educated at Cambrai; Lefebvré and Murat were both educated for the church, though the latter profited but little by his instruction; Moreau and Joubert were educated for the bar; Massena was not a college graduate, but he received a good preliminary education, and for several years before he entered the army as an officer, he had enjoyed all the advantages afforded by leisure and affluent circumstances; Ney, though poor, received a good preliminary education, and entered a notary's office to study a profession. Hoche was destitute of the advantages of early education, but, anxious to supply this deficiency, he early distinguished himself by his efforts to procure books, and by his extraordinary devotion to military studies. By several years devoted in this way to professional studies and the practical duties of a subordinate grade in the army, Hoche acquired a military knowledge which early distinguished him among the generals of the French Revolution. Soult and Gouvion-Saint-Cyr, being of parents in limited circumstances, had not the advantages of extensive education, but close and diligent application, an ardent ambition, and strong and powerful intellect, combined with long years of service in the practical operations of the field, at length enabled these men to overcome all obstacles, and force their way to the higher walks of their professions. But both knew from experience the advantages of military instruction, and the importance of professional

education in the army, and they have consequently both been the warmest friends and strongest advocates of the military schools of France.

The Polytechnic School was established too late to furnish officers for any of the earlier wars of Napoleon; but in his last campaigns he began to reap the advantages of an institution which had been under his fostering care, and Bertrand, Dode, Duponthon, Haxo, Rogniat, Fleury, Valazé, Gourgaud, Chamberry, and a host of other distinguished young generals, fully justified the praises which the emperor lavished on his "*poulet aux œufs d'or*"—the hen that laid him golden eggs!

In our own revolutionary war, Generals Washington, Hamilton, Gates, Schuyler, Knox, Alexander, (Lord Stirling,) the two Clintons, the Lees, and others, were men of fine education, and a part of them of high literary and scientific attainments; Washington, Gates, Charles Lee, the Clintons, and some others, had considerable military experience even before the war: nevertheless, so destitute was the army, generally, of military science, that the government was under the necessity of seeking it in foreigners—in the La Fayettes, the Kosciuskos, the Steubens, the De Kalbs, the Pulaskis, the Duportails—who were immediately promoted to the highest ranks in our army. In fact the officers of our scientific corps were then nearly all foreigners.

But, say the opponents of the Academy, military knowledge and education are not the only requisites for military success; youthful enterprise and efficiency are far more important than a mere acquaintance with military science and the military art: long service in garrison, combined with the indolent habits acquired by officers of a peace-establishment, so deadens the enterprise of the older officers of the army, that it must inevitably result, in case of war, that military energy and efficiency will be derived from the ranks of civil life.

We are not disposed to question the importance of youthful energy in the commander of an army, and we readily admit that while seeking to secure to our service a due degree of military knowledge, we should also be very careful not to destroy its influence by loading it down with the dead weights of effete seniority. But we do question the wisdom of the means proposed for supplying our army with this desired efficiency. Minds stored with vast

funds of professional knowledge, and the rich lore of past history; judgments ripened by long study and experience; with passions extinguished, or at least softened by the mellowing influence of age—these may be best suited for judges and statesmen, for here there is time for deliberation, for the slow and mature judgment of years. But for a general in the field, other qualities are also required. Not only is military knowledge requisite for *directing* the blow, but he must also have the military energy necessary for *striking* that blow, and the military activity necessary for parrying the attacks of the enemy. A rapid *coup d'oeil* prompt decision, active movements, are as indispensable as sound judgment; for the general must *see*, and *decide*, and *act*, all in the same instant. Accordingly we find that most great generals of ancient and modern times have gained their laurels while still young.

Philip of Macedon ascended the throne at the age of twenty-two, and soon distinguished himself in his wars with the neighboring states. At the age of forty-five he had conquered all Greece. He died at forty-seven.

Alexander the Great had defeated the celebrated Theban band at the battle of Cheronea, and gained a military reputation at the age of eighteen. He ascended the throne of his father Philip before twenty, and at twenty-five had reached the zenith of his military glory, having already conquered the world. He died before the age of thirty-two.

Julius Cæsar commanded the fleet sent to blockade Mitylene, where he greatly distinguished himself before the age of twenty-two. He soon after held the important offices of tribune, quæstor, and edile. He had completed his first war in Spain, and was made consul at Rome before the age of forty. He twice crossed the Rhine, and conquered all Gaul, and had twice passed over to Britain, before the age of forty-five; at fifty-two he had won the field of Pharsalia, and attained the supreme power. He died in the fifty-sixth year of his age, the victor of five hundred battles, and the conqueror of a thousand cities.

Hannibal joined the Carthaginian army in Spain at twenty-two, and was made commander-in-chief at twenty-six. Victorious in Spain and France, he crossed the Alps and won the battle of Cannæ before the age of thirty-one.

Scipio Africanus, (the elder,) at the age of sixteen distinguished himself at the battle of Ticinus; at twenty was made edile, and soon after pro-consul in Spain; at twenty-nine he won the great battle of Zama, and closed his military career. Scipio Africanus (the younger) also distinguished himself in early life; at the age of thirty six he had conquered the Carthaginian armies and completed the destruction of Carthage.

Gengis-Khan succeeded to the domain of his father at the age of thirteen, and almost immediately raised an army of thirty thousand men, with which he defeated a numerous force of rebels, who had thought to take advantage of his extreme youth to withdraw from his dominion. He soon acquired a military reputation by numerous conquests, and before the age of forty had made himself emperor of Mogul.

Charlemagne was crowned king at twenty-six, conquered Aquitania at twenty-eight, made himself master of France and the greater part of Germany at twenty-nine, placed on his brows the iron crown of Italy at thirty-two, and conquered Spain at thirty-six.

Gonsalvo de Cordova, the "great captain," entered the army at fifteen, and before the age of seventeen had acquired a brilliant military reputation, and was knighted by the king himself on the field of battle; at forty-one he was promoted over the heads of older veterans and made commander-in-chief of the army in Italy.

Henry IV. of France was placed at the head of the Huguenot army at the age of sixteen, at nineteen he became king of Navarre; at forty he had overthrown all his enemies, placed himself on the throne of France, and become the founder of a new dynasty.

Montecuculi, at the age of thirty-one, with two thousand horse, attacked ten thousand Swedes and captured all their baggage and artillery; at thirty-two he gained the victory of Triebel, at forty-nine defeated the Swedes and saved Denmark, and at fifty-three defeated the Turks at the great battle of St. Gothard. In his campaigns against the French at a later age, he made it his chief merit, "not that he conquered, but that he was not conquered."

Saxe entered the army at the early age of twelve, and soon obtained the command of a regiment of horse; at twenty-four he became *maréchal-de-*

camp, at forty-four marshal of France, and at forty-nine gained the celebrated victory of Fontenoy. He died at the age of fifty-four.

Vauban entered the army of Condé as a cadet at the age of seventeen, at twenty was made a lieutenant, at twenty-four he commanded two companies, at forty-one was a brigadier, at forty-three a *maréchal-de-camp*, and at forty-five commissaire-général of all the fortifications of France. At the age of twenty-five he had himself conducted several sieges, and had assisted at many others.

Turenne entered the army before the age of fourteen; he served one year as a volunteer, four years as a captain, four years as a colonel, three years as a major-general, five years as a lieutenant-general, and became a marshal of France at thirty-two. He had won all his military reputation by the age of forty.

Prince Maurice commanded an army at the age of sixteen, and acquired his military reputation in very early life. He died at fifty-eight.

The great Condé immortalized his name at the battle of Rocroi, in which, at the age of twenty-two, he defeated the Spaniards. He had won all his great military fame before the age of twenty-five.

Prince Eugene of Savoy was a colonel at twenty-one, a lieutenant-field-marshal at twenty-four, and soon after, a general-field-marshal. He gained the battle of Zenta at thirty-four, and of Blenheim at forty-one. At the opening of the war of 1733, he again appeared at the head of the army at the advanced age of sixty-nine, but having lost the vigor and fire of youth, he effected nothing of importance.

Peter the Great of Russia was proclaimed czar at ten years of age; at twenty he organized a large army and built several ships; at twenty-four he fought the Turks and captured Asoph; at twenty-eight he made war with Sweden; at thirty he entered Moscow in triumph after the victory of Embach, and the capture of Noteburg and Marienburg; at thirty-one he began the city of St. Petersburg; at thirty-nine he was defeated by the Turks and forced to ransom himself and army. His latter years were mostly devoted to civil and maritime affairs. He died at the age of fifty-five.

Charles the XII. of Sweden ascended the throne at the age of fifteen, completed his first successful campaign against Denmark at eighteen, overthrew eighty thousand Russians at Narva before nineteen, conquered Poland and Saxony at twenty-four, and died at thirty-six.

Frederick the Great of Prussia ascended the throne at twenty-eight, and almost immediately entered on that career of military glory which has immortalized his name. He established his reputation in the first Silesian war, which he terminated at the age of thirty. The second Silesian war was terminated at thirty-three; and at forty-three, with a population of five millions, he successfully opposed a league of more than one hundred millions of people.

Prince Henry of Prussia served his first campaign as colonel of a regiment at sixteen; at the age of thirty-one he decided the victory of Prague, and the same year was promoted to the command of a separate army. The military reputation he acquired in the Seven Years' War was second only to that of Frederick.

Cortes had effected the conquest of Mexico, and completed his military career, at the age of thirty-six.

Sandoval, the most eminent of his great captains, died at the age of thirty-one. He had earned his great renown, and closed his military achievements, before the age of twenty-five.

Pizarro completed the conquest of Peru at thirty-five, and died about forty.

Lord Clive began his military career at twenty-two, and had reached the zenith of his military fame at thirty-five; he was raised to the peerage at thirty-six, and died at fifty.

Hastings began his military service at about twenty-five, and became governor of Bengal at forty.

Napoleon was made a lieutenant at seventeen, a captain at twenty, *chef-de-bataillon* at twenty-four, general of brigade at twenty-five, and commander-in-chief of the army of Italy at twenty-six. All his most distinguished generals were, like him, young men, and they seconded him in his several

campaigns with all the energy and activity of youthful valor and enthusiasm.

Dessaix entered the army at fifteen; at the opening of the war he quickly passed through the lower grades, and became a general of brigade before the age of twenty-five, and a general of division at twenty-six; he died before the age of thirty-two, with a reputation second only to that of Napoleon.

Kleber did not enter the army till later in life, but he quickly passed through the subordinate grades, and was made a general of brigade at thirty-eight, a general of division at forty, and general-in-chief of an army at forty-one: he died at forty-six. On his death, and in Napoleon's absence, Ménau, aged and inefficient, succeeded by right of seniority to the command of the army of Egypt. Its utter ruin was the almost immediate consequence.

Massena first entered the army at seventeen, but soon married a rich wife, and retired to civil life. He returned to the army at the opening of the revolution, and in two years, before the age of thirty-five, was promoted to the rank of general of division. He immediately acquired that high reputation which he sustained through a long career of military glory.

Soult became a sub-lieutenant at twenty-two, a captain at twenty-four; the following year he passed through the several grades of *chef-de-bataillon*, colonel, and general of brigade, and became general of division at twenty-nine.

Davoust was a sub-lieutenant at seventeen, a general of brigade at twenty-three, and general of division at twenty-five.

Eugene Beauharnais entered the army at a very early age. He became *chef-de-bataillon* at nineteen, colonel at twenty-one, general of brigade at twenty-three, and Viceroy of Italy at twenty-five. He soon proved himself one of Napoleon's ablest generals. At twenty-eight he commanded the army of Italy, and at thirty-one gained great glory in the Russian campaign, at the head of the fourth *corps d'armée.*

Gouvion-Saint-Cyr enured the army at the beginning of the Revolution, and passing rapidly through the lower grades, became a general of brigade at twenty-nine, and a general of division at thirty.

Suchet became a *chef-de-bataillon* at twenty, general of brigade at twenty-five, major-general of Brune's army at twenty-seven, and general of division and of a *corps d'armée* at twenty-eight.

Oudinot became a captain at twenty-three, *chef-de-bataillon* at twenty-four, general of brigade at twenty-five, and general of division at twenty-eight.

Ney was a captain at twenty-three, adjutant-general at twenty-six, general of brigade at twenty-seven, and general of division at twenty-nine.

Lannes was a colonel at twenty-seven, general of brigade at twenty-eight, and very soon after general of division.

Joubert became adjutant-general at twenty-five, general of brigade at twenty-six, general of division at twenty-eight, and general-in-chief of the army of Italy at twenty-nine. He died at thirty.

Victor was a *chef-de-bataillon* at twenty-seven, general of brigade at twenty-nine, and general of division at thirty-two.

Murat was a lieutenant at twenty, and passing rapidly through the lower grades, he became a general of brigade at twenty-five, and a general of division at twenty-seven.

Mortier was a captain at twenty-three, adjutant-general at twenty-five, general of brigade at thirty, and general of division at thirty-one.

Macdonald was a colonel at twenty-seven, a general of brigade at twenty-seven, and a general of division at thirty.

Marmont was a captain at twenty-one, *chef-de-bataillon* at twenty-two, general of brigade at twenty-four, inspector general at twenty-seven, and general-in-chief of an army at thirty-two.

Bernadotte was a colonel at twenty-eight, general of brigade at twenty-nine, and general of division at thirty.

Lefebvre was made a captain at the organization of the army in 1793; he became a general of brigade at thirty-eight, and general of division at thirty-nine.

Bessières entered the army at twenty-six, became a colonel at thirty, general of brigade at thirty-two, and general of division at thirty-four. He died at forty-seven.

Duroc was a captain at twenty-three, *chef-de-bataillon* at twenty-six, colonel and *chef-de-brigade* at twenty-seven, and general of division at thirty. He died at forty-one.

This list might be still further extended with the same results, but names enough have been given to show that the generals who assisted Napoleon in his immortal campaigns were all, with scarcely an exception, *young men*, still burning with the fires of youthful ardor and enthusiasm. The grade of marshal was not created till after Napoleon became emperor. On ascending the throne of the empire, he nominated to this rank eighteen of the most distinguished generals of France. Some of these were generals of the earlier wars of the Revolution, and had never served under him. Others were younger men, several being only thirty-four, thirty-five, and thirty-six years of age. The mean age of all was forty-four. He afterwards made seven more marshals, whose mean age was forty-three. These appointments, however, were regarded as rewards for *past* services, rather than as a grade from which service was expected, for several of the older marshals were never called into the field after their promotion.

Having noticed the ages of the principal generals who commanded in the armies of Napoleon, let us look for a moment at those who opposed him. In the campaign of 1796 the enemy's forces were directed by Beaulieu, then nearly eighty years of age; Wurmser, also an octogenarian, and Alvinzi, then over seventy: these had all three distinguished themselves in earlier life, but had now lost that youthful energy and activity so essential for a military commander.

In the campaign of 1800 the general-in-chief of the Austrian forces was Melas, an old general, who had served some fifty years in the army; he had distinguished himself so long ago as the Seven Years' War, but he had now become timid and inefficient, age having destroyed his energy.

In the campaign of 1805 the French were opposed by Kutusof, then sixty, and Mack, then fifty-three; the plan of operations was drawn up by still more aged generals of the Aulic council.

In the campaign of 1806 the French were opposed by the Duke of Brunswick, then seventy-one, Hohenlohe, then sixty, and Mollendorf, Kleist, and Massenbach, old generals, who had served under the great Frederick,—men, says Jomini, "exhumed from the Seven Years' War,"—"whose faculties were frozen by age,"—"who had been buried for the last ten years in a lethargic sleep."

In the campaign of 1807 the French were opposed by Kamenski, then eighty years of age, Benningsen, then sixty, and Buxhowden, then fifty-six. The Allies now began to profit by their experience, and in 1809 the Austrian army was led by the young, active, skilful, and energetic Archduke Charles; and this campaign, although the commander-in-chief was somewhat fettered by the foolish projects of the old generals of the Aulic council, and thwarted by the disobedience of his brother, was nevertheless the most glorious in the Austrian annals of the wars of the Revolution.

At the opening of the campaign of 1812 the Emperor Alexander, young, (only thirty-five,) active, intelligent, and ambitious, had remodelled his army, and infused into it his own energy and enthusiastic love of glory. He was himself at its head, and directed its operations. Kutusof was for a short time the nominal commander-in-chief, and exhibited an activity unusual at his age, but he was surrounded by younger generals—Barclay-de-Tolley, and Miloradowich, then forty-nine, Wintzengerode, then forty-three, Schouvalof, then thirty-five, and the Archduke Constantine, then thirty-three,—generals who, at the heads of their corps, and under the young emperor and his able staff of young officers, in the two succeeding campaigns, rolled back the waves of French conquest, and finally overthrew the French empire. Wellington, who led the English in these campaigns, was of the same age as Napoleon, and had been educated at the same time with him in the military schools of France. The Austrians were led by Schwartzenburg, then only about thirty, and the Prussians by Yorck, Bulow, and Blücher. The last of these was then well advanced in life, but all his movements being directed by younger men,—Scharnhorst and Gneisenau, —his operations partook of the energy of his able chiefs of staff.

In the campaign of 1815, Napoleon was opposed by the combinations of Wellington and Gneisenau, both younger men than most of his own generals, who, it is well known, exhibited, in this campaign, less than in

former ones, the ardent energy and restless activity which had characterized their younger days. Never were Napoleon's, plans better conceived, never did his troops fight with greater bravery; but the dilatory movements of his generals enabled his active enemies to parry the blow intended for their destruction.

In the American war of 1812, we pursued the same course as Austria, Prussia, and Russia, in their earlier contests with Napoleon, *i.e.*, to supply our armies with generals, we dug up the Beaulieus, the Wurmsers, the Alvinzis, the Melases, the Macks, the Brunswicks, and the Kamenskis of our revolutionary war; but after we had suffered sufficiently from the Hulls, the Armstrongs, the Winchesters, the Dearborns, the Wilkinsons, the Hamptons, and other veterans of the Revolution, we also changed our policy, and permitted younger men—the Jacksons, the Harrisons, the Browns, the McReas, the Scotts,[49] the Ripleys, the Woods, the McCombs, the Wools, and the Millers—to lead our forces to victory and to glory. In the event of another war, with any nation capable of opposing to us any thing like a powerful resistance, shall we again exhume the veterans of former days, and again place at the head of our armies respectable and aged inefficiency; or shall we seek out youthful enterprise and activity combined with military science and instruction? The results of the war, the honor of the country, the glory of our arms, depend, in a great measure, upon the answer that will be given to this question.

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Scott had acquired his military reputation, and attained the rank of major-general at twenty-eight.

But it may be asked, how are we to secure this combination of military instruction and military energy; how are we to fill the higher grades of our army with young and active men possessing due military instruction and talent? The question is not a difficult one, and our government can easily attain the desired object, if it will only set at work honestly, disregarding all party prejudices and the mercenary and selfish interests of its own members and advisers. Other governments have pointed out to us the way. It is this: let *merit* be the main test for all appointments and promotions in the army. Let one or more of the subordinate grades be thrown open to the youth of

the whole country, without distinction as to birth, or wealth, or politics; let them be kept on probation in this subordinate grade, and be thoroughly instructed in all that relates to the military profession; after strict examination let them be promoted to the vacancies in the higher grades as rapidly as they shall show themselves qualified for the duties of those grades, merit and services being here as elsewhere the only tests.

The first part of this rule is already accomplished by the Military Academy. One young man is selected from each congressional district, on an average, once in about two years, the selection being made by the representative of the district; these young men are made warrant officers in the army, and sent to a military post for instruction; frequent and strict examinations are instituted to determine their capacity and fitness for military service; after a probation of a certain length of time, the *best* are selected for commission in the army, relative rank and appointments to corps being made strictly with reference to merit; birth, wealth, influence of political friends—all extraneous circumstances being excluded from consideration. What can be more truly and thoroughly democratic than this? What scheme can be better devised to supply our army with good officers, and to exclude from the military establishment the corrupting influence of party politics, and to prevent commissions in the army from being given to "the sons of wealthy and influential men, to the almost total exclusion of the sons of the poor and less influential men, regardless alike of qualifications and of merit?"

Unfortunately for the army and for the country this system ends here, and all further advancement is made by mere seniority, or by executive favoritism, the claims of merit having but little or no further influence. Indeed, executive patronage is not infrequently permitted to encroach even upon these salutary rules of appointment, and to place relatives and political friends into the higher ranks of commissioned officers directly from civil life, "regardless alike of qualifications and of merit," while numbers "of sons of the poor and less influential men," who have served a probation of four or five years in military studies and exercises, and have proved themselves, in some thirty examinations made by competent boards of military officers, to be most eminently qualified for commissions, are passed by in utter neglect! Our army is much more open to this kind of favoritism and political partiality, than that of almost any of the

governments of Europe, which we have been accustomed to regard as aristocratic and wholly unfriendly to real merit.

In the Prussian service, in time of peace, the government can appoint no one, even to the subordinate grade of ensign, till he has followed the courses of instruction of the division or brigade-school of his arm, and has passed a satisfactory examination. And, "no ensign can be promoted to a higher grade till after his promotion has been agreed to by the superior board or commission of examiners at Berlin, and his name has been placed on the list of those whose knowledge and acquirements (*connaissances*) render them qualified (*aptes*) for the responsible duties of their profession. The nomination to the grade of second-lieutenant is not, even after all these conditions are fulfilled, left to the choice of the government. When a vacancy occurs in this grade, the subaltern officers present to the commandant of the regiment a list of three ensigns who have completed their course of study; the commandant, after taking the advice of the superior officers of the regiment, nominates the most meritorious of these three to the king, who makes the appointment." The government can appoint to the engineers and artillery only those who have been instructed as *élèves* in the Berlin school of cadets and the school of artillery and engineers, and these appointments must be made in the order in which the pupils have passed their final examination. In these corps the lieutenants and second captains can be promoted to a higher grade only after they have passed a satisfactory examination. No political influence, nor even royal partiality, can interfere with this rule.

Even in the arbitrary monarchies of Austria and Russia it is deemed necessary to subject all military appointments and promotions, in the peace establishments, to certain fixed rules. In the Austrian army all sub-lieutenants must be taken from the military schools, or the specially-instructed corps of cadets and imperial guards; from this grade to that of captain all promotions are made by the commandants of regiments and corps on the advice of the other superior officers. Above the grade of captain all nominations for promotion are made to the emperor by the Aulic Council, in the order of seniority of rank, except the claims of superior merit interfere. "In the Russian army," says Haillot, "no one, not even a prince of the imperial family, can reach the grade of officer till he has satisfactorily passed his several examinations, or finished the severe

novitiate to which the cadets in the corps are subjected." Promotion below the grade of colonel is made partly by seniority, and partly by merit; above that grade, by selection alone.

In the British service, rank in the line of the army is obtained by purchase, and the higher grades are in this way filled with young men of energy and enterprise; but this efficiency is gained by injustice to the poor man, who is without the means of purchasing rank. In some respects it is preferable to our ruinous system of exclusive seniority and executive favoritism, but far more objectionable than that based on merit. Wellington has recently said that the system of exclusive seniority would soon utterly destroy the efficiency of the army, by preventing young men from reaching the higher grades. "At first," says an officer of some distinction in the British navy, in speaking of promotions in that arm of service, "it certainly looks very hard to see old stagers grumbling away their existence in disappointed hopes; yet there can be little doubt that the navy, and, of course, the country at large, are essentially better served by the present system of employing active, young, and cheerful-minded officers, than they ever could be by any imaginable system by seniority. It must not be forgotten, indeed, that at a certain stage of the profession, the arrangement by which officers are promoted in turn is already made the rule, and has long been so: but, by a wise regulation, it does not come into operation before the rank of post-captain be attained. Antecedent to this point, there must occur ample opportunities of weeding out those persons, who, if the rule of mere seniority were adopted, would exceedingly embarrass the navy list." We fully agree with this writer respecting the evils of a system of exclusive seniority, but not respecting the best means of remedying these evils. In England, where the wealthy and aristocratic classes govern the state, they may very well prefer a system of military appointment and promotion based exclusively on wealth and political influence; but in this country we are taught to consider *merit* as a claim much higher than wealth, or rank, or privilege.

The various changes in the rules of appointment and promotion in the French service, and the various results of these changes, both on the character of the army and the welfare of the state, are so instructive that we regret that our limits will not allow us to enter into a full discussion of them. We can give only a very brief outline.

Previous to the Revolution, military appointment and promotion were wholly subject to the rules of nobility, certain grades in the army belonging of right to certain grades of the *noblesse*; merit and service being excluded from consideration. But the constituent assembly changed this order of things, and established the rule that three-fourths of the sub-lieutenants be appointed by selection, *after a concours*, and the other quarter be appointed from the sub-officers, alternately by seniority and selection, without *concours*; the captains and lieutenants by seniority; the colonels and lieutenant-colonels two-thirds by seniority and one-third by selection; *maréchaux-de-camp* and lieutenant-generals one-half by seniority and one-half by selection. In 1793 the grades were still further opened to selection, and in the turbulent times that followed, a part of them were even thrown open to election by the soldiers. But in 1795 the combined system of merit and seniority, with certain improvements, was restored. In 1796 and the wars that followed, *merit* was the only qualification required, and Bonaparte, Moreau, and other young generals were actually placed in command of their seniors in rank. Military talent and military services, not rank, were the recognised claims for promotion, the *baptism of blood*, as it was called, having equalized all grades. Bonaparte, in leaving Egypt, paid no attention to seniority of rank, but gave the command to Kleber, who was then only a general of brigade, while Menou was a general of division. Everybody knows that on the death of Kleber, General Menou succeeded in the command; and that Egypt, saved by the *selection* of Kleber, was lost by the *seniority* of Menou.

Napoleon formed rules for promotion, both for peace and war, based on merit. His peace regulations were much the same as the system of 1795; his field regulations, however, from the circumstances of the times, were almost the only ones used. The following extract from the *Reglement de Campagne*of 1809, (title XX.,) gives the spirit of this system:—"The next day after an action the generals of brigade will present to the generals of division the names of all such as have distinguished themselves in a particular manner; the generals of division will immediately report these to the commander-in-chief, and also the names of the generals and superior officers whose conduct has contributed most to secure success, so that the general-in-chief may immediately inform his majesty."

On the restoration of the Bourbons there were also restored many of the ancient privileges and claims of rank by the officers of the *maison militaire du roi,* and court favoritism was substituted for merit and service. But the revolution of 1830 produced a different order of things. "The laws now regulate military promotion; the king can appoint or promote only in conformity to legal prescriptions; and even in the exercise of this prerogative, he is wise enough to restrain himself by certain fixed rules, which protect him from intrigues, and from the obsessions of persons of influence, and of party politicians." Would that the same could always be said of the executive of this country in making appointments and promotions in the army.

The existing laws and regulations of the French service differ slightly for different corps, but the general rule is as follows: No one can be appointed to the grade of officer in the army who has not graduated at one of the military schools, or has not served at least two years as a sub-officer in a *corps d'armée*. In time of peace, no one can be promoted to the rank of lieutenant, captain, or major, (*chef-d'escadron* and *chef-de-bataillon*,) till he has served two years in the next lower grade; no one can be made lieutenant-colonel till he has served four years, nor be made colonel till he has served three years, in the next lower grade; no one can be made *maréchal-de-camp*, lieutenant-general, or marshal of France, till he has served two years in the next lower grade. These numbers are all diminished one half in time of war. For the grades of first-lieutenant and captain, two-thirds of the promotions are by seniority, and one-third by selection; for the *chef-de-bataillon* and *chef-d'escadron*, one-half by seniority and one-half by selection; for all the other grades by selection only. In time of war, one-half of the promotions to the grades of first-lieutenant and captain are filled by selection, and all the promotions to other grades in this way. For promotion by selection, a list of the authorized candidates for each grade is made out every year by inspectors, and boards of examiners appointed *ad hoc*, and the name, qualifications, and particular claim are given of each officer admitted to the *concours*. The recommendations of these inspectors and examiners are almost invariably followed by the government in its selections. This combined system of seniority and merit secures a gradual promotion to all, and at the same time enables officers of great talents and acquirements to attain the higher grades while still young and efficient.

Merit need not, therefore, always linger in the subaltern grades, and be held subordinate to ignorance and stupidity, merely because they happen to be endowed with the privileges of seniority. Moreover, government is precluded from thrusting its own favorites into the higher grades, and placing them over the heads of abler and better men.

If such a system of appointment were introduced into our army, and fixed by legal enactments, and no one were allowed to receive a commission till he had either distinguished himself in the field, or had passed an examination before a board of competent officers, we are confident that better selections would be made in the appointments from civil life than have been within the last ten years by the present system of political influence. It would scarcely be possible to make worse selections.[50] And if the combined system of seniority and examination were pursued in promoting the subalterns already in service, it certainly would produce less injustice, and give greater efficiency to the army, than the present one of exclusive seniority and brevet rank, obtained through intrigue and political influence, or high military appointments bestowed as a reward for dirty and corrupt party services. As a military maxim, *secure efficiency, by limiting the privileges of rank; exclude favoritism, by giving the power of selection to boards of competent officers, totally independent of party politics*. Such a system has been for some time pursued in the medical department of our army; it has produced the most satisfactory results; stupidity, ignorance, and aged inefficiency have been *overslaughed*, and will soon entirely disappear from that corps; they have been replaced by young men of activity, talent, character, intelligence, and great professional skill. Is it less important to have competent military officers to command where the lives of thousands, the honor of our flag, the safety of the country depend upon their judgment and conduct, than it is to have competent surgeons to attend the sick and the wounded?

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To show the working of this system of political appointments, we would call attention to a single fact. On the formation of an additional regiment of dragoons in 1836, *thirty* of its officers were appointed from civil life, and only *four* from the graduates of the Military Academy. Of those appointed to that regiment from civil life, *twenty-two* have already been dismissed or

resigned, (most of the latter to save themselves from being dismissed,) and only *eight* of the whole *thirty* political appointments are now left, their places having been mainly supplied by graduates of the Military Academy.

In case of another increase of our military establishment, what course will our government pursue? Will it again pass by the meritorious young officers of our army,—graduates of the Military Academy,—who have spent ten or twelve of the best years of their life in qualifying themselves for the higher duties of their profession, and place over their heads civilians of less education and inferior character—men totally ignorant of military duties, mere pothouse politicians, and the base hirelings of party,—those who screech the loudest in favor of party measures, and degrade themselves the most in order to serve party ends?—and by thus devoting the army, like the custom-house and post-office, to political purposes, will it seek to increase that vast patronage of the executive which is already debasing individual morality, and destroying the national character? Should any administration of the government be so unmindful of the interests and honor of the country as to again pursue such a course, it is to be hoped that the sword of political justice will not long slumber in its scabbard.

We wish to call particular attention to this subject. It deserves attention at all times, but at the present moment it more especially demands a close and candid consideration. The higher grades of our peace establishment are now filled with men so far advanced in life that, in case of an increase of the army, many of them must undoubtedly be either passed over, or put on a retired list. Sooner or later some change of this kind will undoubtedly be made. It is demanded by the good of service, even in time of peace; and in time of war, it will be absolutely necessary to the success of our arms.[51] But the great danger is that the change may be made for the worse—that all the appointments and promotions to the higher grades will be made through political influence, thus converting the army and navy into political engines. Let proper measures be taken to prevent so dangerous a result; let executive patronage in the army be limited by wholesome laws, like those in France and Prussia; and let military merit and services, as determined by boards of competent military officers, be the only recognised claims to appointment and promotion, thus giving to the poor and meritorious at least an equal chance with the man of wealth and the base hireling of party. In actual

service the system of exclusive seniority cannot exist; it would deaden and paralyze all our energies. Taking advantage of this, politicians will drive us to the opposite extreme, unless the executive authority be limited by wholesome laws, based on the just principles of *merit* and *service*.

[51]

Even at the present moment, in ordering troops to Texas, where immediate and active service is anticipated, it is found necessary to break up regiments and send only the young and efficient officers into the field, leaving most of the higher officers behind with mere nominal commands. Very many of the officers now in Texas are acting in capacities far above their nominal grades, but without receiving the rank, pay, and emoluments due to their services.

But the importance of maintaining in our military organization a suitable system of military instruction is not confined to the exigencies of our actual condition. It mainly rests upon the absolute necessity of having in the country a body of men who shall devote themselves to the cultivation of military science, so as to be able to compete with the military science of the transatlantic powers. It is not to be expected that our citizen soldiery, however intelligent, patriotic, and brave they may be, can make any very great progress in military studies. They have neither the time nor opportunities for such pursuits, and if they can acquire a practical acquaintance with elementary tactics—the mere alphabet of the military art—it is as much as can reasonably be expected of them. As a general rule, the militia are individually more capable and intelligent than the men who compose a regular army. But they must of necessity be inferior in practical professional knowledge.

Technical education is necessary in every pursuit of life. It is possible that the lawyer may succeed in some particular cases without a knowledge of law, but he will probably have few clients if he remain ignorant of the laws and precedents that govern the courts. The unlearned chemist may succeed in performing some single experiment, but his progress will be slow and uncertain if he neglect to make himself familiar with the experiments and discoveries of his predecessors.

Learning, when applied to agriculture, raises it from a mere mechanical drudgery to the dignity of a science. By analyzing the composition of the soil we cultivate, we learn its capacity for improvement, and gain the power to stimulate the earth to the most bountiful production. How different the results attending the labors of the intelligent agriculturist, guided by the lamp of learning, from those of the ignorant drudge who follows the barren formula of traditional precepts! As applied to manufactures and the mechanical arts, learning develops new powers of labor, and new facilities for subsistence and enjoyment. Personal comforts of every kind are greatly increased, and placed within the reach of the humbler classes; while at the same time the "appliances of art are made to minister to the demands of elegant taste, and a higher moral culture." As applied to commerce, it not only greatly increases the facilities for the more general diffusion of civilization and knowledge, but is also vastly influential in harmonizing the conflicting interests of nations.

Nor is learning less humanizing and pacific in its influence when applied to the military art. "During the dark ages which followed the wreck of the Roman power, the military science by which that power had been reared, was lost with other branches of learning. When learning revived, the military art revived with it, and contributed not a little to the restoration of the empire of mind over that of brute force. Then, too, every great discovery in the art of war has a life-saving and peace-promoting influence. The effects of the invention of gunpowder are a familiar proof of this remark; and the same principle applies to the discoveries of modern times. By perfecting ourselves in military science, paradoxical as it may seem, we are therefore assisting in the diffusion of peace, and hastening on the approach of that period when swords shall be beaten into ploughshares and spears into pruning-hooks."

APPENDIX.

Since the first edition of this work was published, two important wars have been commenced and terminated—that between the United States and the Republic of Mexico, and that between Russia and the Western Powers of Europe—and another is now being waged between France and Austria, upon the old battle fields of Northern Italy. In issuing a new edition of these Elements of Military Art and Science, it is deemed proper to refer to these wars, and to apply the principles here discussed to the military operations carried on in Mexico and in the Crimea. It is proposed to do this in the form of Notes to the several Chapters. The war in Italy being still undetermined, and the details of the several battles which have already been fought being but imperfectly known, it is obviously improper to attempt to criticize their strategic character or tactical arrangement.

H.W.H.

NEW YORK, *July*, 1859.

NOTE TO CHAPTER II.—STRATEGY.

In the invasion of Mexico, the United States formed four separate armies, moving on *four distinct lines of operation:* 1st. The "Army of the West," under General Kearny, moving from St. Louis on New Mexico and California; 2d. The "Army of the Centre," under General Wool, moving from San Antonio de Bexar on Chihuahua; 3d. The "Army of Occupation," on the Rio Grande, under General Taylor, moving from Corpus Christi on Matamoras, Monterey, and Saltillo; and 4th. The "Main Army," under General Scott, moving from Vera Cruz on the capital of Mexico.

The Army of the West, under General Kearny, moved upon a separate and distinct line of operations, having no strategic relations to the other three; its objects were the conquest and occupation of New Mexico and Upper

California. The first was readily accomplished; but the general then detached so large a force to operate on Chihuahua after the diversion of Wool's column, that his expedition to California must have utterly failed without the assistance of the naval forces in the Pacific.

The lines of Taylor and Wool were evidently ill chosen, being so distant as to afford the enemy an opportunity to take a central position between them. Fortunately Wool proceeded no further than Monclova, and then turned off to occupy Parras, thus coming under the immediate command of General Taylor. The latter fought the battles of Palo Alto and Resaca de la Palma, and sustained the siege of Fort Brown; then crossing the Rio Grande at Matamoras, he captured Monterey, and, forming a junction with Wool, defeated the army of Santa Anna at Buena Vista. This battle ended the campaign, which, however brilliantly conducted, was entirely without strategic results.

Scott landed his army near the Island of Sacrificios without opposition, and immediately invested Vera Cruz, which surrendered after a short siege and bombardment. Having thus secured his base, he immediately advanced to the city of Puebla, meeting and defeating the army of Santa Anna at Cerro Gordo. Remaining some time at Puebla to reinforce his army, he advanced into the valley of Mexico, and after the brilliant victories of Contreras, Churubusco, Molino del Rey, and Chapultepec, captured the city and terminated the war.

With respect to the double line of operations of Taylor and Scott it may be sufficient to remark, that Santa Anna, from his central position, fought, with the same troops, the battles of Buena Vista and Cerro Gordo. It should also be remarked, that the line of operations of the army of the Rio Grande was not approved by either Scott or Taylor, nor, it is believed, by any other officer of our army. Scott's line of operations, however, was truly strategic, and in turning the Mexican flank by Lake Chalco and the Pedregal, he exhibited the skill of a great general.

The war in the Crimea, from the limited extent of the theatre of operations, afforded but little opportunity for the display of strategic skill on either side. Nevertheless, the movements of both parties, prior to the investment and

siege of Sebastopol, are fair subjects for military criticism with respect to the plans of operation.

When the allies landed their troops at the Old Fort, three plans were open for the consideration of the Russian general: 1st. To destroy or close the harbors of Balaklava, Kamiesch, Kazatch and Strelitzka, and, garrisoning Sebastopol with a strong force, to occupy with the rest of his army the strong plateau south of the city, and thus force the allies to besiege the strong works on the north. 2d. Having closed the harbors on the south, and secured Sebastopol from being carried by the assault of any detachment of the allies, to operate on their left flank, annoying and harassing them with his Cossacks, and thus delay them many days in the difficult and precarious position which they would have occupied. 3d. To advance with his whole force and offer them battle at the Alma. The last and least advantageous of these plans was adopted, and as the garrison of Sebastopol, during the battle, consisted of only four battalions and the sailors of the fleet, it might, considering the weakness of its works, have been easily carried by a detachment of the allied forces.

For the allies at the Alma two plans presented themselves: 1st. To turn the Russian left, cut him off from Sebastopol, and occupy that city in force. 2d. To turn the Russian right, and, throwing him back upon Sebastopol, cut him off from all external succor. Neither plan was fully carried out. The column of General Bosquet turned the Russian left and decided his retreat; but no strategic advantage was taken of the victory. The battle was fought on the 20th of September, and by noon of the 26th the allies had only advanced to the Balbeck, a distance of a little more than ten miles in six days! On the 27th they regained their communication with the fleet at Balaklava, without attempting to occupy Sebastopol, and having exposed themselves to destruction by an ill-conducted flank march. Fortunately for the allies, the Russians failed to avail themselves of the advantages which the enemy had thus gratuitously afforded. The fleet having entered the open harbor of Balaklava, the allies now commenced the labor of landing and moving up their siege material and of opening their trenches, while the Russians prepared their fortifications on the south of Sebastopol for resisting the operations of that gigantic siege which stands without a parallel in history.

NOTE TO CHAPTER III.—FORTIFICATIONS.

In the war between the United States and Mexico, the latter had no fortifications on her land frontiers, and, with the single exception of Vera Cruz, her harbors were entirely destitute of defensive works. The Americans, therefore, had no obstacles of this kind to overcome on three of their lines of operation; and, when Scott had reduced Vera Cruz, his line of march was open to the capital. Moreover, nearly every seaport on the Gulf and Pacific coast fell into our hands without a blow. Had the landing of Scott been properly opposed, and Vera Cruz been strongly fortified and well defended, it would have been taken only after a long and difficult siege. Moreover, had the invading army encountered strong and well-defended fortifications on the line of march to Mexico, the war would, necessarily, have been prolonged, and possibly with a different result.

The Russian fortifications in the Baltic prevented the allies from attempting any serious operations in that quarter, and those in the Black Sea confined the war to a single point of the Heracleidan Chersonese. Had Russia relied exclusively upon her fleet to prevent a maritime descent, and left Sebastopol entirely undefended by fortifications, how different had been the result of the Crimean war.

This subject will be alluded to again in the Notes on Sea-coast Defences, and Permanent Fortifications.

NOTE TO CHAPTER IV.—LOGISTICS.

The war in Mexico exhibited, in a striking manner, our superiority over the enemy in this branch of the military art. No army was better supplied than ours in all matters of subsistence, clothing, medical and hospital stores, and in means of transportation. Two points, however, are worthy of remark in this connection: 1st. The great waste of material, which resulted from the employment of raw troops under short enlistments, and commanded by officers appointed from civil life, who were without experience and destitute of military instruction; and, 2d. The immense expense of transportation, which was due in part to the above cause and in part to the employment, in the administrative departments, of civilians who were

utterly ignorant of the rules and routine of military service. This war was conducted on the system of magazines and provisions carried in the train of the army, or purchased of the inhabitants and regularly paid for, forced requisitions being seldom resorted to, and then in very moderate quantities. The wisdom of this plan was proved by the general good order and discipline of our troops, and the general good-will of the non-combatant inhabitants of the country which was passed over or occupied by the army.

The war in the Crimea proved most conclusively the vast superiority of the French administrative system over that of the English—of the military over a civil organization of the administrative corps of an army. The French troops before Sebastopol were regularly, cheaply, and abundantly supplied with every requisite of provisions, clothing, munitions, medical stores, military utensils, and hospital and camp equipages; while the English army, notwithstanding an immense expenditure of money, was often paralyzed in its operations by the want of proper military material, and not unfrequently was destitute of even the necessaries of life.

Instead of profiting by this lesson, the recent tendency of our own government has been (especially in supplying the army in Utah) to imitate the sad example of the English, and to convert the supplying of our armies into a system of political patronage to be used for party purposes. If fully carried out, it must necessarily result in the ruin of the army, the robbery of the treasury, and the utter corruption of the government.

NOTE TO CHAPTER V.—TACTICS.

The war in Mexico, from the small number of troops engaged, and the peculiar character of the ground in most cases, afforded but few opportunities for the display of that skill in the tactics of battle which has so often determined the victory upon the great fields of Europe. Nevertheless, the history of that war is not without useful lessons in the use which may be made of the several arms in the attack and defence of positions. The limit assigned to these Notes will admit of only a few brief remarks upon these battles.

The affairs of Palo Alto and Resaca de la Palma properly constitute only a single battle. In the first, which was virtually a cannonade, the lines were nearly parallel, and Arista's change of front to an oblique position during the engagement, was followed by a corresponding movement on the part of General Taylor. Being made sensible of the superiority of the American artillery, the Mexican general fell back upon the Ravine of Resaca de la Palma, drawing up his troops in a concave line to suit the physical character of the ground. The Americans attacked the whole line with skirmishers, and with dragoons supported by light artillery, and the charge of a heavy column of infantry decided the victory. General Taylor's operations at Monterey partook more of the nature of an attack upon an intrenched position than of a regular battle upon the field. No doubt Worth's movement to the right had an important influence in deciding the contest, but the separation of his column from the main body, by a distance of some five miles, was, to say the least, a most hazardous operation. The Mexicans, however, took no advantage of the opening to operate between the separate masses into which the American army was divided. The loss which the Mexicans inflicted upon us resulted more from the strength of their position than from any skilful use of their defensive works. In the battle of Buena Vista, the efforts of Santa Anna were principally directed to turning the American left. If he had concentrated his masses more upon the centre at the plateau, the success gained in the early part of the contest would probably have been decisive. The American right at La Angostura was made almost inaccessible by the deep ravines in its front, and the skilful use made of the artillery from this point enabled General Taylor to gain the victory, even after his left had been completely turned, and a portion of the volunteers had actually fled from the field.

The manner in which Scott handled his troops in the various battles on his line of march from Vera Cruz to the capital, proved him to be one of the best generals of the age. At Cerro Gordo he so completely turned Santa Anna's left as to cut off his line of retreat, and nearly destroyed his army, the general himself barely escaping capture. The turning of Valencia's position by the village of San Geronimo, at the battle of Contreras, and the charge by Riley's columns of infantry, were movements well planned and admirably executed, as were also the rapid pursuit of Santa Anna to Churubusco, and the flank and rear attacks by the brigades of Pierce and

Shields. The victory of Molino del Rey was mostly won with the musket, without very material assistance from heavy artillery, and was one of the most brilliant but dearly bought achievements of the war. The assault upon Chapultepec was preceded by a long and heavy cannonade, which produced a decided moral effect upon the enemy and greatly facilitated the assault.

With respect to the battles of the Crimean war, only that of the Alma is subject to the tactical criticism of ordinary battles; those of Balaklava, Inkerman, and the Tchernaya, were of the nature of sorties made to prevent an assault of the unfinished works of defence, and to prolong the operations of the siege. They must therefore be judged as such, and not according to the ordinary rules applicable to contests in the open field. At the battle of the Alma the Russians were attacked in position, the two lines of battle being nearly parallel. According to the original plan of attack, the Turks and Bosquet's division was to turn the Russian left, while the main attack was made upon the centre. But, on account of the division of command in the allied army, there was no concert of action. The heavy column of Bosquet probably decided the victory, although the battle was general throughout the whole line. The English army advanced in columns of brigades at deploying distances, its right connected with the French, and its left protected by a line of skirmishers, of cavalry and horse artillery. With respect to the formation and use of troops in the other battles, it may be remarked that the charge of the English light cavalry at Balaklava was apparently without necessity or object, and led to its inevitable destruction. In the battle of Inkerman the Russians directed their main attack upon the English right and centre, with false attacks upon the French left and towards Balaklava. But these false attacks, as is usual in such cases, were not conducted with sufficient energy and decision, and Bosquet was thus enabled to perceive the real intentions of the enemy upon the English portion of the line and move to its assistance. Moreover, the main body of the Russians moved in too heavy and unwieldy masses, which exposed them to terrible losses, and rendered impossible a rapid and effective deployment of their numerical force. The same criticism is applicable to their formation at the battle of the Tehernaya.

NOTE TO CHAPTER VI.—MEANS OF NATIONAL DEFENCE.

On the invasion of Mexico by the United States, the former republic had a large army of tolerably good troops, though badly officered, still worse equipped, and almost destitute of proper military stores; but she was entirely wanting in two important elements of national defence—fortifications and a navy. Her weakness was shown by the rapid and easy conquest of almost the entire country.

We have already remarked that the fortifications of Russia confined the theatre of war to a single point of the Crimea, and limited the military operations of the allies to the prolonged and only partially successful siege of Sebastopol.

NOTE TO CHAPTER VII.—SEA-COAST DEFENCES.

Allusion has already been made to the weakness of Mexico, resulting from her want of sea-coast defences, as shown by the war between that republic and the United States. This would have been still more manifest had she possessed any thing like a commercial marine, exposed to capture by our naval forces. As it was, the Mexican war afforded not a single contest between ships and forts, no opposition being made to the occupation of Mexican ports by our naval force. The only coast defence, the castle of San Juan d'Ulica was not attacked, but after the bombardment and capture of Vera Cruz, it surrendered without a blow.

The Crimean war, on the contrary, exhibited in a most marked degree the importance of a well-fortified sea-coast. Notwithstanding the immense force of the combined fleets of England and France, no naval attack was made upon either Cronstadt or Sebastopol, and the large naval force of Russia proved utterly useless as a defence against a maritime descent. There was, indeed, a simulachre of a "naval cannonade" on the latter place on the 17th of October, 1854, intended as a diversion of the attention and strength of the garrison from the land side, where the real struggle for predominance was going on between the besieged and the besiegers. The inutility of this attempt was so manifest that no serious naval attack was undertaken, notwithstanding that the allies were ready to bring to bear upon the antiquated and ill-armed Russian works the most powerful naval armaments the world had ever seen.

The results of this "simulachre of a naval cannonade," as it has been called, is worthy of note. The details are taken from Major Barnard's able pamphlet on "The Dangers and Defences of New York," and Commander Dahlgren's interesting and valuable work on "Shells and Shell Guns."

"The allied fleet consisted of 14 French, 10 British, and 2 Turkish ships-of-the-line (some few of which had auxiliary steam power), and a number of side-wheel steamers to tow these; and carried in all about 2,500 guns. It was opposed by about 280 guns from the works. The fleet kept itself (in general) at a respectable distance (from 1500 to 2000 yards); too far to inflict any material injury with its armament (32-pounders, with a moderate proportion of 8-inch shell-guns) upon the works;—too far to receive much from the inefficient armament of the Russian works."

"The only exception to this remark applies to the detached English squadron under Sir Edmund Lyons, consisting of the *Agamemnon*, *Sanspareil*, *London*, *Arethusa*, and *Albion*, the first-named of which vessels took a position at 750 or 800 yards from Fort Constantine, while the others stretched along at about the same distance from Fort Constantine, the 'Wasp Tower,' and 'Telegraph Battery.' Dahlgren describes the result as follows:—"

"The *Agamemnon* was very seriously maltreated, though not to such an extent as to impair her power of battery or engine. She was on fire several times; was struck by 240 shot or shells; and, singular to say, only lost 29, while her second, just by, lost 70 men. The *Albion* suffered still more, and in an hour was towed out crippled, and on fire in more than one place, with a loss of 81 men. The crews of the *London* and *Arethusa*, fared rather better, but the ships nearly as ill; and they too remained in station but a little time after the *Albion*. The *Queen* was driven off soon after she got into her new position, in great danger; and the *Rodney* had the bare satisfaction of getting aground and afloat after experiencing some damage."

"The value of the small works on the cape and bluffs, was clearly defined in these results; being above the dense cloud of smoke that enveloped the ships and the lower forts, their aim was not embarrassed, while the seamen labored under the difficulty of firing, with an inconvenient elevation, at objects that they saw but seldom, and then but dimly and briefly. As a consequence, three line-of-battle ships and a frigate were driven off very

shortly and in great peril, and a fourth badly cut up; while the *Agamemnon* lay opposed to one of the heaviest sea-forts with two tiers of casemates, and at the end of five-hours came off with comparatively little loss."

"Whatever superiority of effect the batteries on the heights may have had (and we have so few details about these works that we can draw no sure conclusion from this mere naked statement of damages received by the vessels), it evidently was not for want of being *hit* often enough (smoke or no smoke), that the *Agamemnon* escaped with so little injury. She 'was struck by 240 shot and shells;' and it is only due to the inefficiency of the projectiles by which she was struck, that she was not destroyed."

"With respect to the damages received by Fort Constantine, Dahlgren says:—"

"' The distance of the *Agamemnon* and *Sanspareil* from Fort Constantine (17th October, 1854), was assumed to be about 800 yards; Lord Raglan states it to have been rather less. These two ships could bring to bear about 87 guns, and the firing from them probably lasted some four hours. There can be no doubt that it inflicted much damage, for the Russian Commander-in-chief-admits it in his official report; but not sufficient to impair the strength of the masonry, and far short of effecting a breach in it."

"'At Bomarsund, the results were rather different:—Three 32-pounders of 42 cwt. (guns of inferior weight), were landed from a ship's spar deck, and placed in battery at 950 yards from the North Tower—the masonry of good quality and 6-1/2 feet thick. In eight hours, the wall between two embrasures was cut through from top to bottom, offering a practicable breach, to effect which 487 shot and 45 shells were fired, being at the rate of one round from the battery in rather less than a minute; or, from each gun, one in 2-3/4 minutes. The Tower surrendered."

"'It seems almost incredible that three pieces should be able to accomplish fully that which eighty-seven pieces utterly failed to do, the distances from the object being alike—particularly when it is considered that many of the latter were of greater calibre, and most of them employed much heavier charges where the calibres were similar. The guns of the ship, if fired at the same rate as those of the battery, which was not unusually rapid (one round in two and three-fourth minutes), would have discharged some seven

thousand seven hundred shot and shells in the course of the four hours, supposing no interruption; a number which, if properly applied, would appear, from the results of three guns, to have been sufficient to breach the wall of the fort in fourteen places; whereas they did not effect a single breach, which is abundant proof of the lack of accuracy. They must either have been dispersed over the surface of the fort, or else missed it altogether, and this could have been due only to a want of the precision which was attained by the battery. The constantly preferred complaint of motion in the ships was not to be urged, because on the day of cannonading Sebastopol, there was scarcely a breath of wind, and the ships were too large to be easily moved by the swell, unless very considerable. That the fort did no greater damage to the ships than it received from them, proves no more than that its fire was quite as illy directed, and the calibres too low. It is said that the *Agamemnon* was struck in the hull by two hundred and forty shot and shells, which must have been but a small portion of what was fired, though sufficient to be decisive, if, as already observed, the calibre had been heavier.'"

Here, then, a number of projectiles thrown from the ships, which were sufficient, had they been thrown from a land battery, according to the result at Bomarsund, to produce fourteen practicable breaches, failed not only to produce a single breach, but even "to impair the strength of the masonry."

The reason of this is obvious. That degree of precision of fire by which a breach is effected by a land battery is utterly unattainable from a floating structure, for the motion of the water, even in the calmest days, is quite sufficient to prevent accuracy of aim at an object at a distance, as in this case, of seven and eight hundred yards.

With respect to the action of the shot and shells upon the *Agamemnon*, it is to be remarked that we have as yet had no fair trial of the power of the fire of modern shell-guns of large calibre from land batteries against ships of war. The Russians had some of them in their fleet, and at Sinope, with their shell-guns, they blew up two Turkish frigates *in fifteen minutes*. It does not appear that in the Crimean war they had yet provided their fortifications with the modern armaments, for where shells were thrown from their sea-coast batteries, they were in every instance of inferior calibre.

With respect to the naval attack upon Kinburn, which has been referred to as showing the importance of floating batteries as an auxiliary to ships in reducing harbor defences, we have no official reports of the Russians from which to derive accurate information of the strength of the works attacked. Dahlgren, drawing his information from the official accounts of the "English and French admirals," describes the works and their location is follows:—

"The Boug and the Dnieper issue into a large basin, formed partly by the projection of the main shore, partly by a long narrow strip of Sand-beach, which continues from it and takes a north-westerly direction until it passes the promontory of Otchakov, where it terminates, and from which it is separated by the channel, whereby the waters of the estuary empty into the Black Sea."

"The distance between the spit or extremity of this tongue and the Point of Otchakov, or the main shore opposite, is about two miles; but the water is too shoal to admit of the passage of large vessels of war, except in the narrow channel that runs nearest to the spit and its northern shore. Here, therefore, are placed the works designed to command the entrance. They are three in number. Near the extreme point of the spit is a covered battery built of logs, which are filled in and overlaid with sand,—pierced for eighteen guns, but mounting only ten."

"Advancing further along the beach is a circular redoubt, connected with the spit battery by a covered way. This work, built of stone, and riveted with turf, is open, and said to be the most substantial of the three; it has eleven cannon, and within is a furnace for heating shot."

"Further on, and where the beach has widened considerably, is Fort Kinburn, a square bastioned work, extending to the sea on the south, and to the waters of the estuary on the north. It is casemated in part, though but few of these embrasures were armed,—its chief force being in the pieces *en barbette,* and some nine or ten mortars. The masonry, though solid, is represented by an eye-witness not to be bomb-proof, and so dilapidated by age that the mortar was falling out from the interstices, leaving the stone to disintegrate. The interior space was occupied by ranges of wooden buildings, slightly constructed and plastered over."

"This fort is said to be armed with sixty pieces. The English admiral states, that all three of the works mounted eighty-one guns and mortars. The calibres are not given officially, but stated in private letters to be 18-pounders and 32-pounders.'"

"The above description will quite justify the further remark as to these works:—"

"They were inferior in every respect, and manifestly incapable of withstanding any serious operation by sea or land. The main fort was particularly weak in design, and dilapidated; all of them were indifferently armed and garrisoned.'"

"So much for the works. As to the character of the armament brought to the assault, the same authority says:—

"The allied force was admirably adapted to the operation, embracing every description of vessel, from the largest to the smallest, and all propelled by steam. There were screw-liners, and like vessels of inferior class, side-wheel steamers, screw gunboats, floating-batteries, mortar-vessels, etc., each armed in what was considered the most approved manner. And this truly formidable naval force carried *besides* some thousand troops' on board, all designed to attack these dilapidated' works of Kinburn."

"Without going into the particulars, we simply give Dahlgren's account of the affair:—"

"The French floating-batteries (*Devastation, Lave*, and *Tonnante*) steamed in to make their first essay, anchoring some six or seven hundred yards off the S.E. bastion of Fort Kinburn, and at 9.20 opened fire, supported by the mortar-vessels, of which six were English, by the gunboats, five French and six English, and by the steamer *Odin*, 16."

"The heavy metal of the floating-batteries (said to be twelve 50-pounders on the broadside of each) soon told on the walls of the fort; and the vertical fire was so good that the French admiral attributed to it, in great part, the speedy surrender of the place. The gunboats also made good ricochet practice, which was noticed to be severe on the barbette batteries."

"The Russian gunners, in nowise daunted by this varied fire, plied their guns rapidly in return, directing their attention chiefly to the floating-batteries, which were nearest."

"Exactly at noon, the admirals steamed in with the *Royal Albert* 121, *Algiers*, 91, *Agamemnon*, 90, and *Princess Royal*, 90, with the four French liners in close order, taking position in line, ranging N.W. and S.E., about one mile from the fort, in twenty-eight feet water."

"At the same time, a squadron of steam-frigates, under Rear-Admirals Stewart and Pellion, dashed in through the passage to the basin, opening fire on the spit and central batteries in passing, and anchoring well inside of Fort Nicholaiev and Otchakov. The attack seaward was completed by the *Acre*, 100, *Curaçoa*, 30, *Tribune*, 30, and *Sphynx*, 6, opening on the central battery; while the *Hannibal*, 91, *Dauntless*, 24, and *Terrible*, 21, assailed that on the spit. To this storm of shot and shells, the Russians could not reply long. In the spit battery, the sand falling through between the logs, displaced by shot and shells, choked the embrasures, and blocked up the guns. In the fort, the light wooden buildings were in flames at an early hour; then the walls began to crumble before the balls which came from every quarter, front, flank, and rear; and as the guns were disabled successively, the return became feeble, until few were in condition to be fired, the central redoubt alone discharging single guns at long intervals. The Russian commander, however, made no sign of surrender; but the admirals, seeing that his fire had ceased, and further defence was unavailing, hoisted the white flag at 1.35 P.M., upon which the works were given up on honorable terms."

"The garrison consisted of about fourteen hundred men; their loss is differently stated,—the French admiral says eighty wounded,—another, forty-three killed and one hundred and fourteen wounded."

"The English suffered the least, having but two men wounded; besides two killed and two wounded in the *Arrow*, by the bursting of her two 68-pounder Lancaster guns."

"The superiority of the allied vessels in number and calibre of ordnance was very decided; they must have had at least six hundred and fifty pieces in play, chiefly 32-pounders, and 8-inch shell guns, with a fair proportion of

68-pounders and mortars, besides the 50-pounders of the French floating batteries. To which the Russians could only reply with eighty-one cannon and mortars, and no guns of heavier calibre than 32-pounders, while many were lower. The great disparity in offensive power was not compensated to the works by the advantage of commanding position, the Russian fort and redoubt being upon nearly the same level with the ships' batteries, and also very deficient in proper strength. On the other hand, the depth of water did not allow the liners to approach nearer than one mile; and thus their fire was by no means so intense as it would have been at shorter range."

"This was the sole occasion in which the floating batteries had an opportunity of proving their endurance; which was the question of most importance, as no one could doubt the effect of long 50-pounders, or 68-pounders, when brought within a few hundred yards of masonry, and able to retain the steadiness indispensable to a breaching fire."

"No siege operation had ever embraced batteries of such power, for though the English had employed long 68-pounders at Sebastopol, yet the distance from the objects exceeded a thousand yards; and the concentration of fire, so far as any opinion can be formed from the published statements, was far inferior to that of the thirty-six 50-pounders, in the broadsides of the three batteries anchored in close order."

"They were hulled repeatedly by shot; one of them (the *Devastation*), it is said, sixty-seven times, without any other effect on the stout iron plates than to dint them, at the most, one and a half inches,—still, there were ten men killed and wounded in this battery by shot and shell which entered the ports, —and the majority of damage to the French personnel (twenty-seven men) occurred in the three floating-batteries."

Major Barnard, in commenting upon this affair, says that it "proves nothing, unless it be, that dilapidated, and ill-designed, and ill-constructed works, armed with inferior calibres, cannot contend against such an overwhelming array of force as was here displayed. * * * The Fort of Kinburn surrendered, *not because* it was breached—not because the defenders were so far diminished by their losses as to be unable to protract the contest,—but simply because the guns and gunners, exposed in all possible ways, were put hors-du-combat, and the calibres (of the guns in Kinburn) were

incapable of doing any great damage to the vessels, at the distance they were stationed."

The guns in the low *open* batteries were exposed to a ricochet and vertical fire, to which latter the French admiral attributed, in good part, the surrender of the place. The buildings behind the batteries, built of wood, "slightly constructed and plastered over," were set on fire, and the heat and smoke must have rendered the service of the guns almost impracticable. Nevertheless, out of a garrison of 1,400, only 157 were killed and wounded —a very small loss under all the circumstances. If the works had been well-constructed casemates, covering the men from the ricochet and vertical fires and the sharpshooters of the troops who invested the land fronts, the loss of the garrison would have been still less; and if they had been armed with heavier projectiles, much greater damage would have been inflicted upon the attacking force.

With respect to the use of floating-batteries in this case, Commander Dahlgren very judiciously remarks:—

> "The use that can be made of floating-batteries, as auxiliaries in attacking shore-works, must depend on further confirmation of their asserted invulnerability. It may be that the performance at Kinburn answered the expectation of the French emperor as regards offensive power, for that is a mere question of the battering capacity of the heaviest calibres, which is undoubted; but the main issue, which concerns their endurance, cannot be settled by the impact of 32-pounder shot, fired at 600 and 700 yards. Far heavier projectiles will in future be found on all seaboard fortifications; and the ingenuity of the artillerist may also be exerted more successfully than at Kinburn. Still, it is not to be doubted that the floating-battery is a formidable element in assailing forts, even if its endurance falls short of absolute invulnerability; and the defence will do well to provide against its employment."

The works at Bomarsund were taken by means of *land-batteries*, which breached the exposed walls of the towers and main works. An auxiliary fire was opened upon the water front by the fleet, but it produced very little

effect. But after the work had been reduced, an experimental firing was made by the *Edinburgh*, armed with the largest and most powerful guns in the British navy.

In speaking of the effects of the siege batteries upon the walls of Bomarsund, and the experimental fire of the *Edinburgh*, Sir Howard Douglas remarks:—

> "This successful operation (of the land batteries) is very generally, but erroneously, stated to have been effected by the fire of the ships, and it is even strongly held up as a proof of what ships can do, and ought to attempt elsewhere."
>
> "But the results of the experimental firing at the remnant of the fort, which, unless the previous firing of the ships during the attack was absolutely harmless, must have been somewhat damaged, and moreover shaken by the blowing-up of the contiguous portions, do not warrant this conclusion, even should the attacking ships be permitted, like the *Edinburgh*, to take up, quietly and coolly, positions within 500 yards, and then deliberately commence and continue their firing, without being fired at! The firing of the *Edinburgh*, at 1,060 yards, was unsatisfactory. 390 shot and shells were fired, from the largest and most powerful guns in the British navy (viz., from the Lancaster gun of 95 cwt., with an elongated shell of 100 lbs.;—from 68-pounders of 95 cwt., and 32-pounders of 56 cwt., solid shot guns;—from 10-inch shell guns of 84 cwt., with hollow shot of 84 lbs.;—from 8-inch shell guns of 65 and 60 cwt., with hollow shot of 56 lbs.), and did but little injury to the work. At 480 yards, 250 shot, shells, and hollow shot were fired. A small breach was formed in the facing of the outer wall, of extremely bad masonry, and considerable damage done to the embrasures and other portions of the wall; but no decisive result was obtained—no practicable breach formed, by which the work might be assaulted, taken, and effectually destroyed, although 640 shot and shells (40,000 lbs. of metal) were fired into the place, first at 1,060, and then at 480 yards."

Surely, this "naval attack," taken in connection with the true facts of the capture of Kinburn, the abortive attempt of the British fleet in the Pacific upon the Russian works of Petropauloski, is not calculated to affect the well established opinion of the ability of forts to resist maritime attacks.

Few are now disposed to dispute the general superiority of guns ashore over guns afloat; but some think that works of masonry are incapable of resisting the heavy and continuous fire which may now be brought against it by fleets and floating-batteries, and would therefore extend the area of the works and rely mainly upon earthen parapets, with guns in barbette. This conclusion they form from the results of the maritime attack on Kinburn, and of the land-batteries on Bomarsund.

Major Barnard, in his valuable work on "The Dangers and Defences of New York," draws a very different conclusion from these attacks, and contends that they abundantly prove the capability of well-constructed stone masonry to resist the fire of ships and floating-batteries, if the latter are opposed by proper armaments in the forts; moreover, that they proved the superiority of casemated forts over low open batteries, with guns in barbette, in covering the garrison from the effects of a vertical and ricochet fire. Unquestionably the masonry at Bomarsund was poorly constructed; nevertheless, the fire of the shipping produced very little effect upon it. It is also equally certain that Kinburn Was taken, not by a breaching fire, but mainly by the effects of vertical and ricochet fires.

With respect to our own system of sea-coast defences, it may be remarked, that, since this chapter was written, the works mentioned therein as having been commenced, have been gradually advanced towards completion, and that the acquisition of Texas and California, and the settlement of Oregon and Washington Territory, by greatly extending our line of maritime defence, have rendered necessary the fortification of other points. It should also be noted that while the value and necessity of these works are generally admitted, and while the general outline of the system is almost universally approved, many are of the opinion that the increased facilities for naval attacks, and the immense power of modern maritime expeditions, like that upon Sebastopol, render it necessary to more strongly fortify the great naval and commercial ports of New York and San Francisco—one the *key point* of the Atlantic, and the other of the Pacific coast. Perhaps the system adopted

by our Boards of Engineers may be open to the objection that they have adopted *too many* points of defence, without giving sufficient prominence to our great seaports, which are necessarily the strategic points of coast defence. However this may have been *at the time the system was adopted*, there can be no question that the relative strength of the works designed for the different points of our coast does not correspond to *the present* relative importance of the places to be defended, and the relative temptations they offer to an enemy capable of organizing the means of maritime attack. On this subject we quote from the work of Major Barnard:—

> "While the means of maritime attack have of late years assumed a magnitude and formidableness not dreamed of when our defensive system was planned, and our country has so increased in population, wealth and military resources, that no enemy can hope to make any impression by an invasion of our territory,—our great maritime places like New York, have, on the other hand, increased in even greater proportion, in every thing that could make them objects of attack."
>
> "The works deemed adequate in former years for the defence of New York could not, therefore, in the nature of things, be adequate at the present day."
>
> "The recent war of England and France against Russia may illustrate my meaning; for it has taught us what to expect were either of these nations to wage war against the United States."
>
> "No invasion of territory, no attempt at territorial conquest was made, or thought of; for it was well foreseen that no decisive results would flow from such means. The war consisted exclusively in attacks upon maritime places—great seaports—seats of commercial and naval power. Such places, by their vast importance to the well-being and prosperity of a nation—by the large populations and immense amount of wealth concentrated in them, and by their exposure to maritime attack, offer themselves at once as points at which the most decisive results may be produced. Cronstadt, Sebastopol, Sweaborg, Kinburn, Odessa, Kertch, Petropauloski, and other places of less note, were in succession or simultaneously objects of attack; while such as the first

named became, indeed, the true seats of war."

"Around Sebastopol assailed and assailant gathered their resources, and on the result of the arduous struggle may be said to have turned the issue of the war. Had it not been so decided *there*, Cronstadt would have been the next field of combat,—for which, indeed, the allies had made the most enormous preparations."

"Is it not *certain* that in future all war of maritime powers against the United States, will take a similar course? All territorial invasion being out of the question, it is against our *great* seaports and strategic points of coast defence—such as New York, New Orleans, and San Francisco—pre-eminently New York,—that an enemy will concentrate his efforts. Against these he will prepare such immense armaments, —against these he will call into existence special agencies of attack, which (unless met by an inexpugnable defensive system) shall *insure* success."

"The mere defense of the city against *ordinary fleets*, is no longer the question; but *through the defensive works to be here erected, the nation is to measure its strength against the most lavish use of the resources of a great maritime power, aided by all that modern science and mechanical ingenuity in creating or inventing means of attack, can bring against them*; in short, in fortifying New York, we are really preparing the battle-field on which the issue of future momentous contests is to be decided."

A few, however, object to the system at present adopted, on the ground that casemated works do not offer sufficient resistance to ships and floating-batteries, and that earthen works, covering a greater area, will accomplish that object much more effectually, while their longer land fronts will be more difficult of reduction by siege.

It cannot be doubted that earthen batteries, with guns in barbette, can, as a general rule, be more easily taken by assault, that they are more exposed to vertical and ricochet firing, and more expose their gunners to be picked off by sharpshooters. Moreover, they give but a very limited fire upon the most

desirable point, as the entrance to a harbor. On the other hand, it has not been proved that masonry-casemated works, when properly constructed and properly armed, will not effectually resist a naval cannonade, whether from ships or floating-batteries. The results of recent wars, and of the West Point experiments by General Totten, would seem to prove them abundantly capable of doing this. Against such proofs the mere *ad captandum* assertion of their incapacity can have but little weight—certainly not enough to justify the abandonment of a system approved by the best military authorities of this country and Europe, and sanctioned by long experience.

Major Barnard, in speaking of the capacity of masonry casemated forts to resist the fire of a hostile armament, and of the propriety of abandoning them for earthen batteries in our system of Coast Defences, uses the following forcible language:—"When we bear in mind that the hostile 'floating batteries,' of whatever description, will themselves be exposed to the most formidable projectiles that can be thrown from shore batteries,—that when they choose to come to 'close quarters,' to attempt to breach, *their* 'embrasures' present openings through which deluges of grape, canister, and musket balls can be poured upon the gunners; and consider what experience has so far shown, and reason has taught us, with regard to the casemate,—we need not be under apprehension that our casemated works will be battered down; nor doubt that they will, as they did in Russia, answer the important purposes for which they were designed."

"It only remains to show the *necessity* of such works. It, in general, costs much less to place a gun behind an earthen parapet, than to build a masonry structure covered with bomb-proof arches, in which to mount it. All authorities agree that an open barbette battery (Grivel's very forcible admission has been quoted), on a low site, and to which vessels can approach within 300 or 400 yards, is utterly inadmissible. It may safely be said, that in nine cases out of ten, the sites which furnish the efficient raking and cross fires upon the channels, are exactly of this character; and indeed it very often happens that there are *no others*."

"When such sites *are* found, it rarely happens that they afford room for sufficient number of guns in open batteries. Hence the necessity of putting them tier above tier, which involves, of course, the casemated structure. Such works, furnishing from their lower tier a low, raking fire, and (if of

several tiers) a plunging fire from their barbettes, offer as favorable emplacements for guns as can be contrived, and afford to their gunners a degree of security quite as great as *can* be given to men thus engaged."

"On subjects which have a mere speculative importance, there is no danger in giving rein to speculation; but on those of such real and intense practical importance as the security against hostile aggression of the great city and port of New York, it is not admissible to set aside the experience of the past, or the opinions of the best minds who have devoted themselves to such subjects. A means of defence, sanctioned by its being confided in to protect the great ports of Europe—which *has* protected the great ports of Russia against the most formidable naval armament that ever floated on the ocean, has a claim upon our confidence which mere criticism cannot diminish; and a claim to be adhered to in place of all new 'systems,' until time and trial shall have *necessitated* (not merely justified) the change."

"If, then, we refer to the practice of other nations, to find what has been judged necessary for the defence of important ports,—to experience, to find how such defensive systems have stood the test of actual trial,—we may draw useful conclusions with regard to what is now required to defend New York. We shall find at *Sebastopol*—a narrow harbor, which owed its importance to its being the great naval dépôt of Russia on the Black Sea—an array of 700 guns, about 500 of which were placed in five 'masonry-casemated' works (several of them of great size), and the remainder in open batteries. These defensive works fulfilled their object, and sustained the attack of the allied fleet, on the 17th of October, 1854, without sensible damage."

"The facility with which seaports are attacked by fleets—the enormous preparations required—the great risks encountered in landing a besieging army on the coast of a formidable enemy (while, for protection against the *former* species of attack, costly works are necessary, and against the latter, field works and men can, in emergency, afford protection), naturally caused the Russians to make these water defences their *first* object. Yet, though almost unprotected on the land side, Sebastopol resisted, for a whole year, an attack on that quarter; and illustrated how, with plenty of men and material, an energetic and effectual *land defence* may be improvised, where the *sea defence* is provided for, as thoroughly as it was at that place."

"Let Cronstadt be another example. Great as was the importance of its defence to Russia, it was not greater,—it was by no means *as great*, as that of New York to our own country. This port, and military and naval dépôt, was defended (in its main approach) by upwards of 600 guns, 500 of which were mounted in five 'masonry-casemated' works; the remainder in an open barbette battery, which enfiladed the main channel. This number is formidable in itself; yet the same number mounted in New York harbor would not afford anything like such a formidable defence as was found at Cronstadt, owing to its great area, and long line of approach, compared with the latter."

"*These works fulfilled their object.* They protected the great port and dépôt of Cronstadt and the capital of the empire from invasion. For two successive years did the mighty armaments of France and England threaten; but they were overawed by the frowning array of 'casemated castles' which presented itself, and declined the contest."

"Let us turn our eyes now to the great naval dépôt of France. After the almost incredible expenditure lavished here, in creating a harbor facing the shores of her great rival, England, and an equally profuse expenditure in providing all that constitutes a great naval dépôt, we may suppose that the best means, without regard to cost, which the science of man could devise, would be employed here to make this great seat of naval power secure against the formidable means of attack possessed by the great maritime power most likely to be the assailant. The means there employed are (so far as regards mere *harbor* defence) precisely the same (viz., casemated works in several tiers, combined with open batteries where the locations are favorable); and the application of means is the same as we have found so successful in Russia,—the same which constitute the system of harbor defence of New York."

Captain McClelland, in his official report to the War Department, on the siege of Sebastopol, uses language equally strong and pertinent:—

> "The permanent defences of Sebastopol against an attack by water, although inferior in material and the details of construction to our own most recent works, proved fully equal to the purpose for which they were intended. Indeed, the occurrences on the Pacific, the Baltic, and

the Black Sea, all seem to establish beyond controversy, the soundness of the view so long entertained by all intelligent military men, that well constructed fortifications must always prove more than a match for the strongest fleet."

"It is deemed that a calm consideration of the events so hastily and imperfectly narrated in the preceding pages must lead all unprejudiced persons among our countrymen to a firm conviction on two vital points:"

"1st. That our system of permanent coast defences is a wise and proper one, which ought to be completed and armed with the least possible delay."

"2d. That mere individual courage cannot suffice to overcome the forces that would be brought against us, were we involved in an European war, but that it must be rendered manageable by discipline, and directed by that consummate and mechanical skill which can only be acquired by a course of education, instituted for the special purpose, and by long habit."

"In the day of sailing-vessels the successful siege of Sebastopol would have been impossible. It is evident that the Russians did not appreciate the advantages afforded by steamers, and were unprepared to sustain a siege."

"This same power of steam would enable European nations to disembark upon our shores even a larger force than that which finally encamped around Sebastopol. To resist such an attack, should it ever be made, our cities and harbors must be fortified, and those fortifications must be provided with guns, ammunition, and instructed artillerists. To repel the advance of such an army into the interior, it is not enough to trust to the number of brave but undisciplined men that we can bring to bear against it. An invading army of 15,000 or 20,000 men could easily be crushed by the unremitting attacks of superior numbers; but when it comes to the case of more than 100,000 disciplined veterans, the very multitude brought to bear against them works its own destruction; because, if without discipline and instruction, they cannot be handled, and are in their own way. We cannot afford a Moscow campaign."

"Our regular army never can, and, perhaps, never ought to be, large enough to provide for all the contingencies that may arise, but it should be as large as its ordinary avocations in the defence of the frontier will justify; the number of officers and non-commissioned

officers should be unusually large, to provide for a sudden increase; and the greatest possible care should be bestowed upon the instruction of the special arms of the artillery and engineer troops. The militia and volunteer system should be placed upon some tangible and effective basis; instructors furnished them from the regular army, and all possible means taken to spread sound military information among them. In the vicinity of our sea-coast fortifications, it would be well to provide a sufficient number of volunteer companies with the means of instruction in heavy artillery, detailing officers of the regular artillery for instructors."

On this subject of instructing our volunteers and militia in the use of sea-coast batteries, we add the following quotation from Major Barnard's pamphlet:—

"One of the main causes of inefficiency in coast batteries, which has given color to the idea that they may be passed, or even *attacked* with impunity, I conceive to be the want of *skill* and *care* in the use of the guns. The result is a prodigious smoke, and a prodigious throwing away of balls, and very little damage done. This has been, however, by no means a *peculiarity* of coast defences. The same system of random firing has hitherto prevailed, both in the use of small arms in land and of heavy ordnance in sea battles; nor has it occurred apparently to even the greatest masters of the art of war, to ask why, for one man wounded, or for one effective shot in a vessel's hull, so many thousands of shot should be thrown uselessly into the air."

"But this question is *now* asked, both in the use of the soldier's rifled musket, and in the management of ships' guns, as well as of artillery of all kinds."

"It is at last discovered that it is of more importance to teach the soldier to direct his piece with accuracy of aim, than to perform certain motions on parade with the precision of an automaton. The same idea is now infused into all the departments of military and naval science, and is a *necessary* result of the recent great improvements in the construction of arms. In short, the truth has at last become apparent that the old-fashioned system of random firing,

though perhaps like the 'charge of the six hundred' at Balaklava, 'bien magnifique, *n'est pas la guerre*.'"

"It is of the utmost importance that we should apply this principle to the management of our sea-coast batteries, and give it a practical effect. The *volunteers* of our cities will constitute *mainly*, in time of war, the gunners of our forts and manipulators of our sea-coast guns. In time of war, they will probably be exercised in these duties. But it is most desirable that we should have at *all times* a body of gunners, practised in these exercises. The result would be, not only to give to our *citizens*, as well as citizen-soldiers, confidence in the defences provided for their security, but it would disseminate military knowledge, and an intelligent idea of the bearing and objects of the different defensive works. To carry out this idea, it would be desirable that there should be at each considerable seaport town, a sufficient garrison of *artillery* troops to aid in the instruction of the volunteers. In the present condition of the army *this* cannot be hoped; but perhaps it might, at least, be found practicable to detail an artillery officer or two for the purpose."

NOTE TO CHAPTER VIII.—OUR NORTHERN FRONTIER DEFENCES.

The author has seen nothing since this chapter was written to induce him to change the views therein expressed with respect to the superior strategic importance of the line of Lake Champlain, both as a line of military operations, and as a line of defence. The mutual commercial interests of the United States and the Canadas render a war between the two countries less probable than formerly; nevertheless, such an event is by no means impossible, and common prudence should induce us to prepare in the best possible manner for such a contingency.

NOTE TO CHAPTERS IX., X., XI. AND XII.—ARMY ORGANIZATION.

Since these chapters were written, several important changes have been made in our army organization. The rank of Lieutenant-General (at least, by brevet) has been revived, the staff, administrative corps, infantry and cavalry

have been increased, and a company of engineer troops organized. But this company is mainly employed at West Point for instruction of the cadets in the several branches of military engineering, and thus serves to supply a deficiency long felt in the system of education at the Military Academy. The want, however, of troops of this arm for the construction, care, and preservation of our permanent fortifications, and for the general duties of field engineering, still remains to be supplied. Of all the arms of military organization, this one most requires instruction in time of peace; it cannot be supplied at the moment a war is declared.

In speaking of our present army organization, as compared with those of the different European powers which he was sent to examine and report upon, Captain McClelland says:—

> "Our force of artillery is large in proportion to the other arms of service, while the number of our engineer troops is ridiculously and shamefully small; it is, therefore, more than probable that in any future siege it will be easy for the artillery to construct their own batteries, while the engineers will be sufficiently burdened by the construction of the other works of attack; we have now, at last, the germ of an artillery school of practice; I would then suggest, for the consideration of the Secretary, the propriety of causing the artillery to construct their own batteries. The position and armament of siege batteries should be determined by consultation between the engineers and
>
> the artillery, the former having the preponderating voice, in order to secure the necessary harmony and connection between all parts of the works of attack. This change," he says, "will require to be introduced into the artillery manual and course of instruction everything in relation to the preparation of the fascines, gabions, platforms, and magazines, the dimensions of batteries, manner of arranging, working parties, etc."

With regard to the suggestion of Captain McClellan, it is sufficient to remark, that it seeks to remedy one evil by introducing another equally as great and equally as objectionable. The defect in our present army organization is that one of its arms is too small for the duties which, from the very nature of military service, naturally and properly belong to it; and it surely is no remedy for this defect to permanently transfer a part of these

duties to another arm. As well might it be said, if our artillery force were "ridiculously and shamefully small" in proportion to the infantry and cavalry, that the field batteries should be permanently transferred to those arms, and that light artillery tactics should be comprised in our infantry and cavalry manuals.

There are certain duties which the military experience of ages has shown to properly and almost necessarily belong to each particular arm of an army organization, and every attempt to make one branch perform the appropriate duties of another has invariably destroyed its efficiency for either service. Suppose our medical corps were "ridiculously and shamefully small" in proportion to our pay department, shall our paymasters perform the duties of surgery, and be instructed in the use of the scalpel and amputating instruments! This is, perhaps, an extreme case, but it serves to illustrate the principle.

The defect referred to by Captain McClelland, and which has so often been pointed out by our best military men, cannot be obviated by any transfer or assignment, whether temporary or permanent, of the appropriate duties of one corps to another. Indeed, such a measure would only tend to make this defect permanent, and to convert a temporary into a lasting evil. It can readily be remedied by legislative action, but in no other way. The executive action suggested would be deprecated by all. Moreover, the evil is now so obvious and so generally admitted, that there can be little doubt that Congress will soon perceive the importance of applying the only proper and effective remedy.

NOTE TO CHAPTER XIII.—PERMANENT FORTIFICATIONS.

Although the general principles of the plan and arrangement of a permanent fortification, as established by the great masters of this branch of military science, remain the same; nevertheless, the vast improvements which have, within the last few years, been made in projectiles, require some changes in the details of defensive works of this character. These changes consist mainly in an increased thickness of stone and earthen parapets and of the covering of magazines, in the arrangement of embrasures, and in protecting the garrison from an enemy's sharpshooters. The introduction of heavier

siege guns, and of heavier ordnance on ships of war, and especially on those propelled by steam, require much larger ordnance in forts designed for the defence of harbors. In the Russian war, Sweaborg was made to suffer from a distant bombardment which left her fortifications intact. These modifications in the arrangements and armaments of forts are absolutely necessary in order to restore the relative power of defence against the improvements made in the means of attack. They can very easily be introduced without changing the form or general character of the works, and they are really so very essential that, without them, a fort constructed 25 or 30 years ago, and well suited to the then existing state of the military art, will be likely to offer no very considerable resistance to modern siege batteries or well organized maritime attacks.

Some have gone much further in their estimate of the effect produced by the increased size and force of military projectiles, and boldly assert that masonry works of strong relief can no longer be used, and that the increased range of small arms requires an entire change of the bastioned front, with lines more extended.

With respect to the effect of the increased range of small arms, it is very natural that a superficial observer should adopt the opinion that this improvement must be followed by an extension of the lines of a defensive military work; but a close study of the subject will probably lead to a different conclusion. Such at least is the opinion of the ablest military engineers of Europe. The lines of the bastioned front now generally in use, were really too long for a good defence with the arms in use at the time it was adopted; and, in theory, the "rampart gun" was to be relied upon for the defence of certain exposed points. But this weapon is no longer in use; its place, however, is better supplied by the increased range of the musket and rifle. The latter weapon is almost invaluable for defending the approaches to a permanent work.

With respect to the breaching of stone masonry by siege batteries, it has long been an established principle that all masonry exposed to the fire of land batteries should be masked by earthen works. The neglect of this rule caused the fall of Bomarsund. Those who so readily draw, from the results of that siege, the inference that the present mode of fortifying land fronts must be abandoned, exhibit their ignorance of military engineering. The facts do not justify their conclusions.

With respect to sea fronts, which can be reached only by guns afloat, the case is very different. They are usually casemates of masonry, not masked by earthen works. Whether the increased efficiency of projectiles thrown by ships and floating batteries now require a resort to this mode of protecting masonry on the water fronts of fortifications, is a question well worthy of discussion. This subject has already been alluded to in the Note on Sea-coast Defences, and it is there shown that no facts have yet been developed which require or authorize any change in our present system.

NOTE TO CHAPTER XIV.—FIELD ENGINEERING.

As Mexico had no permanent fortifications to be besieged, the war in that country afforded very little practice in that branch of engineering which is connected with the attack and defence of permanent works, particularly sapping and mining. The only operation resembling a siege was the investment and bombardment of Vera Cruz, and it is worthy of remark that if General Scott had stormed that place, weak as it was, he must have lost a large number of his men, while from his trenches and batteries he reduced it with scarcely the sacrifice of a single life.

Nor did either party in this war make much use of field works in the attack and defence of positions. Nevertheless, no one can read the history of the war without appreciating the important influence which Fort Brown had upon General Taylor's defence of the left bank of the Rio Grande. Again if we compare our loss in other Mexican battles with that which the Americans sustained in their attacks upon Monterey, Churubusco, Molino del Key, and Chapultepec,—places partially secured by field works—we shall be still more convinced of the value of temporary fortifications for the defence of military positions, although it was manifest that the Mexicans neither knew how to construct nor how to defend them.

Nor was there much practice in this war in the use of military bridges, for, with the exception of the Rio Grande, our armies had no important rivers to cross. We must not, however, omit to note the important fact that General Taylor was unable to take advantage of the victories of Palo Alto and Resacade La Palma to pursue and destroy the army of Arista, *because* he had no pontoon equipage to enable him to follow them across the Rio Grande. It

should also be remarked that even a very small bridge equipage would have been of very great use in crossing other streams and ravines during the operations of this war. One of our cavalry officers writes:—

> "On our march from Matamaras to Victoria and Tampico, in 1846 and 1847, we had infinite difficulty in bridging boggy streams (there being no suitable timber), and in crossing ravines with vertical banks; a few ways of the Birago trestles would have saved us many days and a vast amount of labor. In the operations in the valley of Mexico, our movements, checked as they so often were by impassable wet ditches and sometimes by dry ravines, would have been rendered so much more free and rapid by the use of the Birago trestles, that our successes could have been gained at far less cost, and probably with more rapidity than they were."

With regard to military reconnaissance, the splendid achievements of Lee and others connected with the operations of General Scott, proved the value and importance of this particular branch of field engineering.

But field engineering, as a branch or arm of the military service, received its greatest development and most brilliant application in the Crimean war, particularly in the siege of Sebastopol, and the measures resorted to by General Todtleben to defend that place against the attack of superior forces.

A brief sketch of these defensive works may be of interest to the reader:—

When the allies reached Balaklava, Sebastopol was defended on the south side only by a loop-holed wall about four feet and a half thick, and from eighteen to twenty feet high, and a semicircular redoubt with two stories of loop-holes, and five guns in barbette. These works would have afforded some protection against a *coup-de-main* by infantry and cavalry, but could have offered no very considerable obstacle to a combined attack of these arms with artillery.

The Russian engineer commenced his operations for strengthening this position by occupying the most important points in his line of defence with detached field works of sufficient relief to resist an assault, and generally closed at the gorge. These works were afterwards connected by re-entering lines of a weaker profile, which served to enfilade the ravines and to flank

the advanced works. The old wall was strengthened with earth, and rifle-pits for sharpshooters were constructed at a considerable distance in front.

The most important points of the main line of defence were: 1st. The Flag-staff Bastion. 2d. The Central Bastion. 3d. The Malakoff. 4th. The Redan. 5th. The little Redan. The command of the first was about fifteen feet, its ditch thirty feet wide and from twelve to fifteen feet deep. A portion of the scarp was provided with palisades some ten feet high. The construction of the Central Bastion was similar to that of the Flag-staff, but weaker in profile. The relief of the other works was still less. The command of the Malakoff was about fourteen feet, its ditch eighteen feet wide and twelve feet deep. The thickness of parapet in these works was generally about eighteen feet, and the bombproofs were covered with timber eighteen inches thick and six feet of earth. The loop-holed walls connecting these works were covered by a rampart and parapet, or entirely replaced by a simple parapet. Many of the embrasures were revetted with the common boiler iron ships' water-tanks filled with earth. The same material was sometimes used for traverses. Rope mantelets were used to protect the artillerists at the pieces from rifle balls and small grape. Great attention was given to the construction of bombproofs to cover the men from vertical firing. These were sometimes under the rampart and the second line of defence (where there was one), often under special traverses, or entirely under ground, and occasionally excavated in the solid rock. Some had fireplaces and chimneys, and were well ventilated. Interior slopes were revetted with gabions, crowned by fascines and sand bags. Gabions were also employed to repair the damage caused by the enemy's artillery. Abattis, military pits, caltrops and spikes, stuck through planks, and explosive machines were employed in front of different parts of the defences. Mines were resorted to in front of the Flag-staff Bastion to retard the French approaches. They were made in rocky soil with craters from twelve to fifteen feet deep. The Russian counter-approaches generally consisted of flêches, united by a simple trench.

Captain McClelland, one of our officers sent to the Crimea, from whose valuable Report most of the foregoing details are gathered, adds the following remarks upon these works of defence:—

> "From the preceding hasty and imperfect account of the defences of Sebastopol, it will appear how little foundation there was for the generally-received accounts of the stupendous dimensions of the

works, and of new systems of fortifications brought into play. The plain truth is, that these defences were simple temporary fortifications of rather greater dimensions than usual, and that not a single new principle of engineering was developed. It is true, that there were several novel minor details, such as the rope mantelets, the use of iron tanks, etc., but the whole merit consisted in the admirable adaptation of well-known principles to the peculiar locality and circumstances of the case. Neither can it be asserted that the plans of the various works were perfect. On the contrary, there is no impropriety in believing that if Todtleben were called upon to do the same work over again, he would probably introduce better close flanking arrangements."

"These remarks are not intended to, nor can they, detract from the reputation of the Russian engineer. His labors and their results will be handed down in history as the most triumphant and enduring monument of the value of fortifications, and his name must ever be placed in the first rank of military engineers. But, in our admiration of the talent and energy of the engineer, it must not be forgotten that the inert masses which he raised would have been useless without the skilful artillery and heroic infantry who defended them. Much stronger places than Sebastopol have often fallen under far less obstinate and well-combined attacks than that to which it was subjected. There can be no danger in expressing the conviction that the siege of Sebastopol called forth the most magnificent defence of fortifications that has ever yet occurred."

We will now pass to the works of attack. When the allies decided that the works of Sebastopol could not be carried by a simple cannonade and assault, but must be reduced by a regular siege, the first thing to be considered was to secure the forces covering the siege works from lateral sorties and the efforts of a relieving army. The field works planned for this purpose were not of any great strength, and many of them "were only undertaken when a narrow escape from some imminent danger had demonstrated their necessity." The French line of defence consisted of eight pentagonal redoubts, connected by an infantry parapet. The English seemed to attach but

little importance to field works for the defence of their position; the terrible slaughter at Inkerman was the natural consequence of this neglect.

In describing the engineering operations of the allies at this siege. Captain McClelland says:—

> "In regard to the detailed execution of the French attacks, little or nothing novel is to be observed. Even when coolly examining the direction of their trenches, after the close of the siege, it was very rare that a faulty direction could be detected; they always afforded excellent cover, and were well defiladed; in some cases the excavation of the double direct sap was carried to the depth of six and a half feet in the solid rock! The execution of many of the saps and batteries was worthy of a school of practice. In the parallels, bombproofs were provided as temporary hospitals, offices for the generals on duty, etc. They did not use the sapper armor. The use of the sap-roller was often attempted, but it could be employed only during the latter part of the attack upon the Malakoff, when the fire of the Russian artillery was nearly extinguished by the mortars; before that, as soon as a sap-roller was placed in position—some thirty guns would be brought to bear upon it, the result being its immediate destruction. It may justly be said of the French approaches, that they admirably carried into practice their system of sapping. The technical skill and patient courage evinced by their officers and men in pushing forward such excellent approaches, under a most deadly fire, is worthy of all commendation, and
> is such as might have been expected from the antecedents of their corps of engineers."
>
> "With regard to the English, the case was different; it seemed as if they systematically abandoned the excellent system taught and perfected with so much care at Chatham. Whenever the ground was difficult, their trenches generally ceased to afford shelter; a shallow excavation in the rock, and a few stones thrown up in front, appeared to be all that was considered necessary in such cases. They were often faulty in direction as well as in profile, being not unfrequently badly defiladed, or not gaining ground enough and entirely too cramped; nor were they pushed as close to the Redan as

> they ought to have been before giving the assault. In too many cases the expression '*tâtonnement* of the French would seem to convey the best idea of their operations. Their batteries, however, were very well constructed. The magazines, platforms, etc., were usually similar to those adopted at Chatham, although unnecessary deviations were sometimes complained of. They employed neither armor nor the full sap, sometimes the half-full, but generally the flying-sap were employed."

It may also be added, that, at the time of the assault, the French approaches had been pushed to the distance of thirty-two paces of the counterscarp of the Malakoff, while the English had scarcely reached within two hundred and twenty-five yards of the ditch of the Redan.

This description of the operations of the English at the siege of Sebastopol carries the professional reader directly back to their sieges in the Spanish Peninsula. It certainly is very strange that a great nation leading the van of civilization should, after such experience, have neglected to provide its army with a proper number of engineer officers and engineer troops, well instructed in the peculiar and difficult duties of that arm. What excuse can ever be offered for substituting human life for professional skill in the operations of a siege, when that skill may so readily be acquired in time of peace, and is always so necessary an element of a good military organization!

While every one admits that the siege of Sebastopol proved the immense importance of field-works against land attacks, some would conclude from the operations of that siege that good earthen works of a large development are better suited for the defence of a large city than permanent fortifications with masonry revetments, and which will necessarily have a less extended line of fire and less capacity for men and military stores. We quote the remarks of Captain McClelland on this point, and also make a short extract from the recently published Journal of the siege of Sebastopol by General Niel.

Captain McClelland says:—

> "This would seem to be the proper place to notice a popular fallacy, which, for a time at least, gained extensive credence. It was, that the

siege of Sebastopol proved the superiority of temporary (earthen) fortifications over those of a permanent nature. It is easy to show that it proved nothing of the kind; but that it only proved that temporary works in the hands of a brave and skillful garrison are susceptible of a longer defence than was generally supposed. They were attacked as field works never were before, and were defended as field works never had been defended. The main difference between properly constructed permanent fortifications (intended to resist a siege) and temporary works, is that the latter seldom present an insuperable obstacle against assault, while the former always do. In addition, permanent works have a better command over the adjacent country, and are more carefully and perfectly planned. The masonry walls, which render an assault impossible, cannot be seen from the distance, and can be destroyed only by establishing batteries on the crest of the glacis, or the edge of the ditch; the earthen parapet alone being visible beyond that point, they may, until the besiegers arrive there, be regarded in the same light as field works, with the difference that the garrison are not harassed by the necessity of being constantly prepared to repel an assault."

"Now, in the siege of Sebastopol, the trenches of the besiegers never reached the edge of the ditch; so that, had the fortification been a permanent one, the most difficult, slow, and dangerous part of the siege remained to be undertaken, viz., the crowning of the covered way, the establishment of the breach batteries, the descent and passage of the ditch, and the assault of the breach; in other words, at the moment when the weakness of the temporary works became apparent and fatal, the true strength of the permanent defences would have commenced coming into play."

"Assuming the progress of the attack to have been as rapid as it was under existing circumstances, the besiegers, on the 8th of September, would not yet have been in a condition to crown the covered way, the siege would certainly have extended into the winter; and it may even be doubted whether the place would eventually have fallen, until the allies were in sufficient force to invest the north as well as the

southside."

General Neil remarks:—

"Struck by the length of the siege of Sebastopol, certain foreign officers have expressed the opinion that masonry-revetted scarps are not of incontestable utility in fortified places."

"Sebastopol, a vast retrenched camp, defended by field fortifications of strong profile, derived its principal strength from an armament such as could only exist in an extensive maritime arsenal, and from a large army which always preserved its free communications with the interior of Russia."

"If the enceinte had been provided with good revetted scarps; if it had been necessary to breach these, and subsequently have been compelled to penetrate through difficult passages, in rear of which the heads of our columns would have met an army, Sebastopol would have been an impregnable fortress."

"When we compare, in effect, the works of attack at Sebastopol with those of an ordinary siege, we will see that on the 8th of September, 1855, the day of the last assault, we had only executed, after the greatest effort, the besieging works which precede the crowning of the covered way; we had not then, as yet, entered upon that period of the works of a siege which is the most difficult and the most murderous; and there was no occasion to engage ourselves in them, since the ditches and parapets of the enceinte were not insurmountable, as the sequel has proved."

"The difficulty consisted in conquering the Russian army upon a position prepared long beforehand for its defence, quite as much as in surmounting the material obstacle of the fortification."

"Our places of arms being established at thirty metres from the besieged works, we were able to choose our own time for action, and to throw ourselves unexpectedly upon the enemy when the fire of our artillery had forced him to shelter himself, up to the last minute,

behind his numerous blindages; to have gone further would have been inviting the initiative in the attack on the part of the Russian army."

"The absence of scarp walls, which would have secured the place from escalade, did not exercise a less influence upon the defence; for the besieged were compelled to keep permanently at the gorges of the works, strong reserves, in readiness to repulse the assault, which they saw themselves menaced with from the commencement of the siege."

"Finally, it can be remarked, that these reserves, which were decimated night and day by the concentric fire of our batteries, were able to issue out from the enceinte through wide debouches, without having to pass through the narrow defiles which are formed by the drawbridges of revetted places; they were, then, a permanent threat for the besiegers, who were exposed to seeing their trenches unexpectedly invaded by the greater part of the Russian army."

"Neither side, consequently, was in a position analogous to that which is presented in the siege of a fortified place, protected from insult by good masonry scarps.'" (Note to page 443.)

And again, page 423, the same authority remarks:

"Now, it (the Russian army) is no longer able to escape from the concentric fires of our batteries; for, *not being protected by masonry scarps*, it is obliged constantly to keep united strong reserves, in order to repulse the assault with which it is at every instant menaced"

NOTE TO CHAPTER XV.—MILITARY EDUCATION, &C.

With regard to the subjects discussed in this chapter it will, perhaps, be sufficient to remark that the Mexican war incontestably proved the value of the West Point Military Academy; for the superior efficiency of properly-educated officers over those who had been appointed from civil life without any knowledge of the profession they were called upon to practice, fully satisfied the country of the importance of that institution, and even silenced the clamors of the few who refused to be convinced.

The recent abortive attempt to give efficiency to our navy by means of a retired list, has, it is feared, destroyed for a time all hopes of introducing this very necessary measure into our military service; although it is very certain that without this we can never have our system of promotion placed upon an effective and satisfactory basis, which shall give efficiency to the army by rewarding merit, while it prevents injustice by closing the avenues of political favoritism.

The Mexican war also most abundantly proved that our objections to the system of military appointment were well founded, and it is hoped that the more recent abuses of that system will call public attention to the necessity of a change; for if military office continue to be conferred for partisan services, it will soon destroy the integrity as well as the efficiency of our army.

EXPLANATION OF PLATES

Figs. 1, 2, 3.—Used to illustrate the strategic relations of the armies A and B.

Fig. 4.—Line of operations directed against the extremity of the enemy's line of defence, as was done by Napoleon in the Marengo campaign.

Fig. 5.—Napoleon's plan of campaign in 1800, for the army of the Rhine, and the army of reserve.

Fig. 6 shows the plan adopted by Napoleon in the campaign of 1800, to preserve his communications.

Fig. 7 illustrates the same thing in the campaign of 1806.

Fig. 8.—Interior and central line of operations.

Fig. 9 represents a camp of a grand division of an army. The distance from the front row of tents to the line of camp-guards should be from 350 to 400 feet; thence to the line of posts, from 150 to 200 feet; thence to the line of sentinels, from 100 to 200 feet. In many cases, the line of posts between the camp-guards and sentinels may be dispensed with. The distance between battalions will be from 50 to 100 feet; and the same between squadrons and batteries.

Fig. 10.—Details of encampment for a battalion of infantry. The width of company streets will depend upon the strength of a company, and will be so arranged that the front of the camp shall not exceed the length of the battalion, when drawn up in line of battle. This width will be from 50 to 100 feet. The distance between the tents of each row will be 2 or 3 feet; the distance between the tents of one company and those of another, from 4 to 6 feet.

Fig. 11 is the camp of a squadron of cavalry. A single company encamping alone, would be arranged in the same way as an entire squadron. The horses are picketed in two lines parallel to the tents, and at a distance from them of about 12 feet. The forage is placed between the tents. A squadron of two companies will occupy a front of about 180 feet. The fires, or company

kitchens, should be 50 or 60 feet in rear of the non-commissioned officers' tents.

Fig 12 is the camp of two batteries of foot artillery, or two companies of foot engineers.

[The plan of encampment for artillery, as given in the "Instruction of U.S. Field Artillery, horse and foot," may be employed where a single battery encamps by itself, or where only the skeleton of companies is maintained; but it will be found exceedingly inconvenient, where a full battery, with a large train, encamps on the same line with other troops. The plan we have given is that which is employed in most European services.]

Fig. 13.—In this plan for mounted artillery and engineers, the fires are so arranged as to expose the ammunition as little as possible to the sparks from the kitchens.

Fig. 14.—Simple parallel order of battle.

15.—Parallel order, with a crochet on the flank.

16.—Parallel order, reinforced on a wing.

17.—Parallel order, reinforced on the centre.

18.—Simple oblique order.

19.—Oblique order, reinforced on the assailing wing.

20.—Perpendicular order.

21.—Concave order.

22.—Convex order.

23.—Order by echelon on a wing.

24.—Order by echelon on the centre.

25.—Combined order of attack.

26.—Formation of infantry by two deployed lines.

27, 28.--- Arrangements corresponding to depth of column.

29.—Formation by squares.

30.—Mixed formation of three battalions.

31.—Deep formation of heavy columns.

32.—Formation in columns by brigade.

33.—Formation of two brigades of cavalry, by the mixed system.

34.—Passage of the Sound by the British fleet, in 1807.

35.—Attack on Copenhagen.

36.—Attack on Algiers.

37.—Attack on San Juan d'Ulloa.

38.—Attack on St. Jean d'Acre.

39.—Plan of a regular bastioned front of a fortification.

40.—Section of do. do.

41.—Tenaillons.

Fig. 42.—Demi-tenaillons, with a bonnet.

43.—A horn-work.

44.—A crown-work.

45.—A redan.

46.—A lunette.

47.—A mitre or priest-cap.

48.—A bastioned fort.

49.—Vertical section of a field intrenchment.

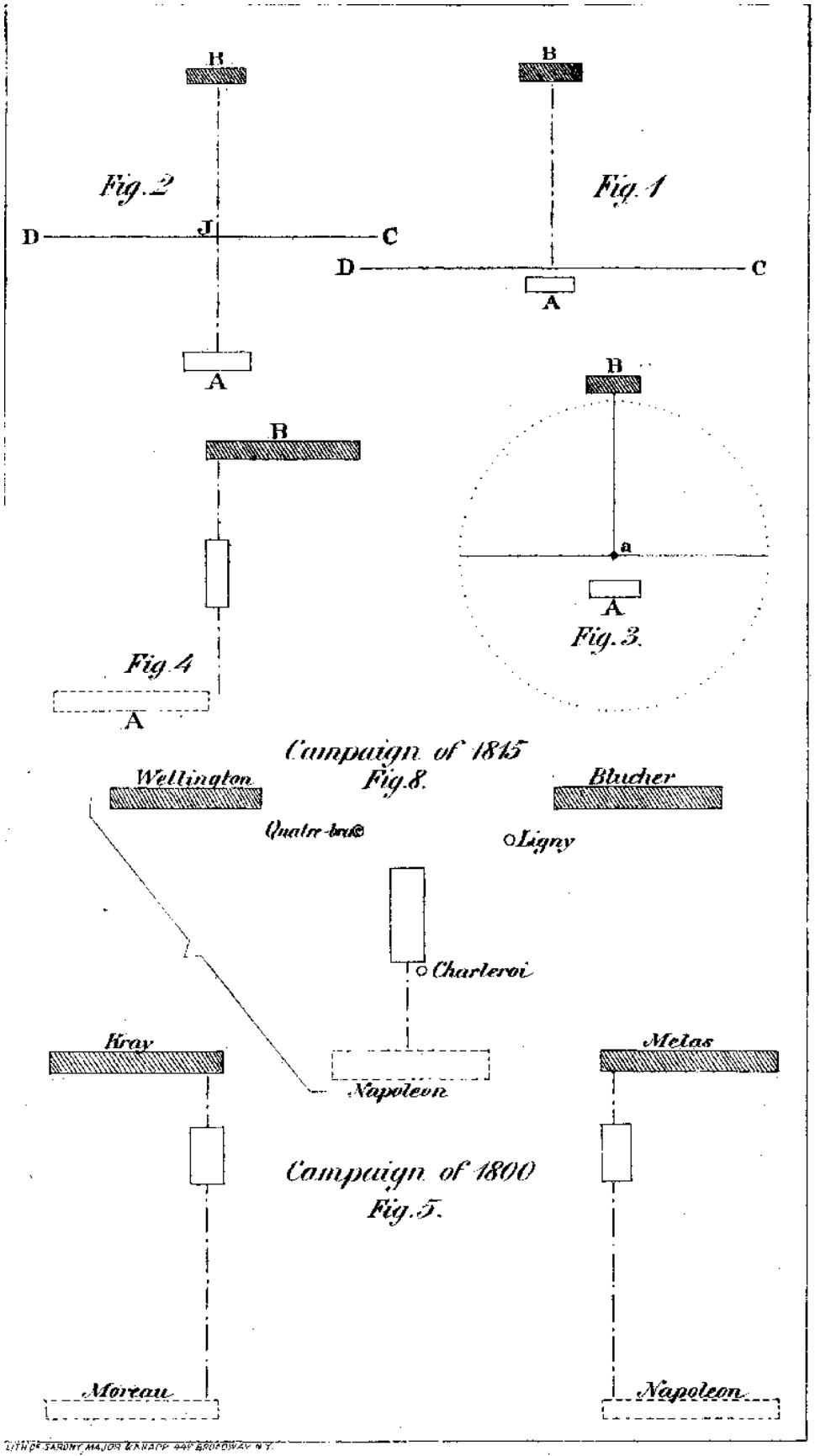
50.—Simple sap.

51.—Flying sap.

52.—Full sap.

53.—Crater of a military mine.

54.—Plan of the attack of a regular bastioned work.



LITH OF SARONY, MAJOR & KNAPP 449 BROADWAY N.Y.

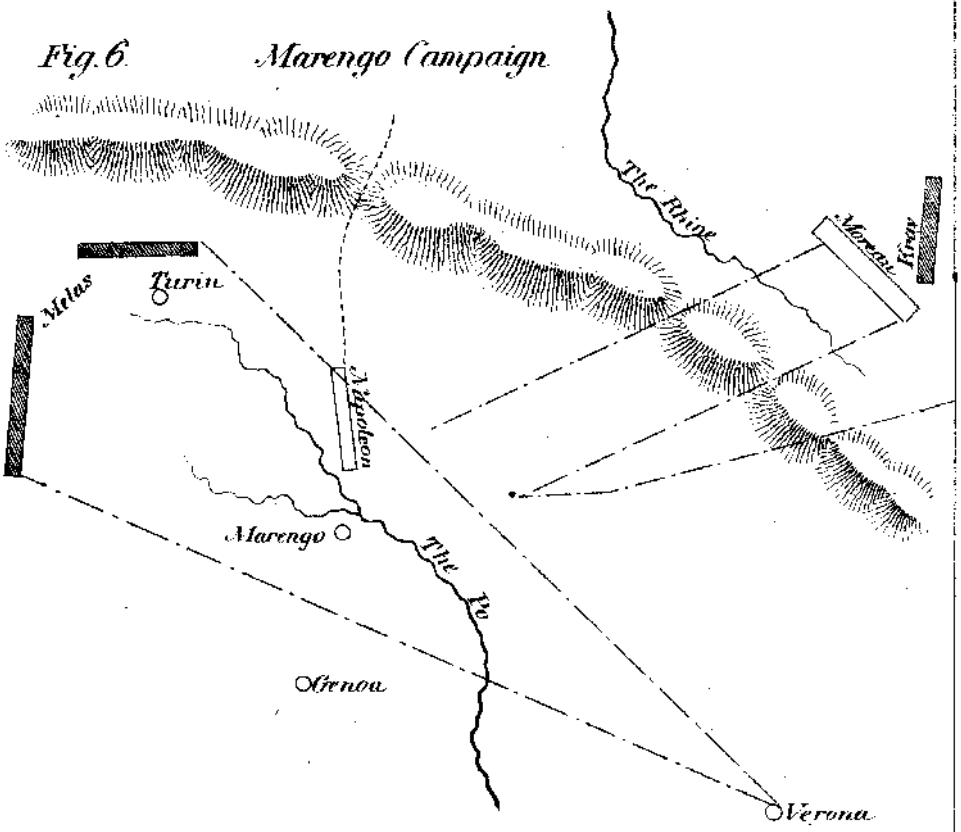


Fig. 6. Marengo Campaign
The Rhine
Moreau Krey
Milas
Turin
Napoleon
Marengo
The Po
Genoa
Verona

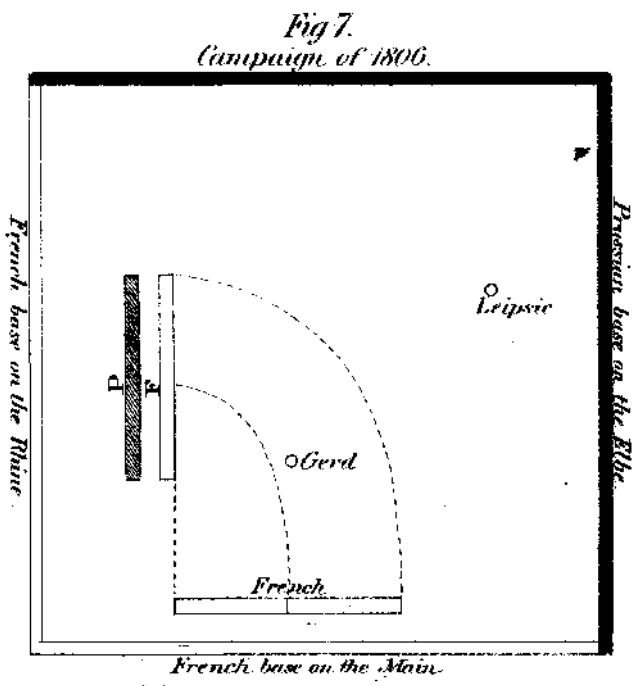


Fig 7.
Campaign of 1806.
French base on the Rhine
Prussian base on the Elbe
Leipsic
P
F
Gerd
French
French base on the Main

Fig. 15

Fig. 14

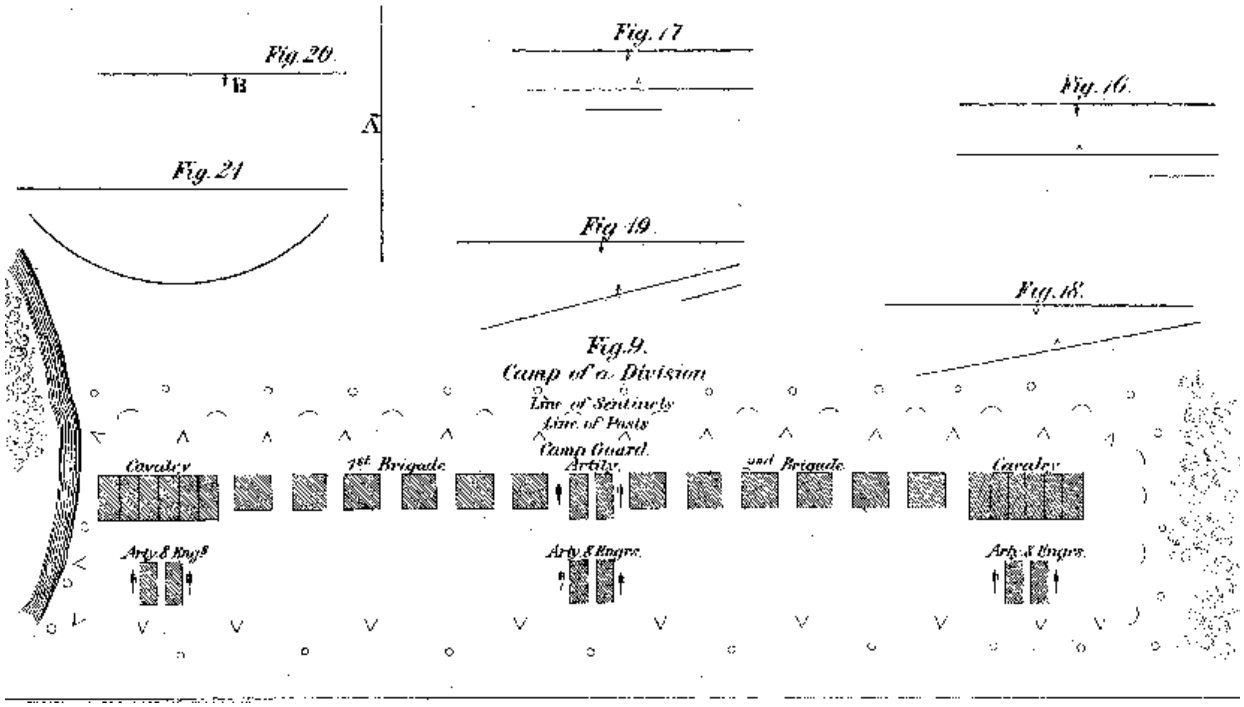


Fig. 20.
B
A
Fig. 17
Fig. 16.
Fig. 21
Fig. 19.
Fig. 18.
Fig. 9.
Camp of a Division
Line of Sentinels
Line of Posts
Camp Guard
Cavalry
1st Brigade
Artily.
2nd Brigade
Cavalry
Arty & Engrs
Arty & Engrs.
Arty & Engrs.

Fig. 11.
Squadron of Cavalry.

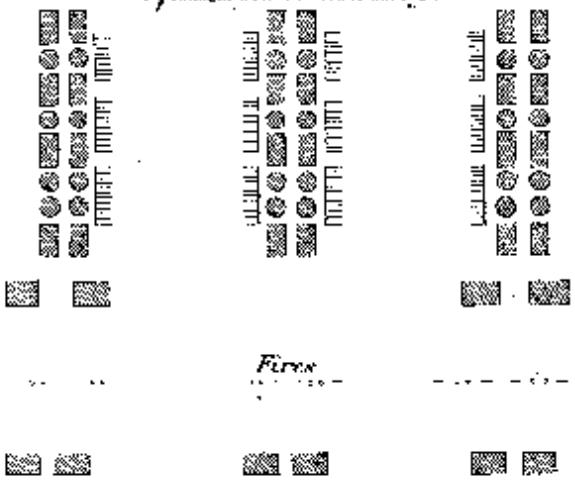


Fig 24

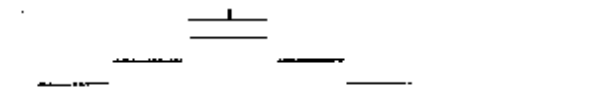


Fig 22

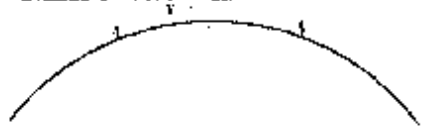


Fig 23

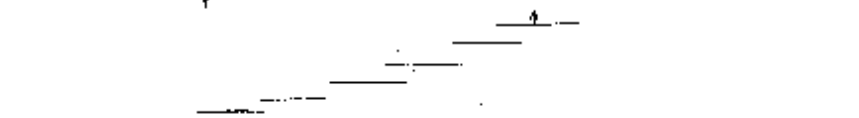


Fig. 25.

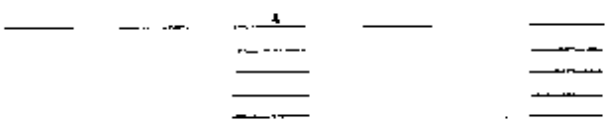


Fig. 26.

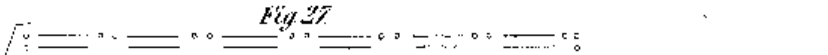


Fig. 31.

Fig. 27.

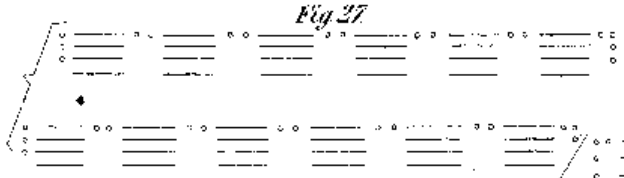



Fig. 28.

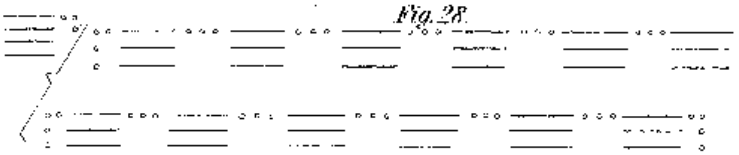


Fig. 29.

Fig. 32.

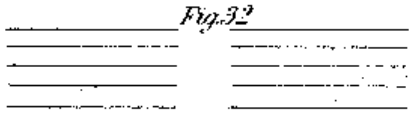


Fig. 30.

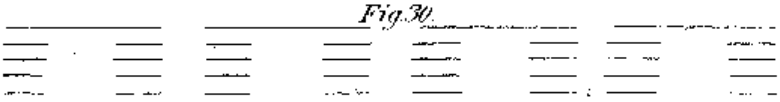
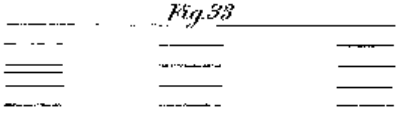


Fig. 33.



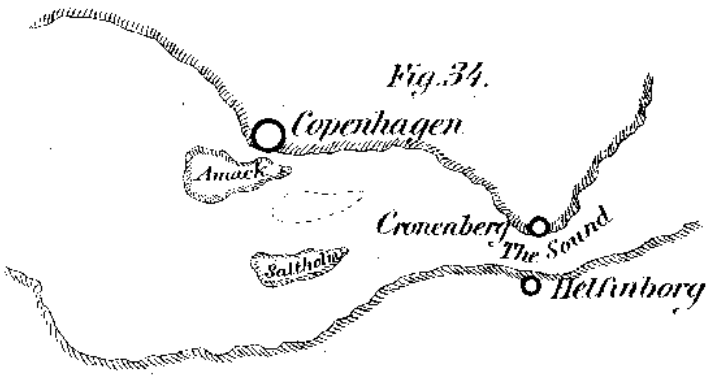
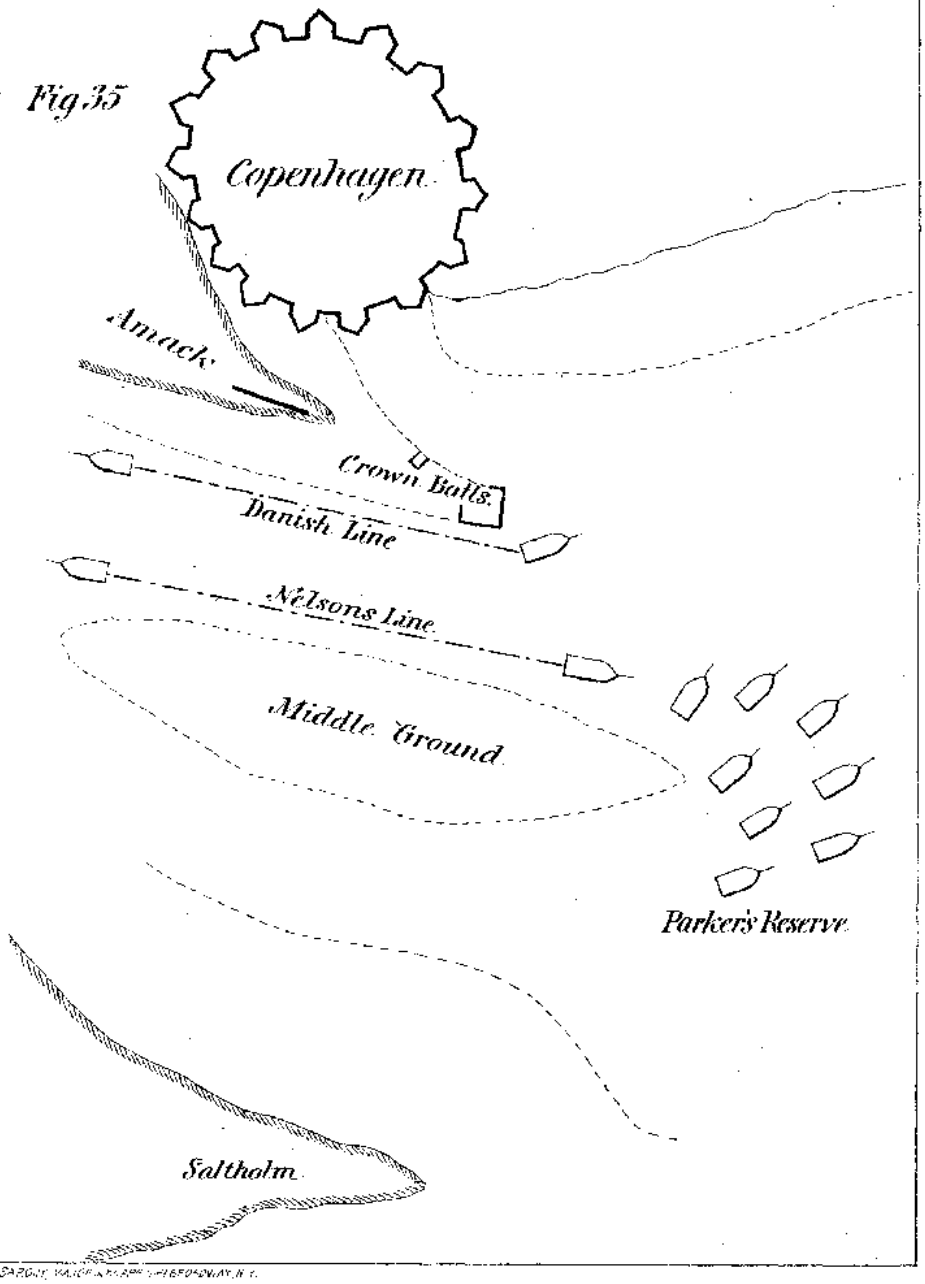

Copenhagen
Amack
Cronenberg
The Sound
Saltholm
Helsinborg

Fig. 34.

Fig. 35


Copenhagen
Amack
Crown Balls
Danish Line
Nelsons Line
Middle Ground
Parker's Reserve
Saltholm

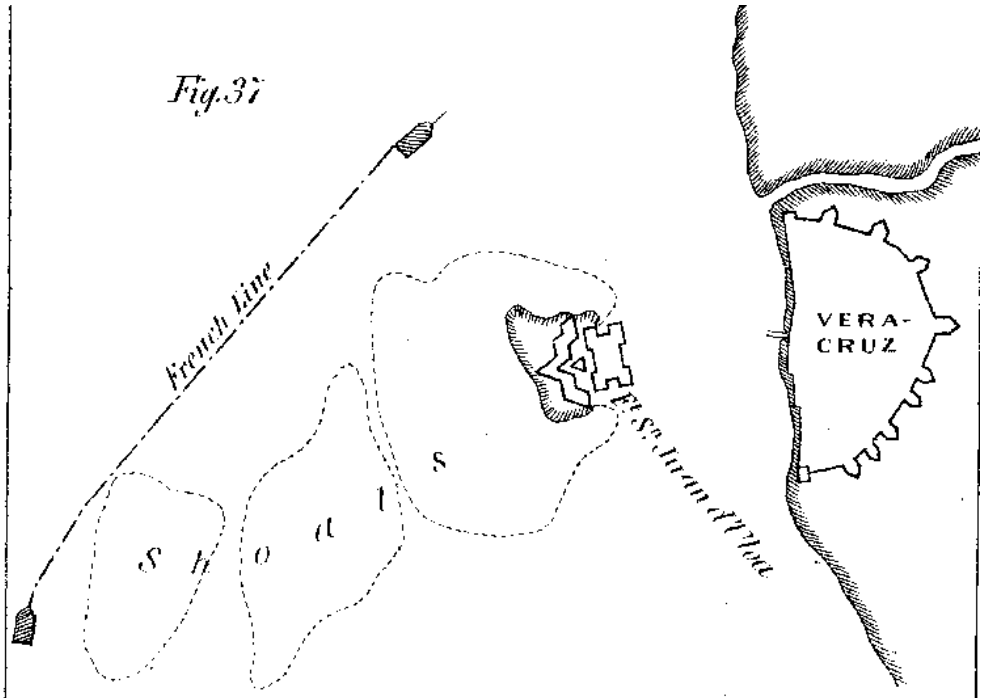


Fig.37
French Line
VERA-
CRUZ
Fl.S.Juan d'Ulua
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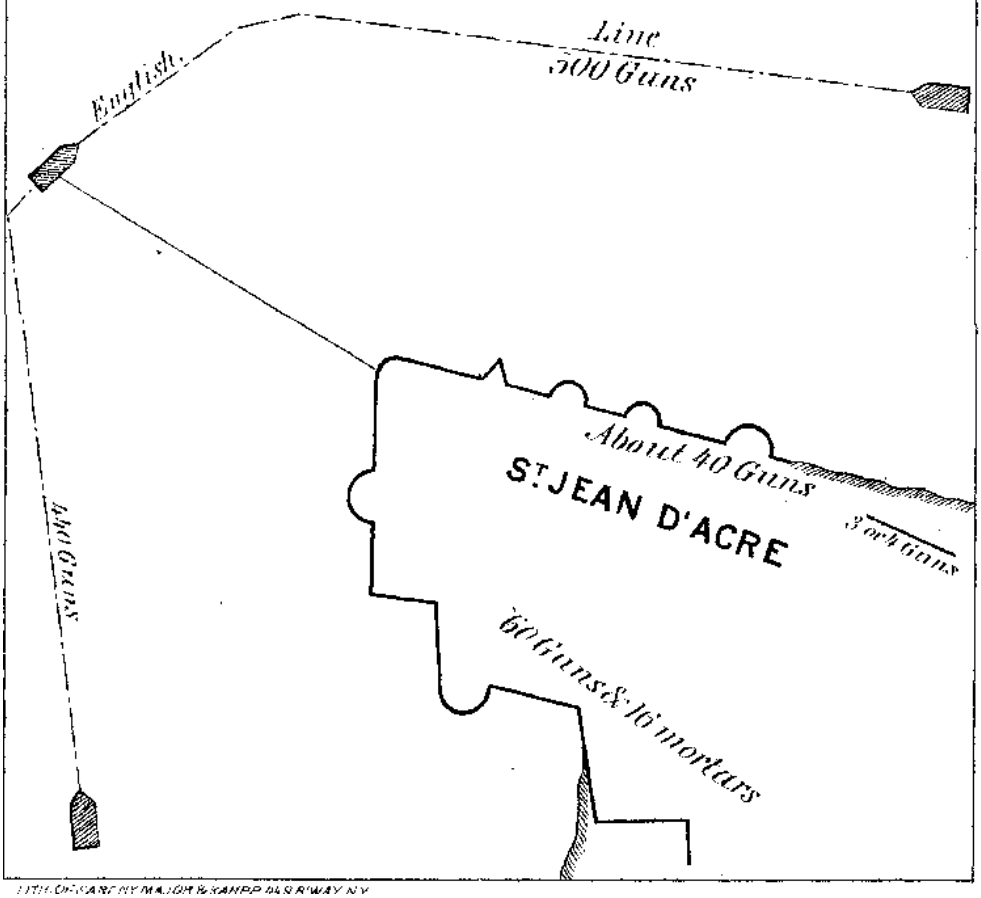


Fig.38
English
Line
500 Guns
About 40 Guns
ST JEAN D'ACRE
3 or 4 Guns
60 Guns & 10 mortars
400 Guns

Fig. 39

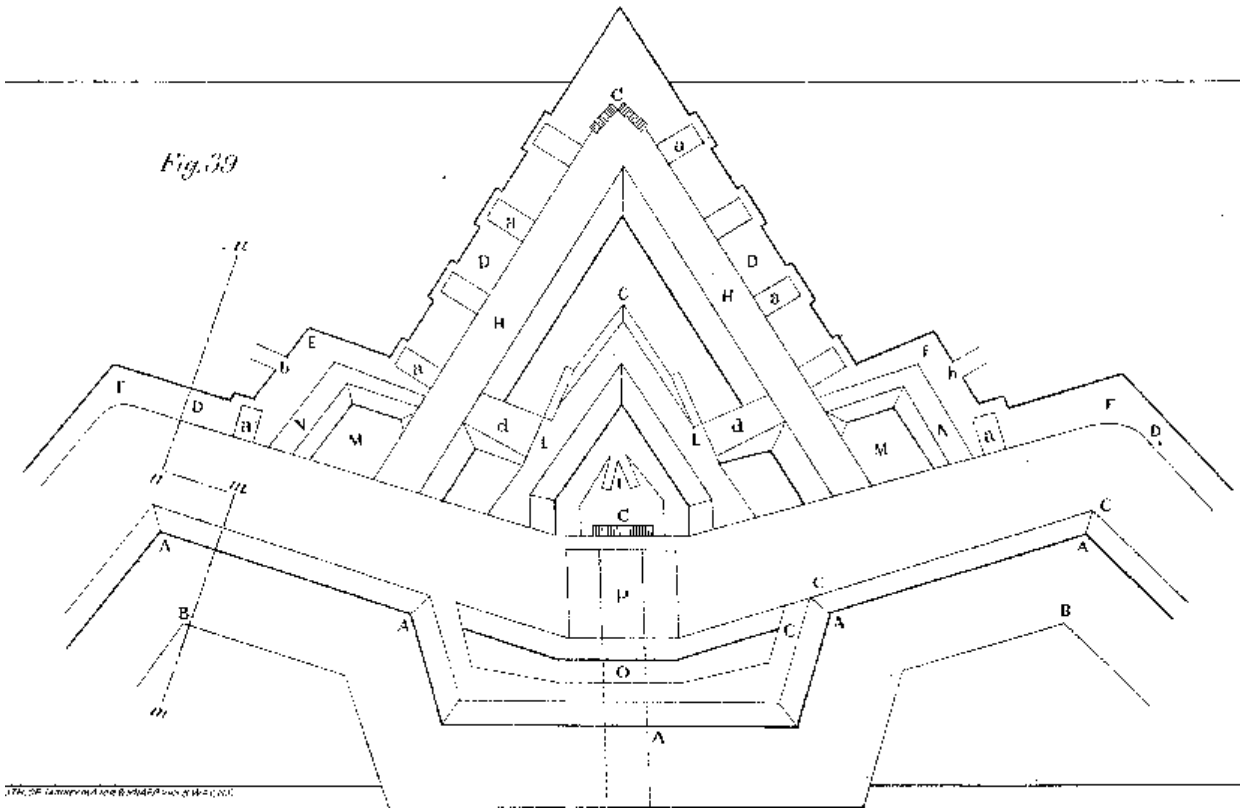


Fig. 10.
Battalion of Infantry.

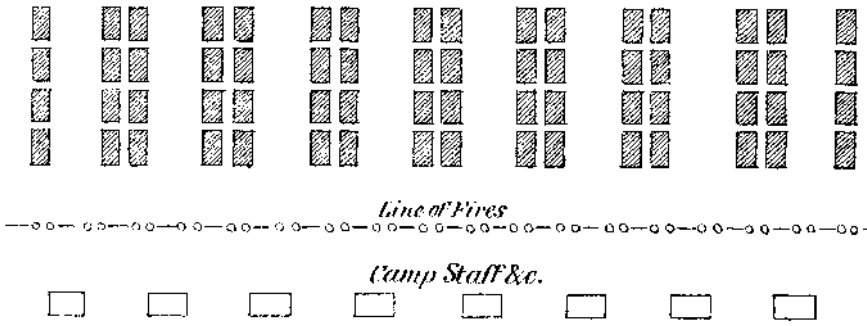


Fig. 12
2 Comps. of Foot Arty. or Engrs.

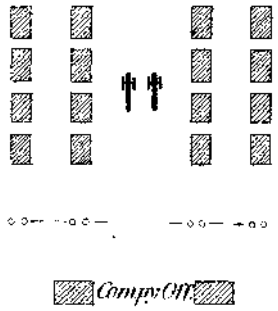
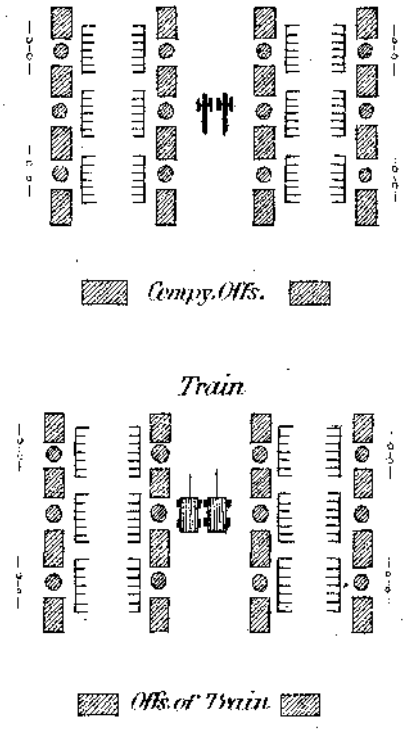


Fig. 13
2 Comps. of Mounted Arty. or Engrs.



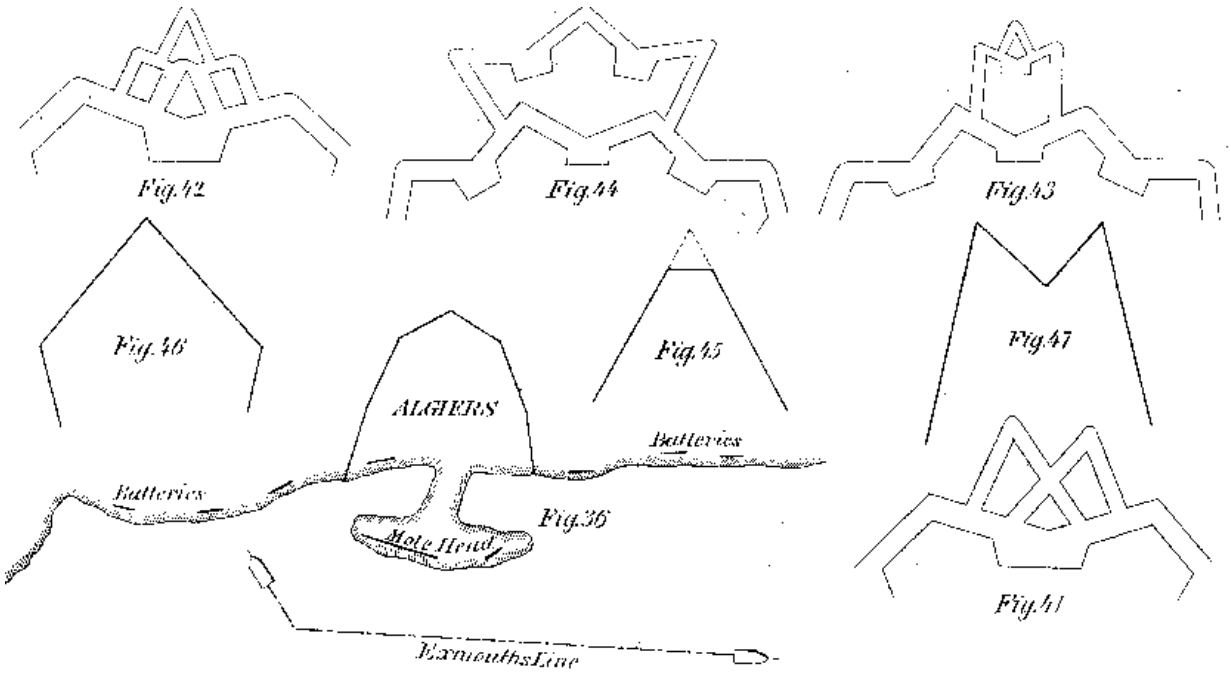


Fig.42
Fig.44
Fig.43
Fig.46
ALGIERS
Fig.45
Fig.47
Batteries
Batteries
Fig.36
Mole Head
Fig.41
ExmouthsLine

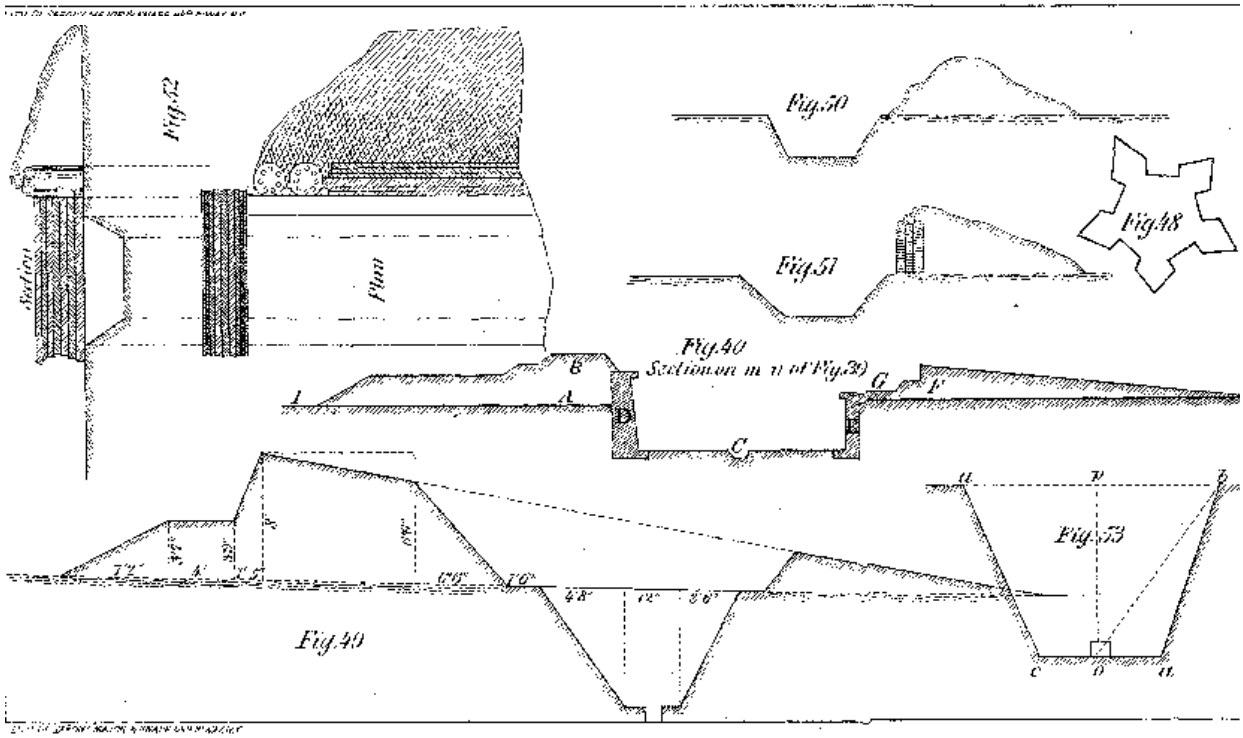


Fig.52
Section
Plan
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Fig.48
Fig.51
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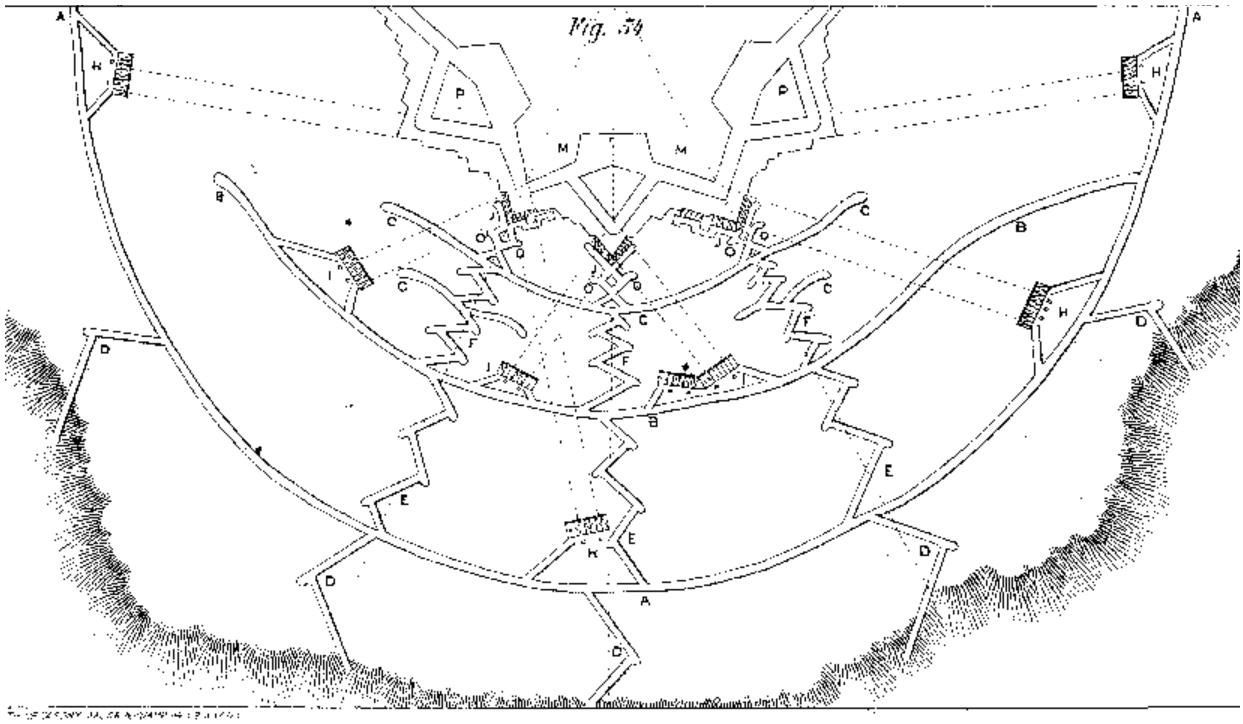

Fig. 54

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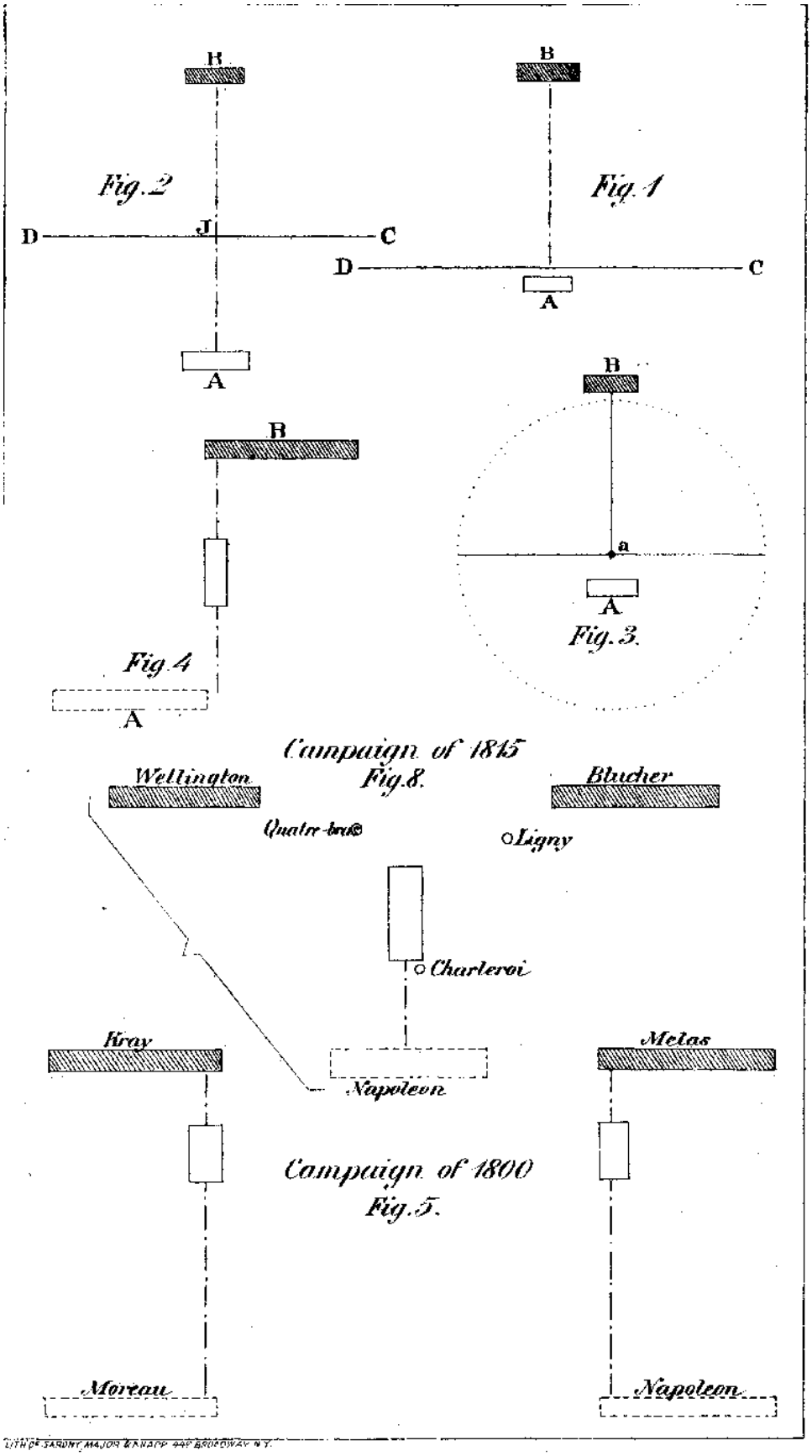

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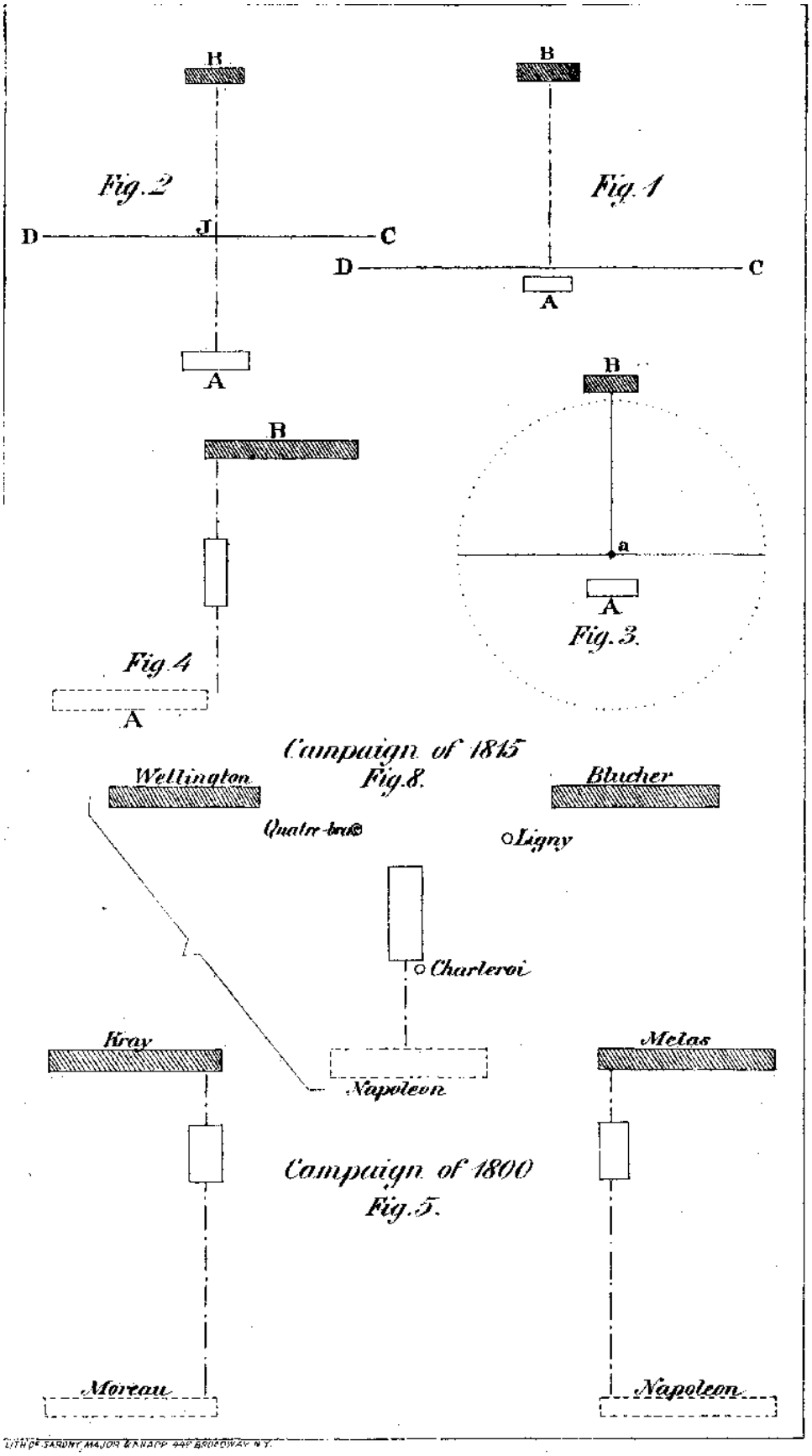

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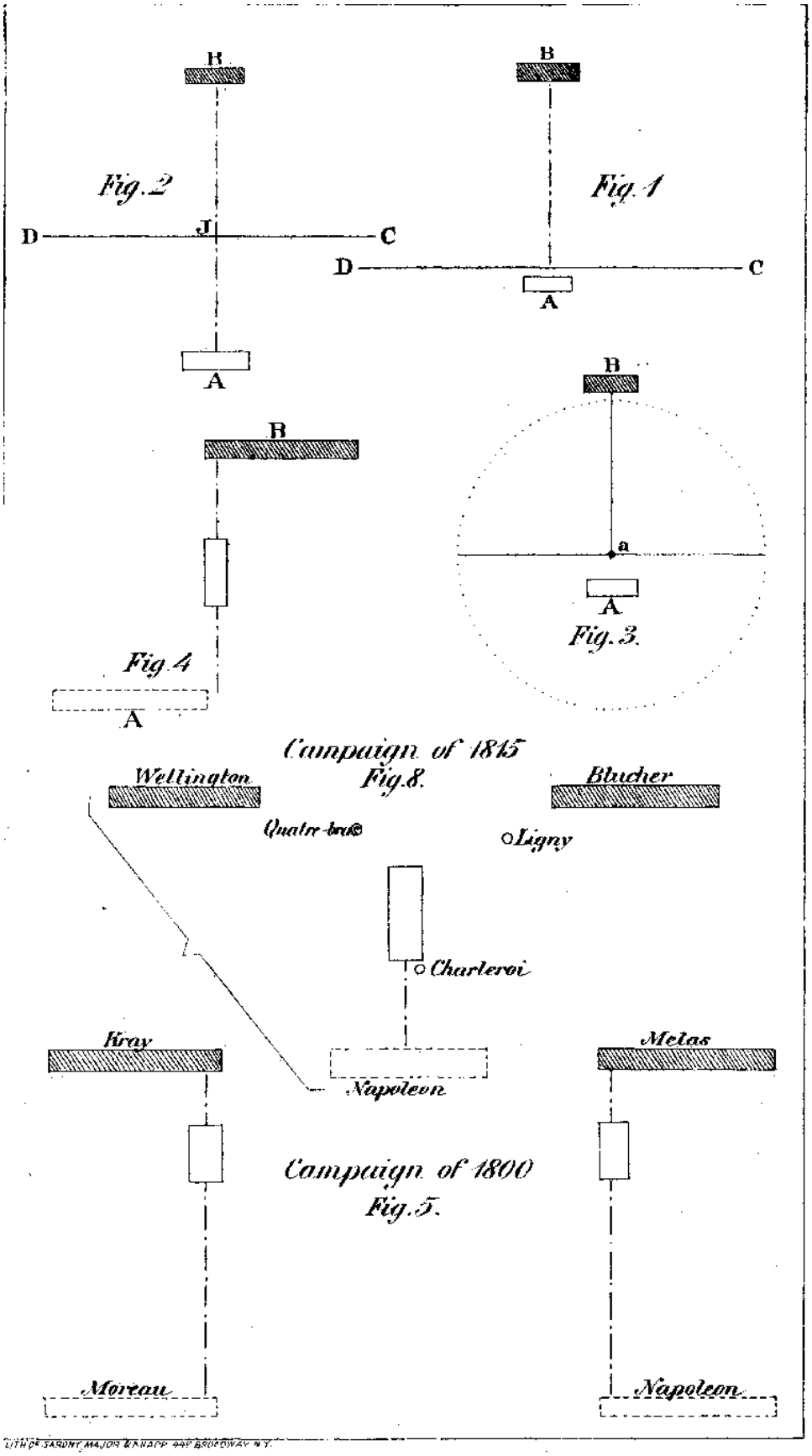

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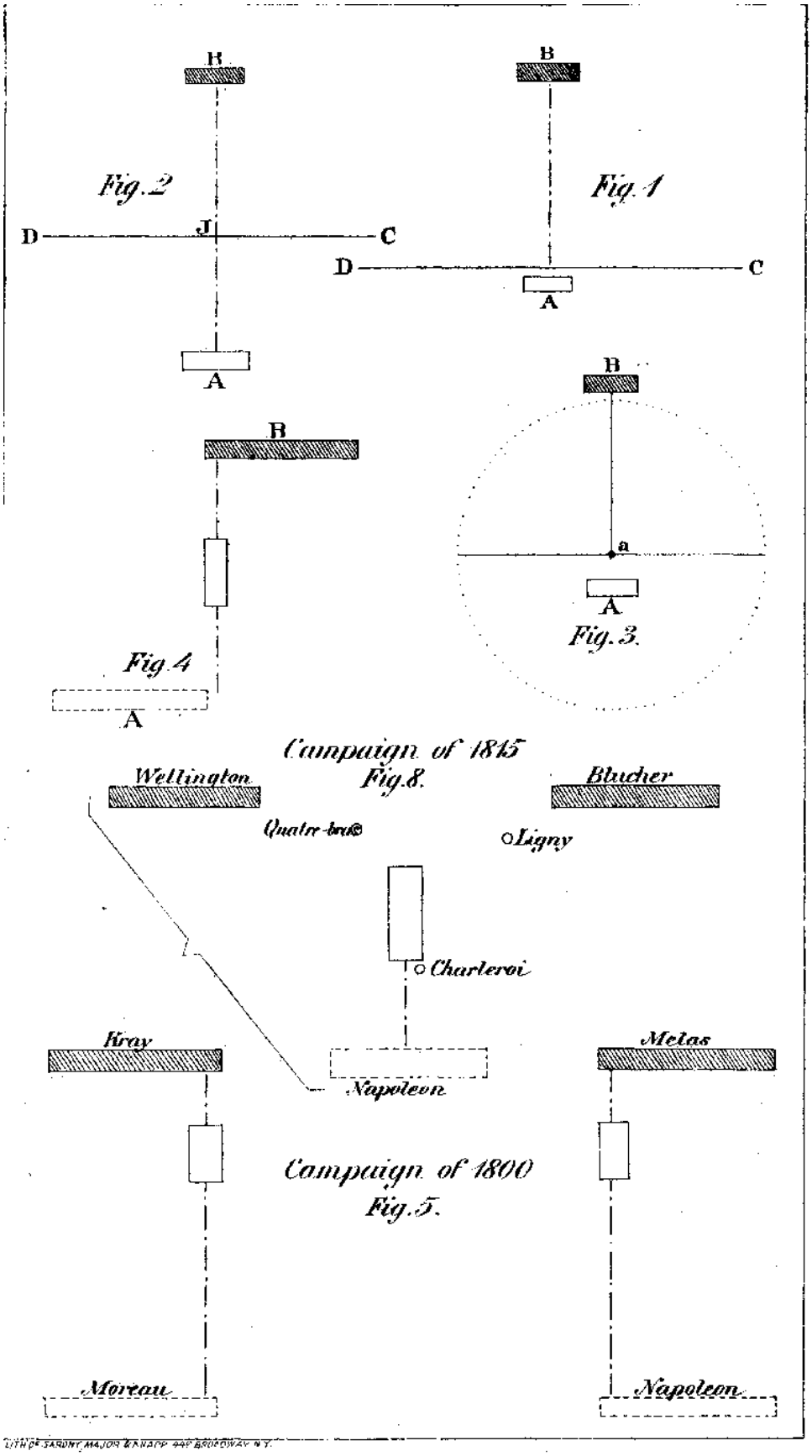

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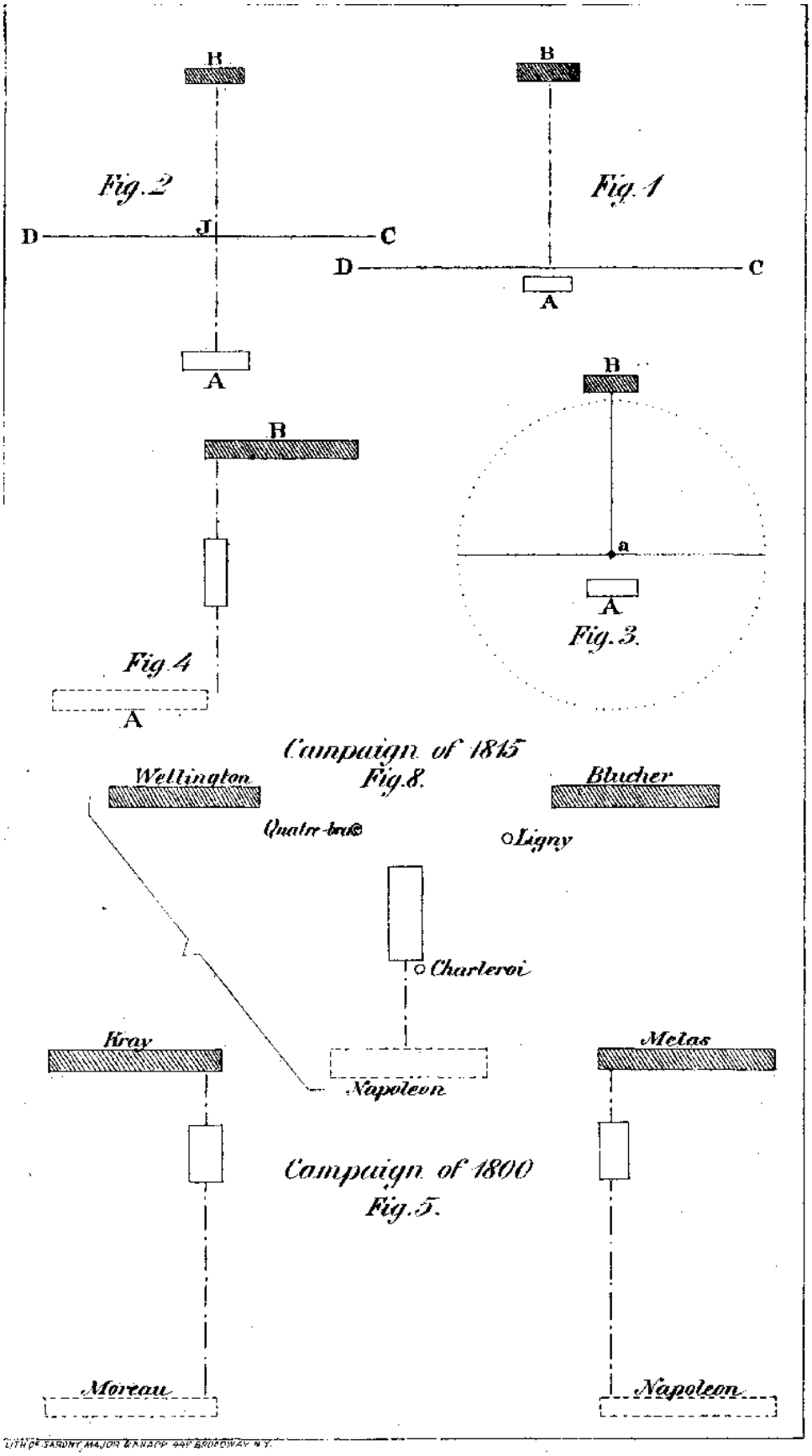

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Fig. 6. Marengo Campaign.

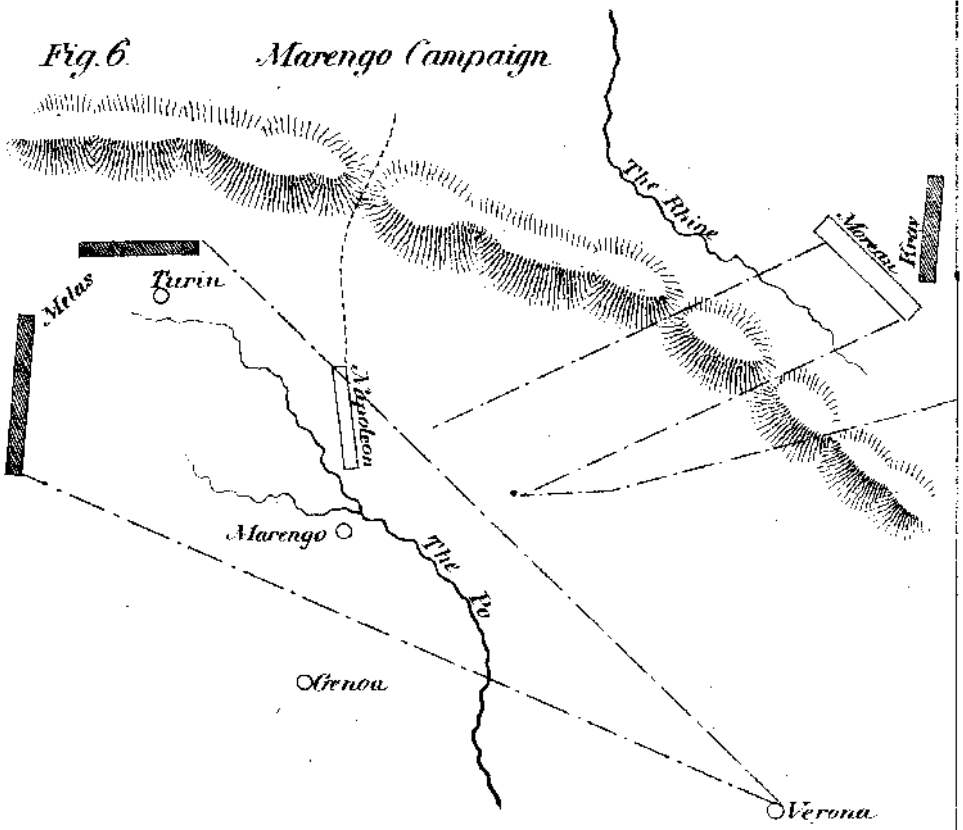

Fig 7.
Campaign of 1806.

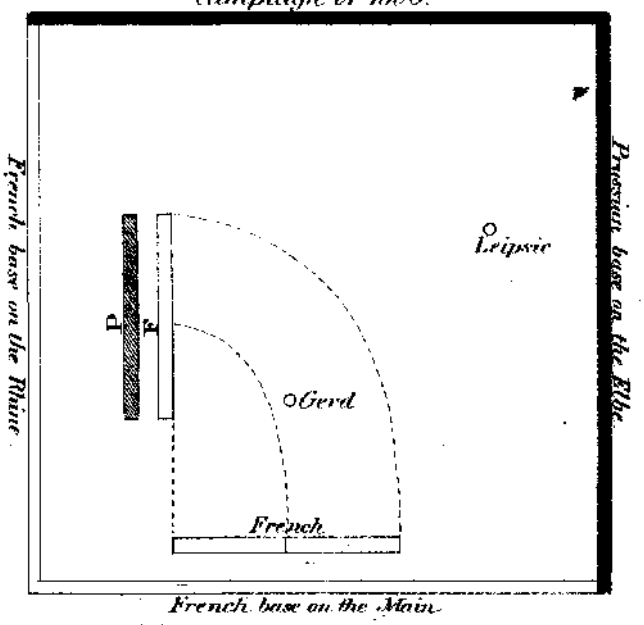

Fig. 15

Fig. 14

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Fig. 6. Marengo Campaign.

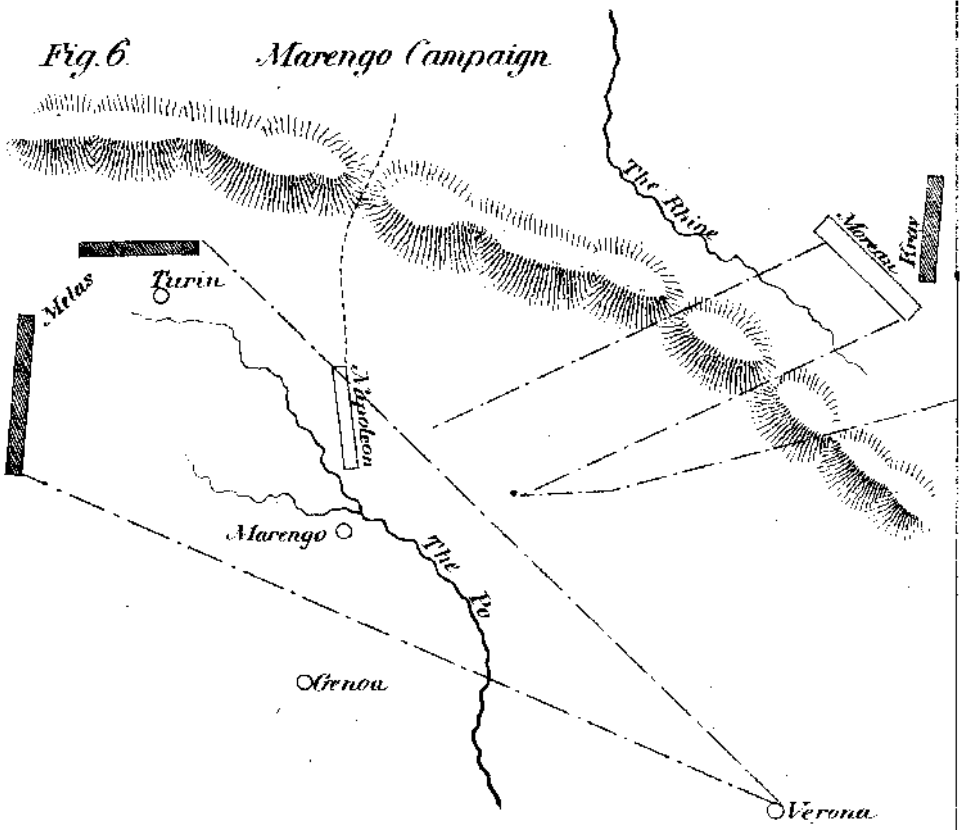

Fig 7.
Campaign of 1806.

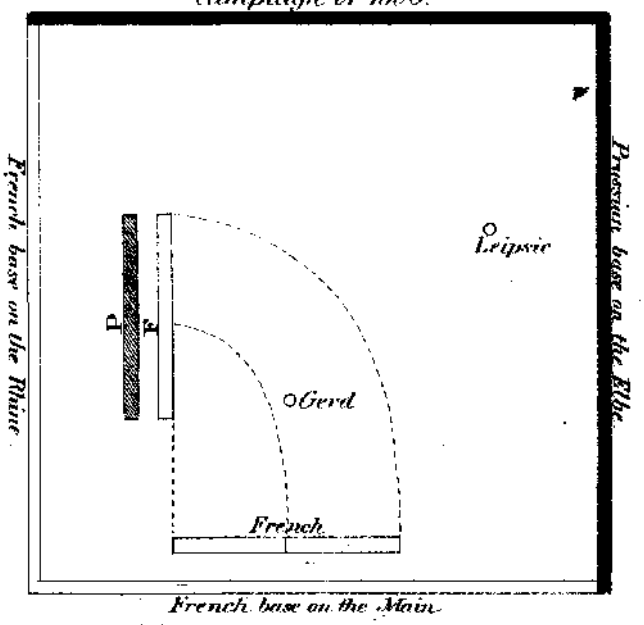

Fig. 15

Fig. 14

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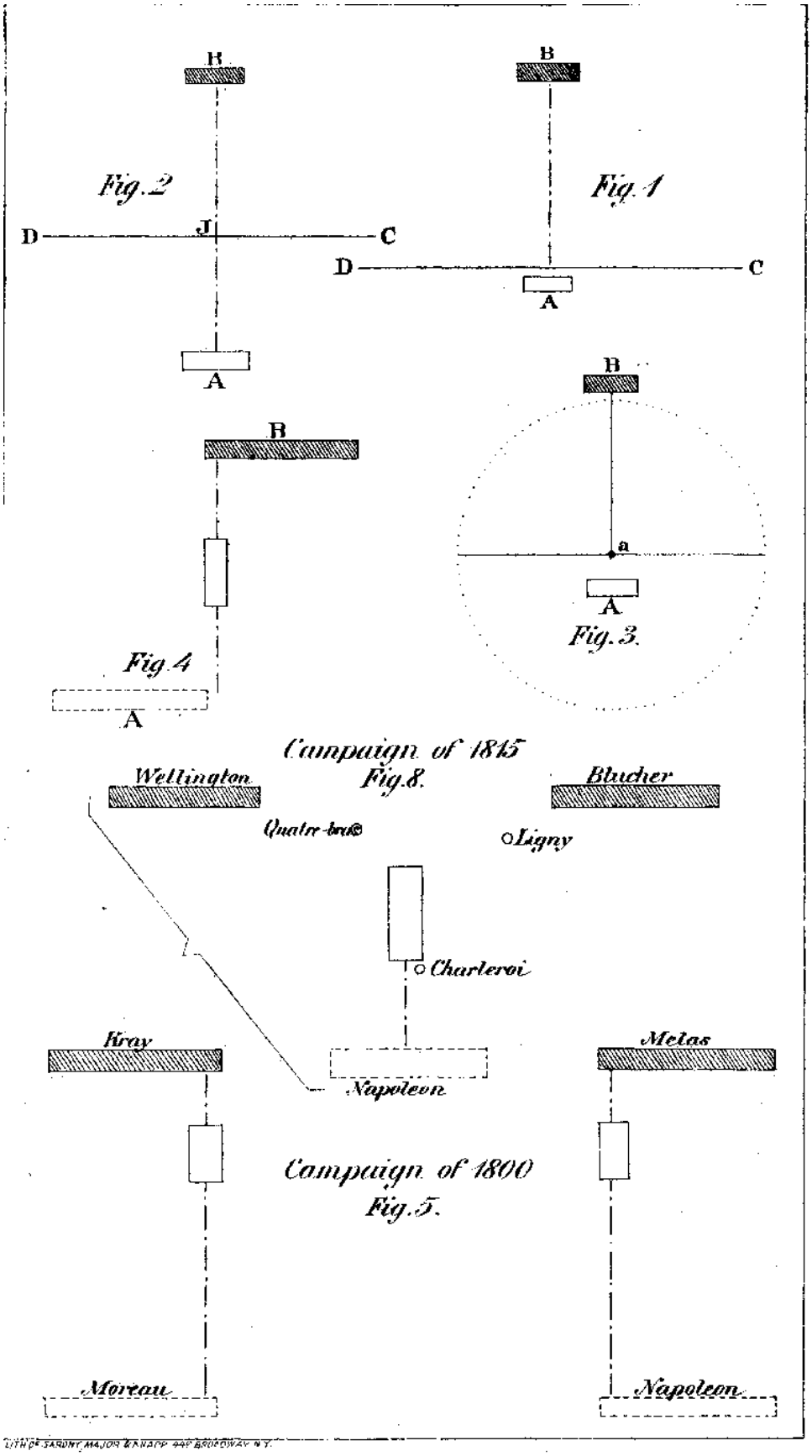

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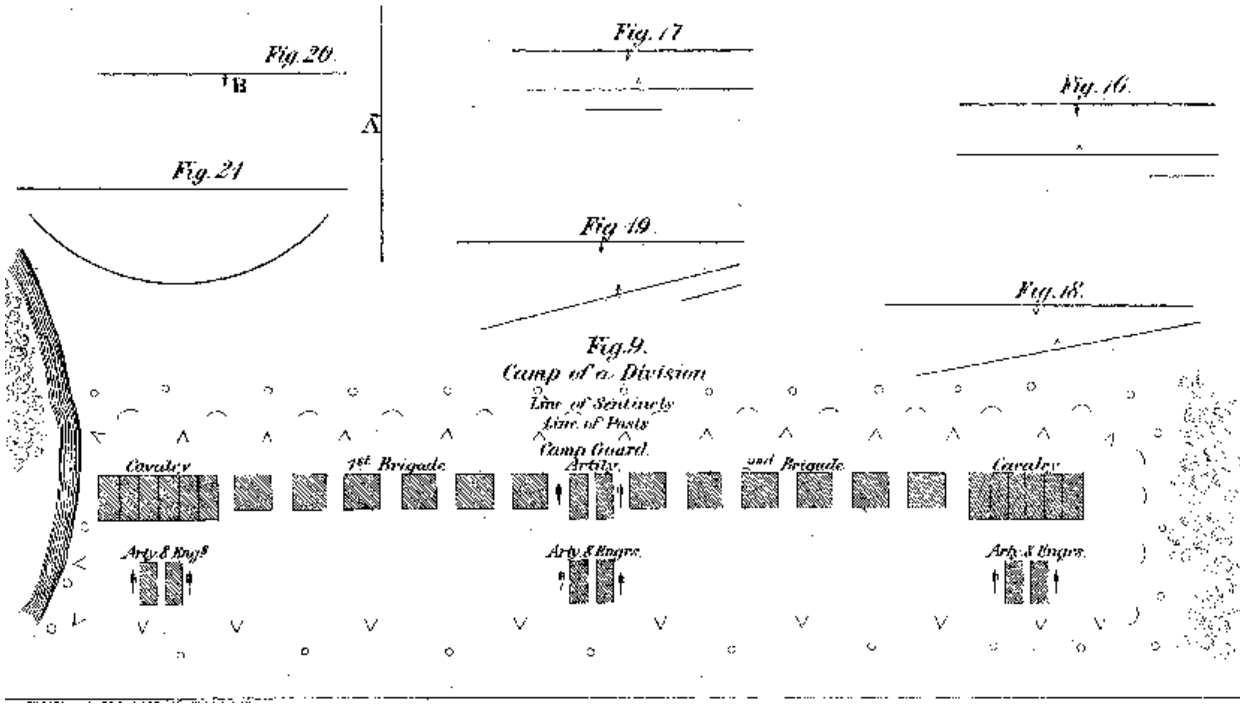
Fig. 20.
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Fig. 17
Fig. 16.
A
Fig. 21
Fig. 19.
Fig. 18.
Fig. 9.
Camp of a Division
Line of Sentinels
Line of Posts
Camp Guard.
Artilry.
Cavalry
1st. Brigade
2nd Brigade
Cavalry
Artly & Engrs
Artly & Engrs
Artly & Engrs

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Fig. 10.
Battalion of Infantry.

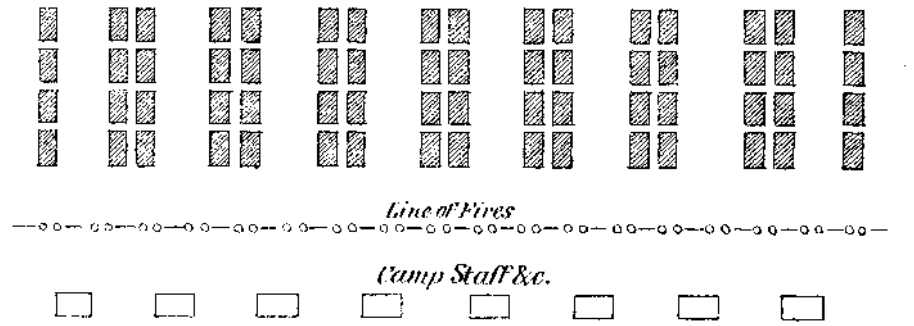

Fig. 12
2 Comps. of Foot Arty. or Engrs.

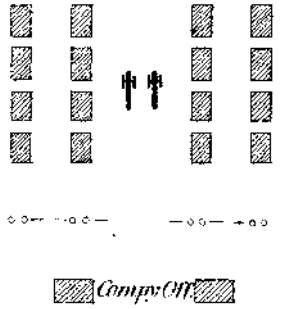

Fig. 13
2 Comps. of Mounted Arty. or Engrs.

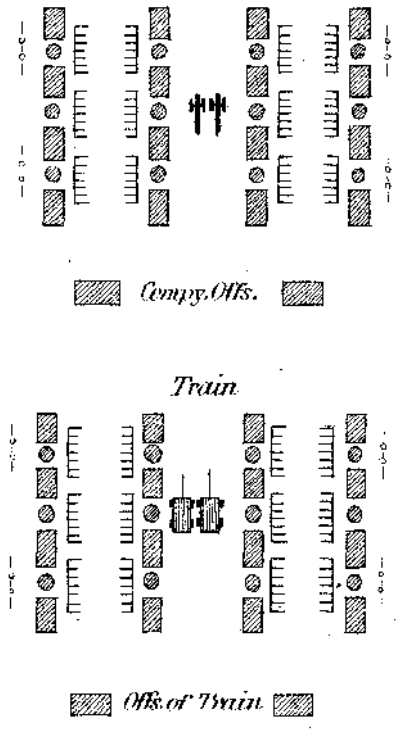

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Fig. 10.
Battalion of Infantry.

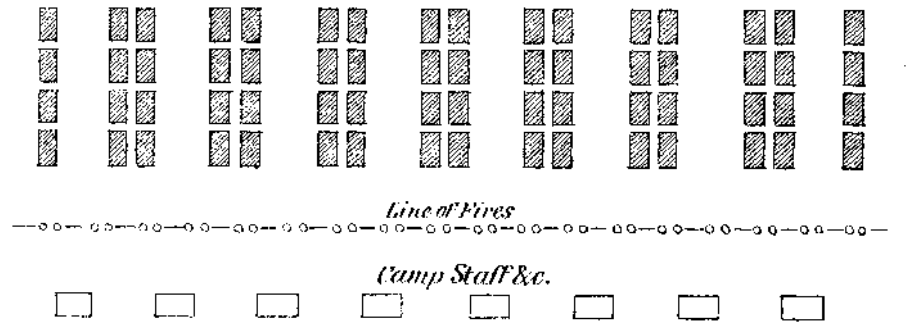

Fig. 12
2 Comps. of Foot Arty. or Engrs.

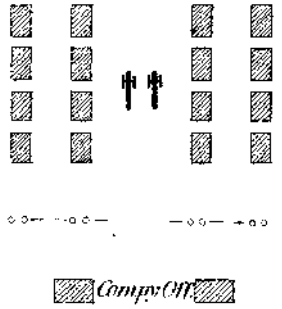

Fig. 13
2 Comps. of Mounted Arty. or Engrs.

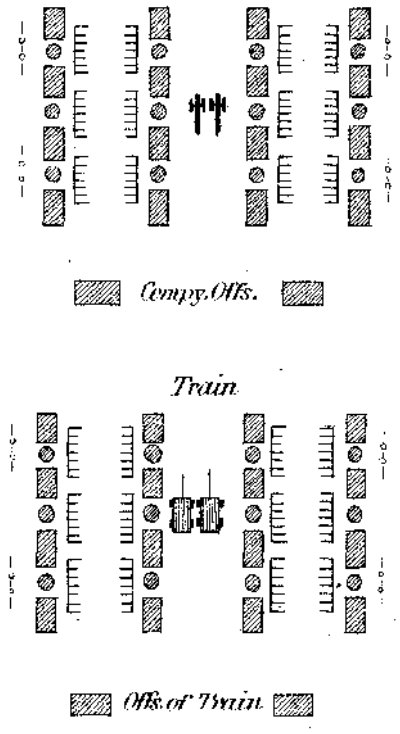

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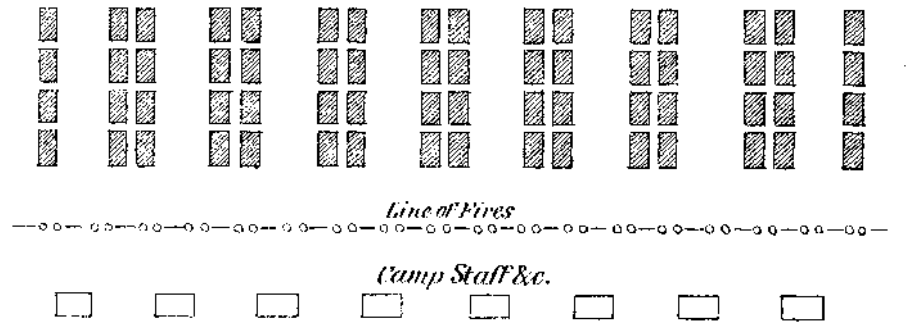
Fig. 10.
Battalion of Infantry.



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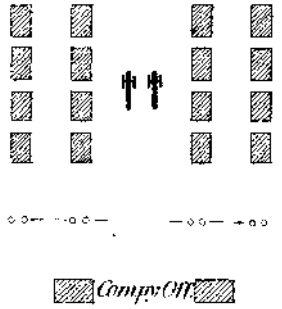

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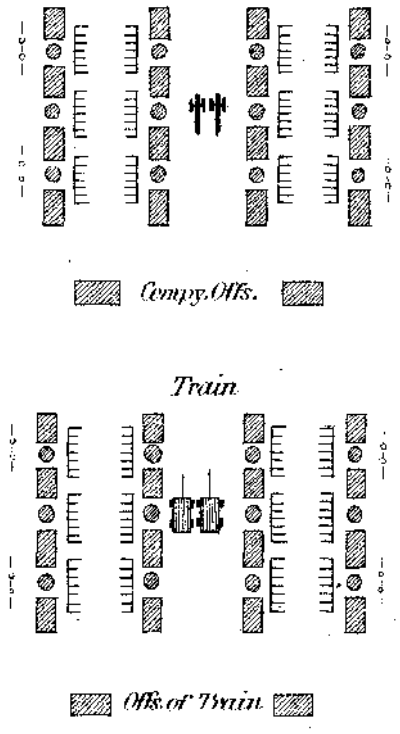

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Fig. 10.
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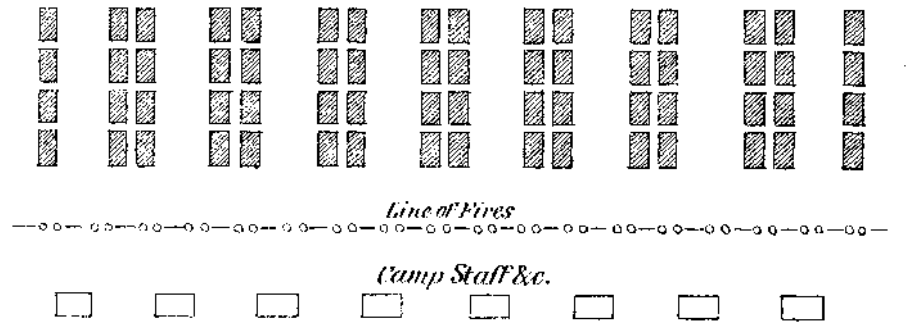

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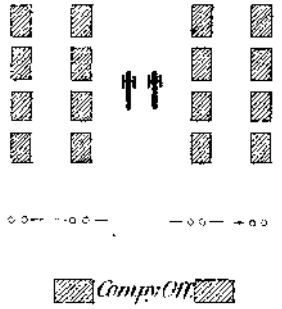

Fig. 13
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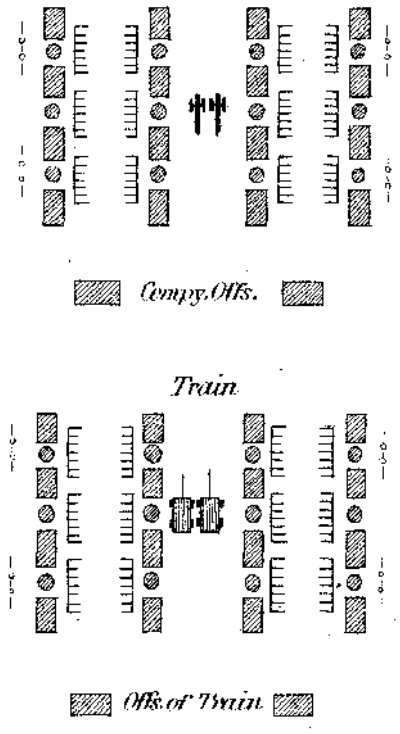

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Fig. 6. Marengo Campaign.

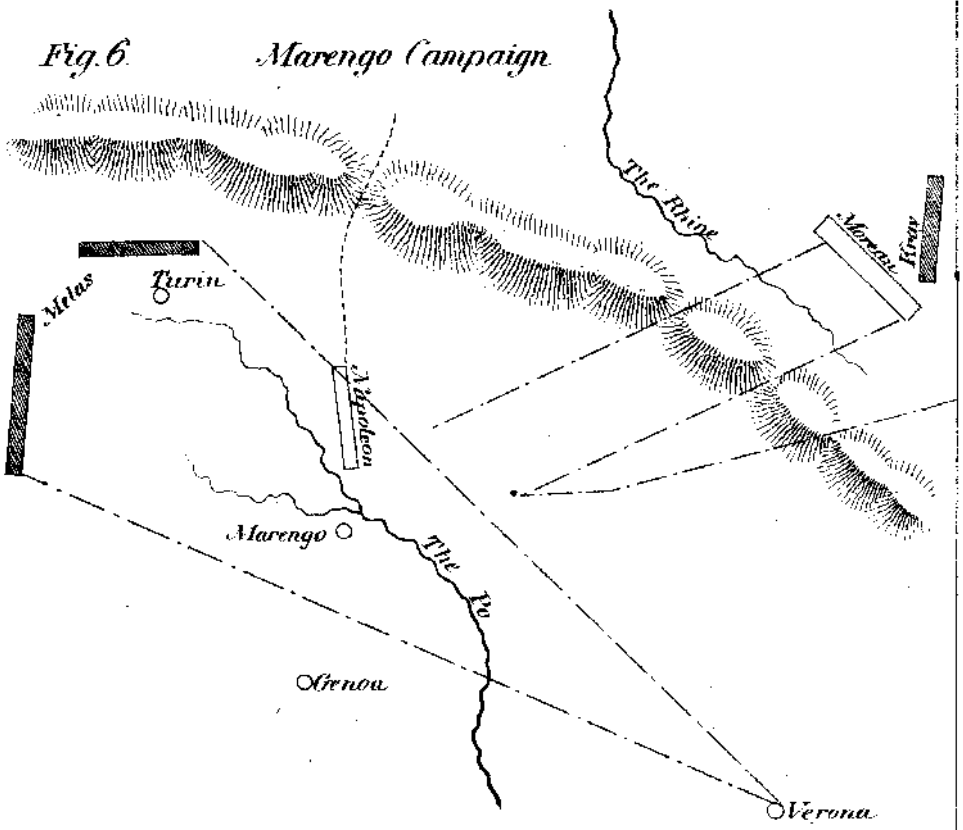

Fig 7.
Campaign of 1806.

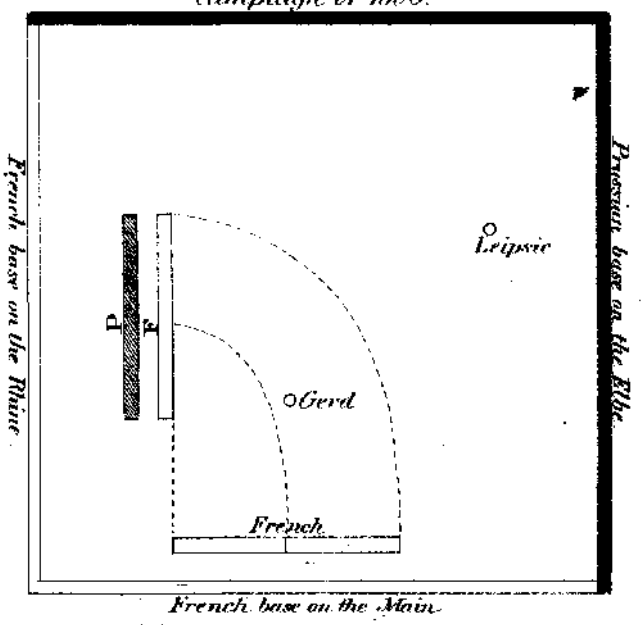

Fig. 15

Fig. 14

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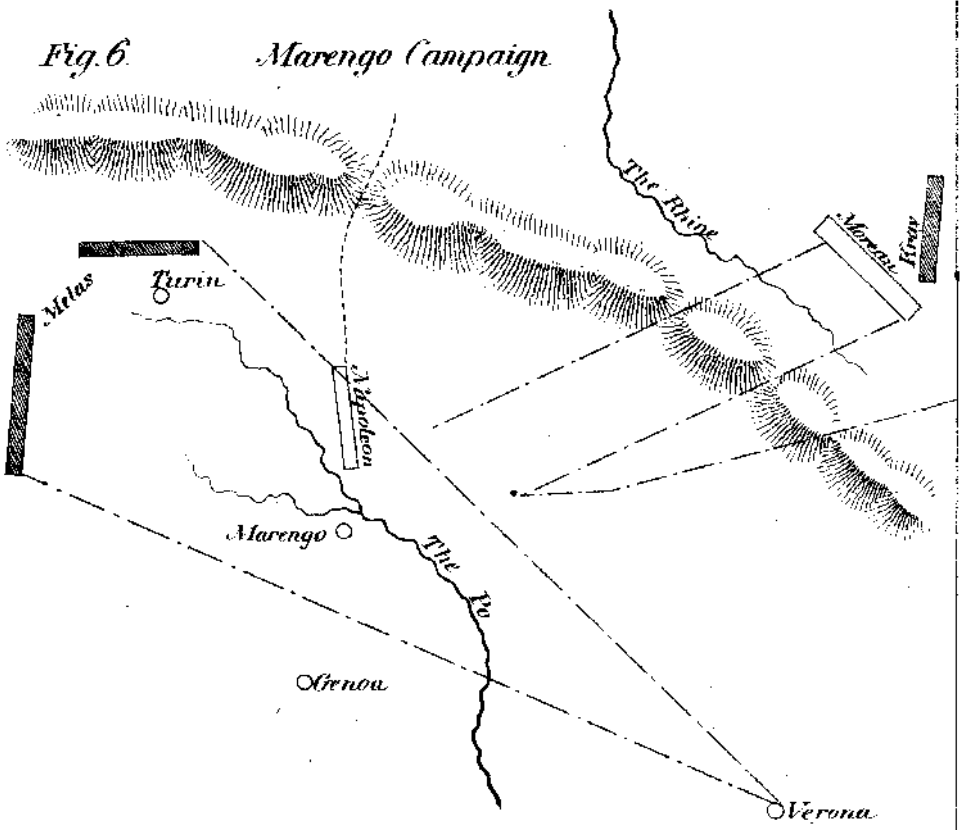
Fig. 6. Marengo Campaign.



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Campaign of 1806.

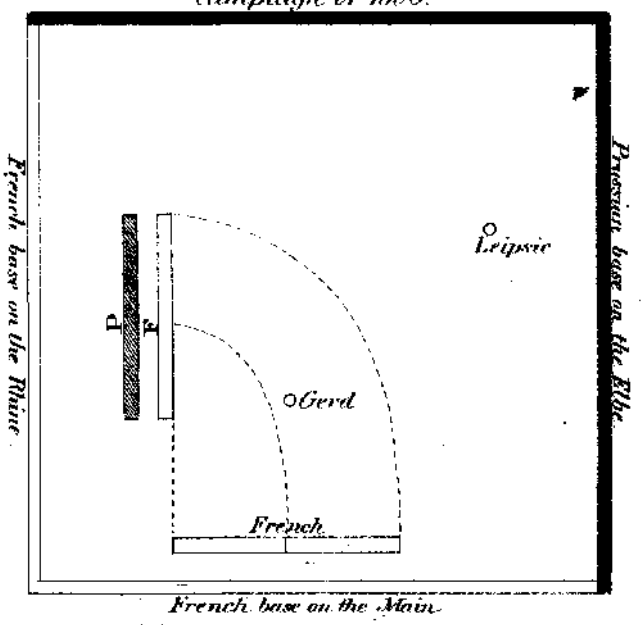

Fig. 15

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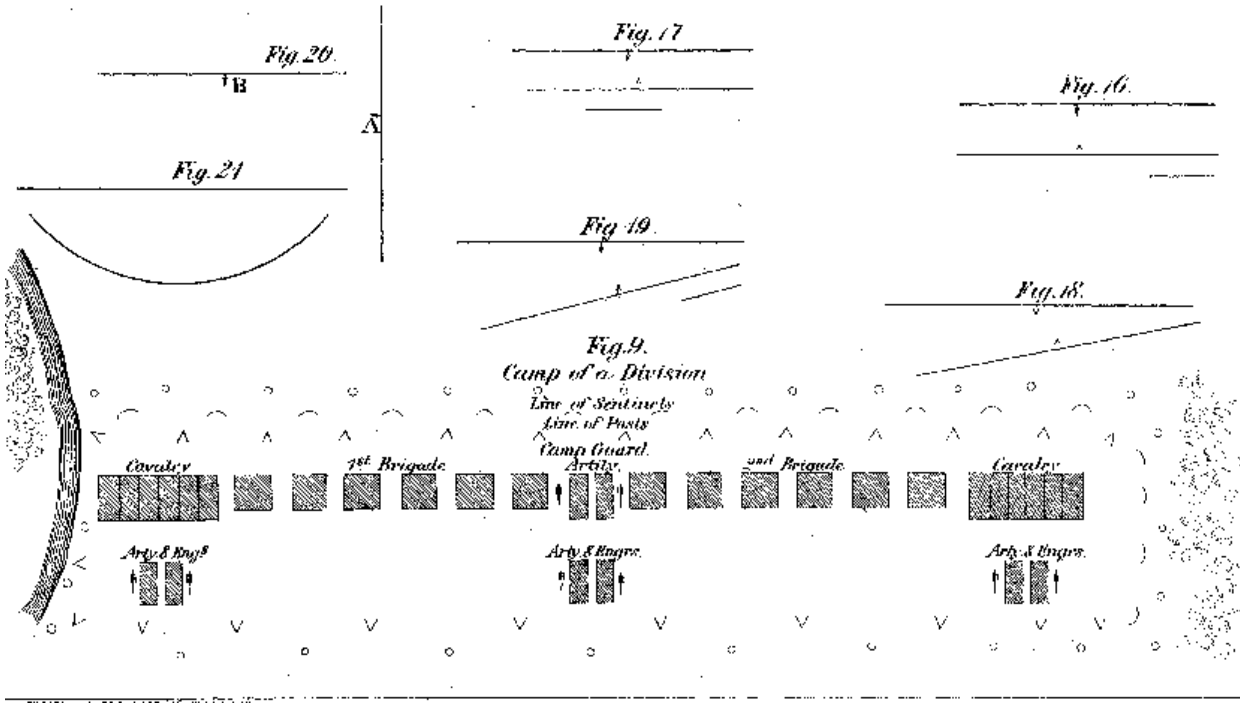
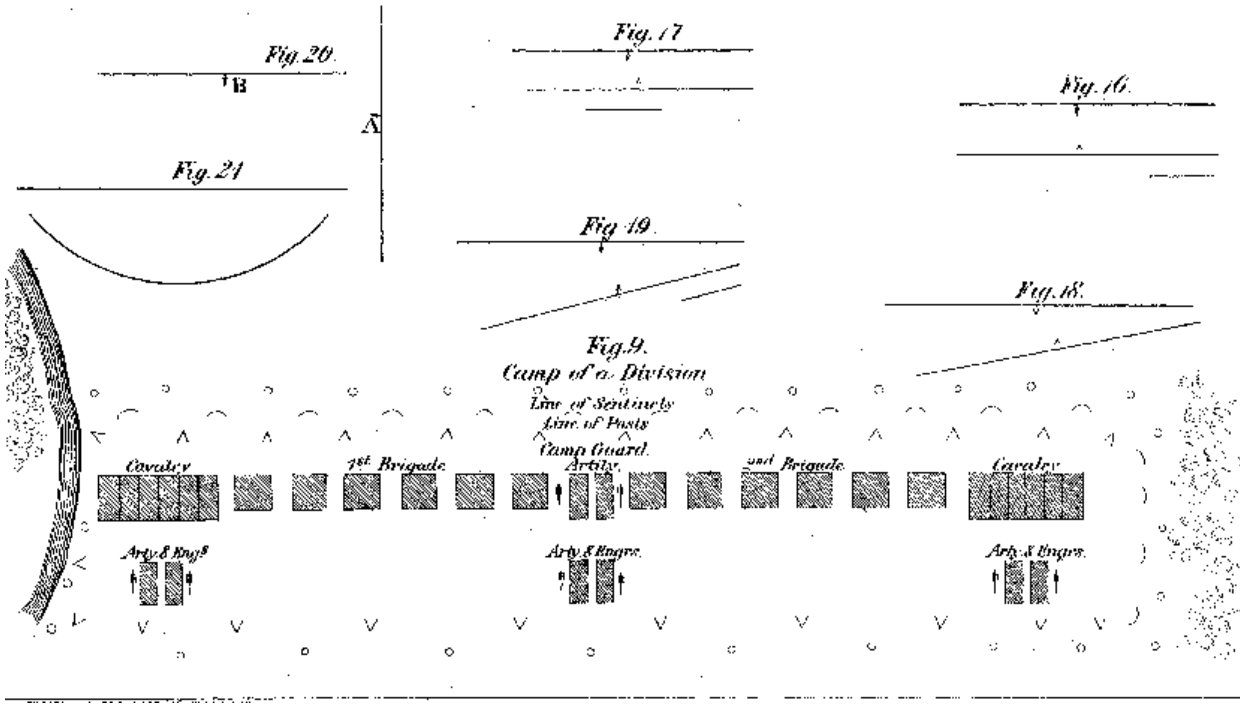


Fig. 20.
B
Fig. 17
Fig. 16.
A
Fig. 21
Fig. 19.
Fig. 18.
Fig. 9.
Camp of a Division
Line of Sentinels
Line of Posts
Camp Guard.
Artilry.
Cavalry
1st. Brigade
2nd Brigade
Cavalry
Artly & Engrs
Artly & Engrs
Artly & Engrs

back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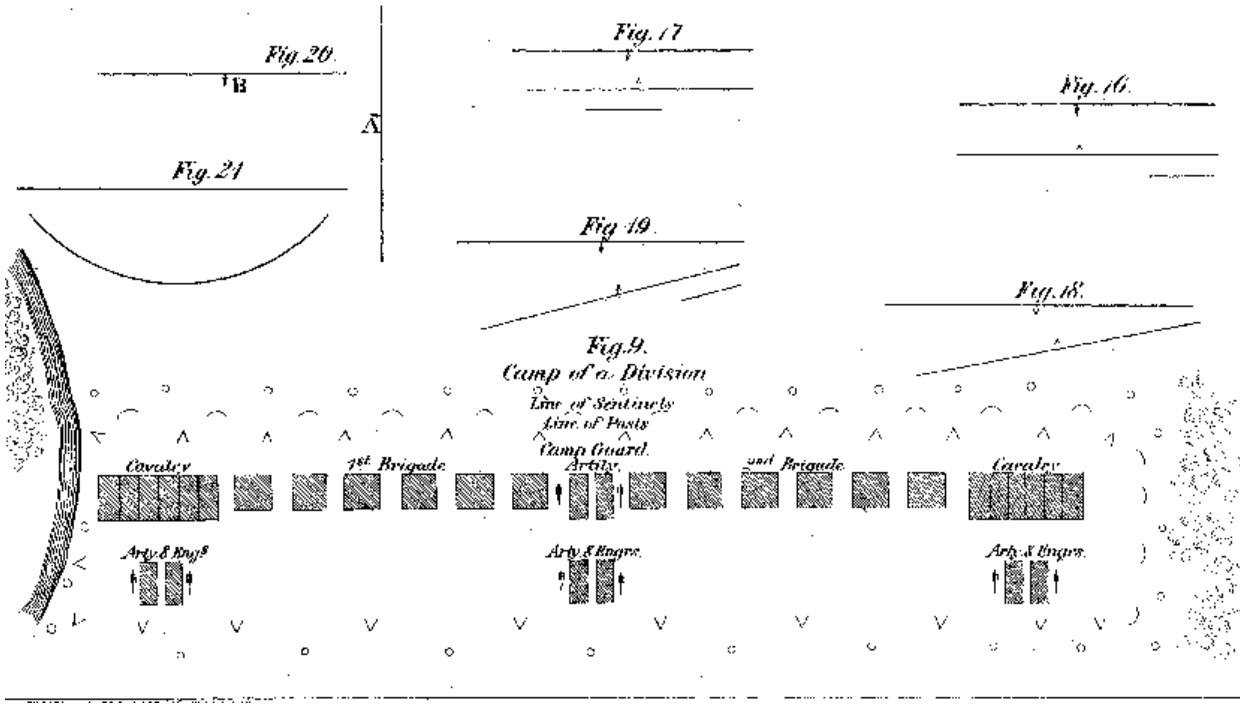
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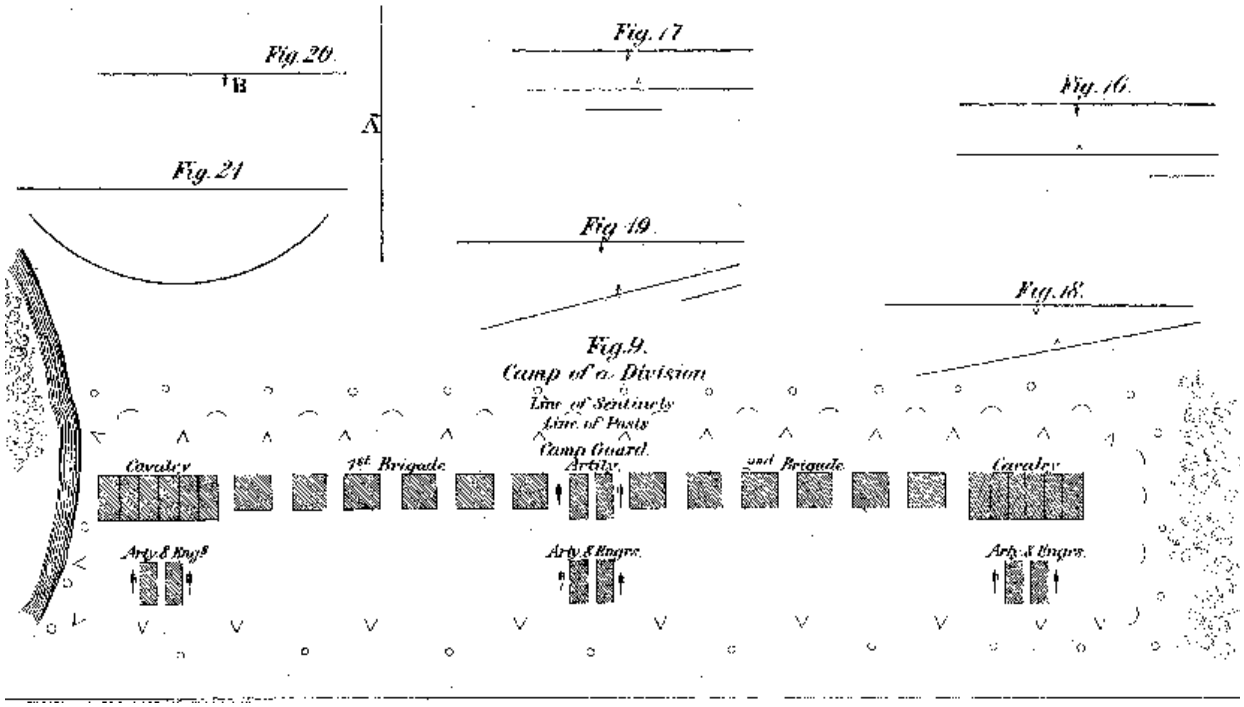
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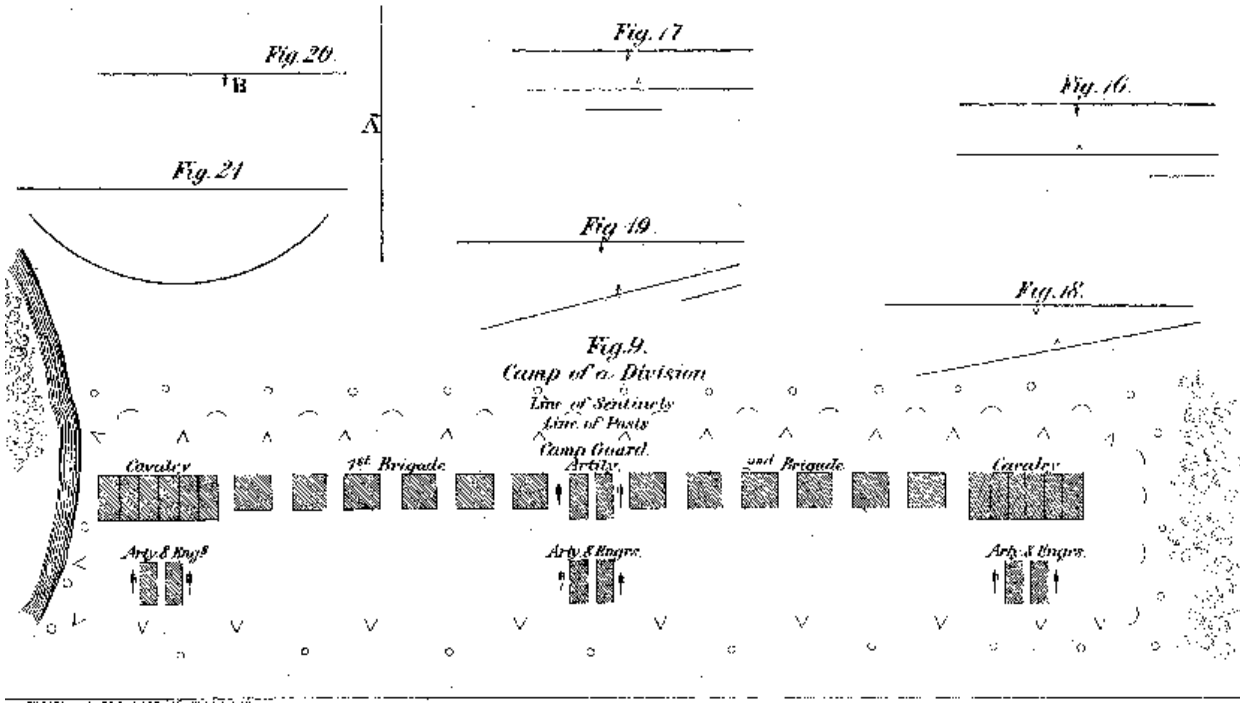
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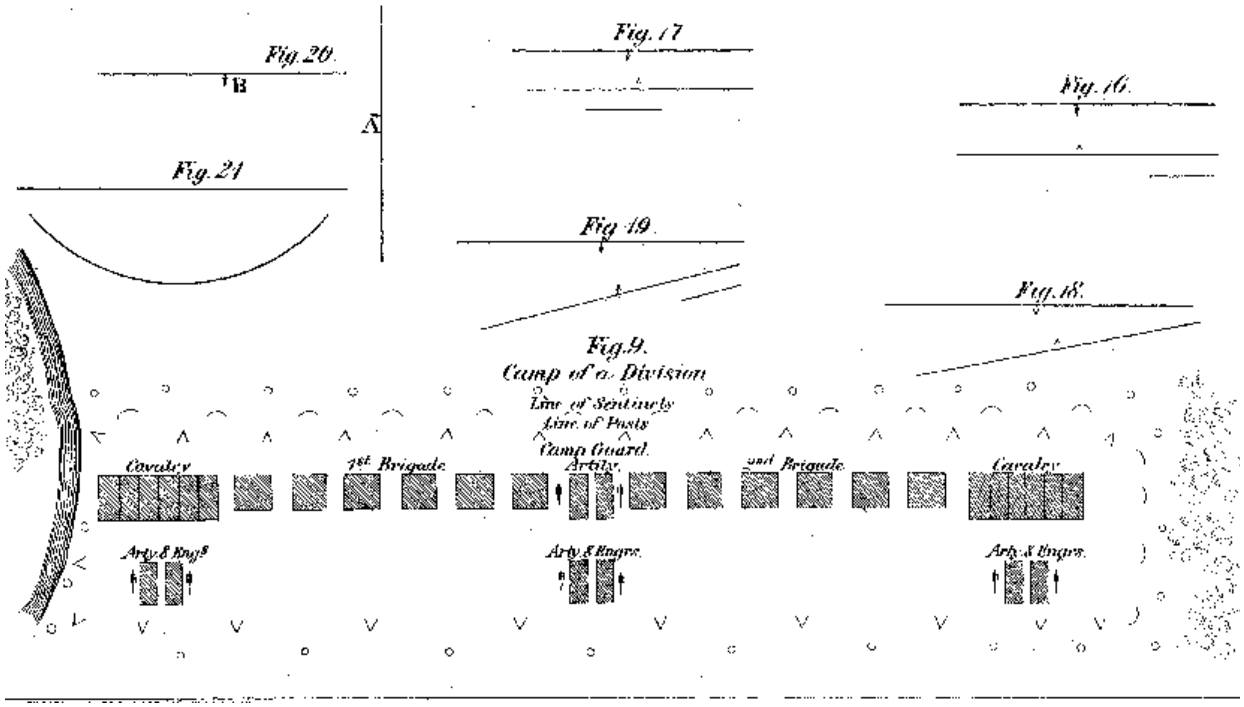
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Artly & Engrs
Artly & Engrs
Artly & Engrs

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Fig. 11.
Squadron of Cavalry.

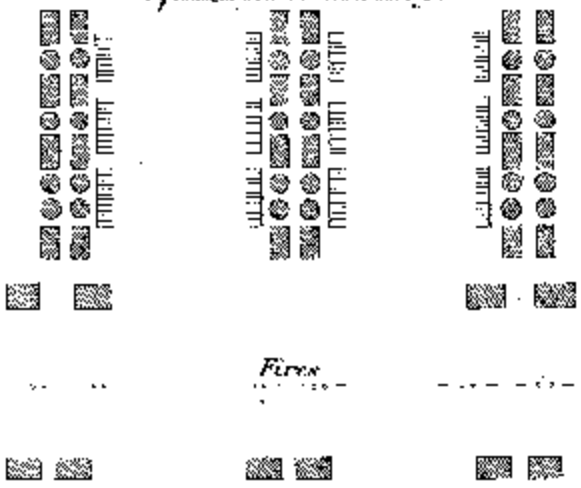
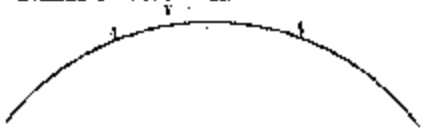


Fig. 24

Fig. 22



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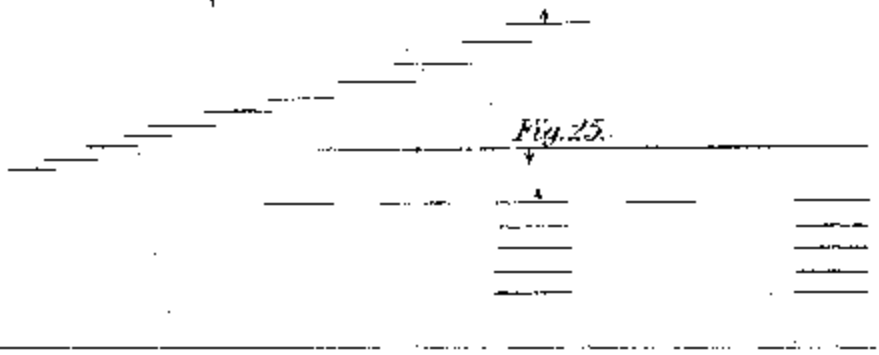

Fig. 25.

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Fig. 11.
Squadron of Cavalry.

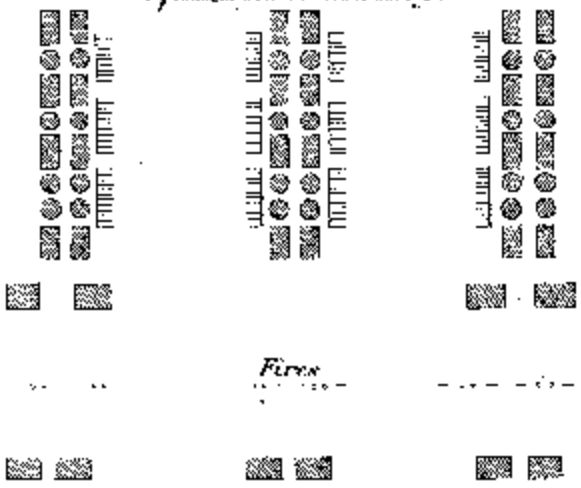
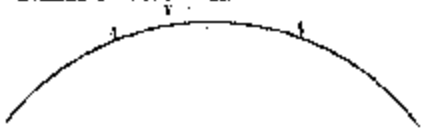


Fig. 24

Fig. 22



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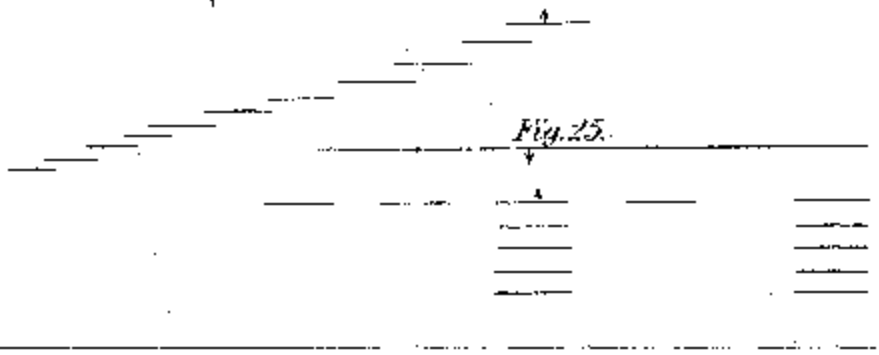

Fig. 25.

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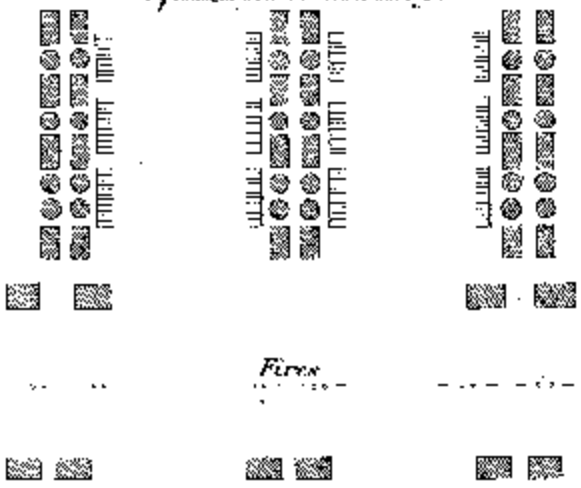
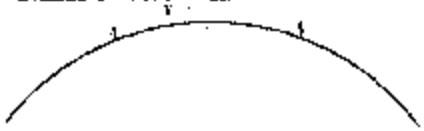


Fig. 24

Fig. 22



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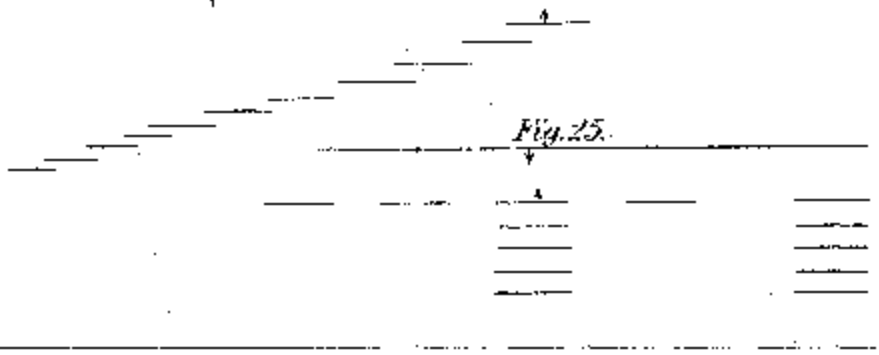

Fig. 25.

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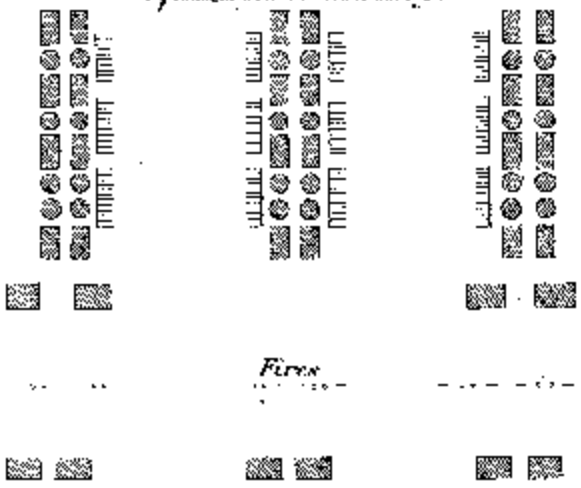

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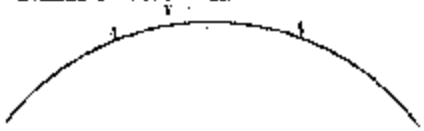

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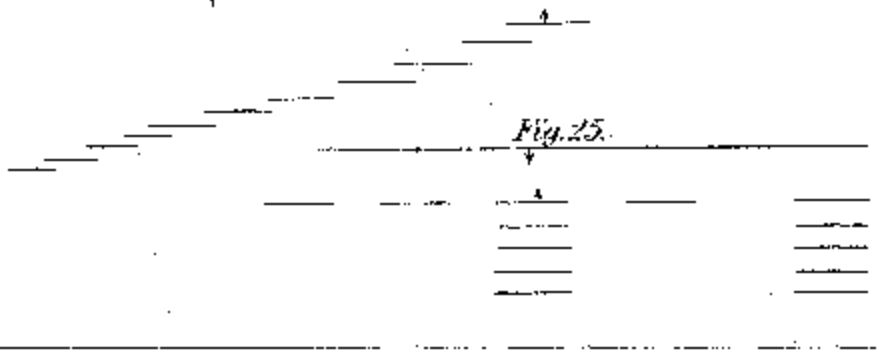

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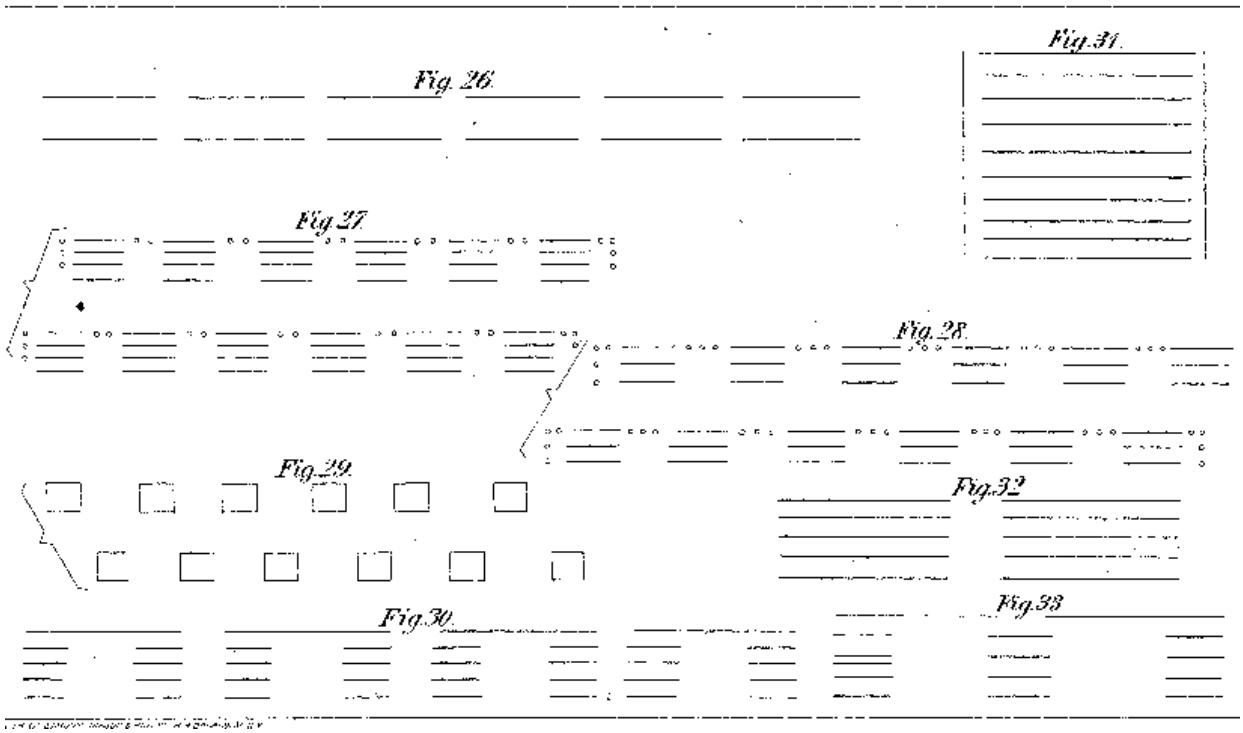

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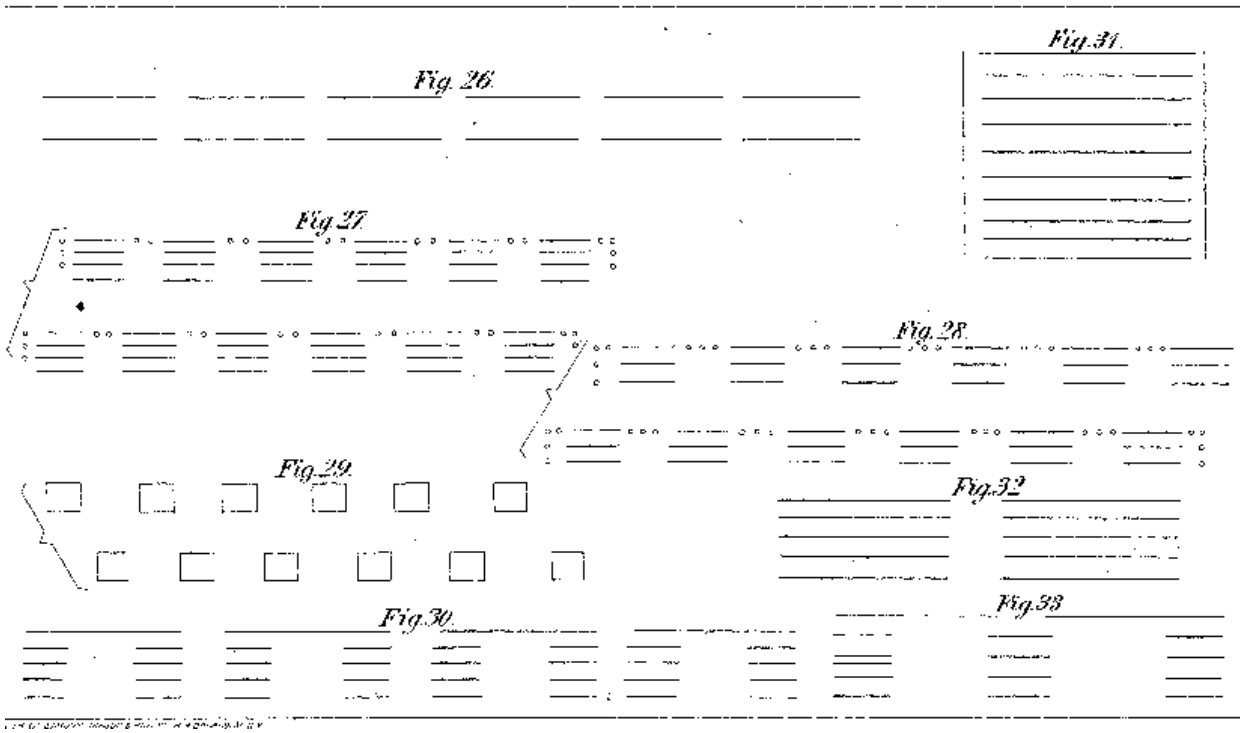

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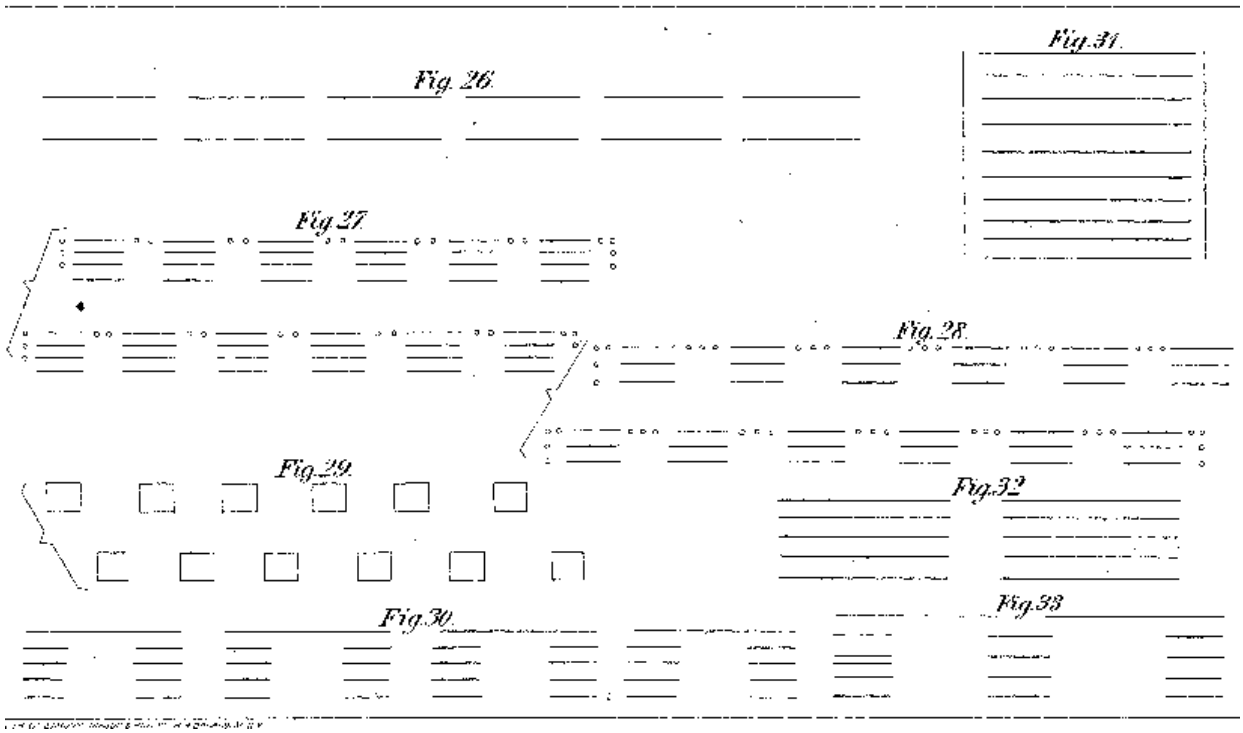

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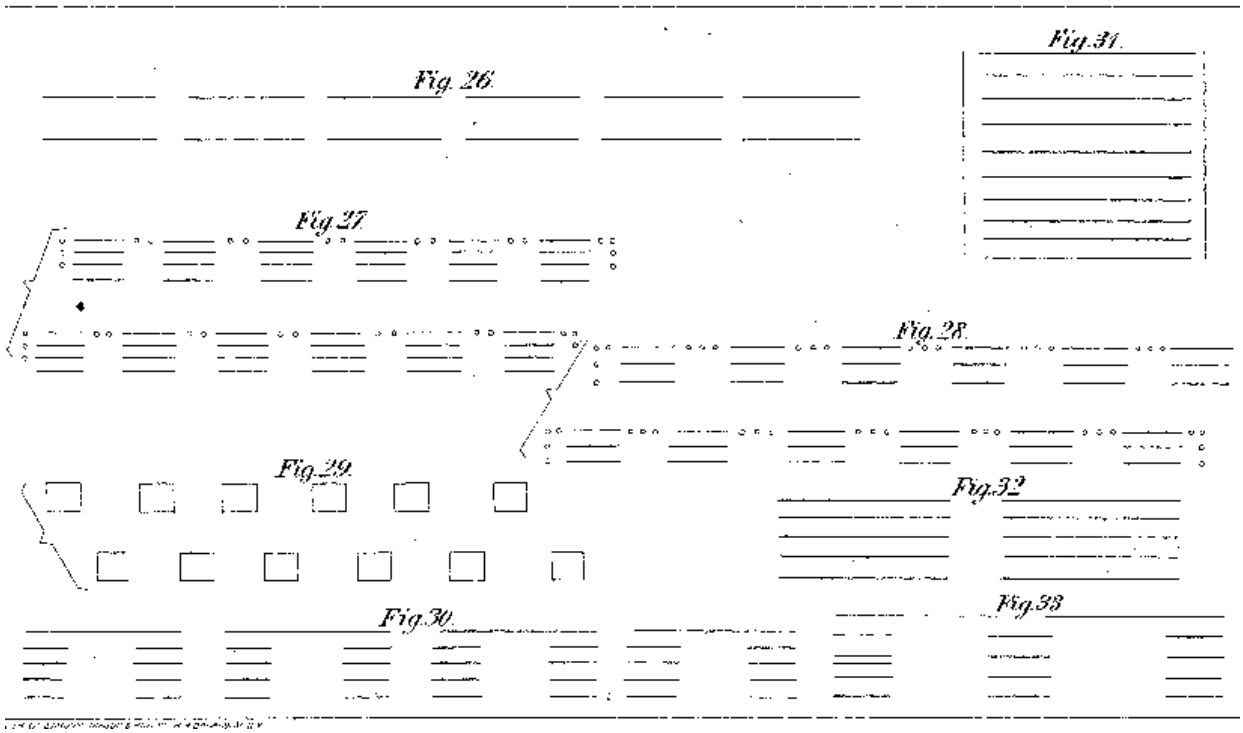

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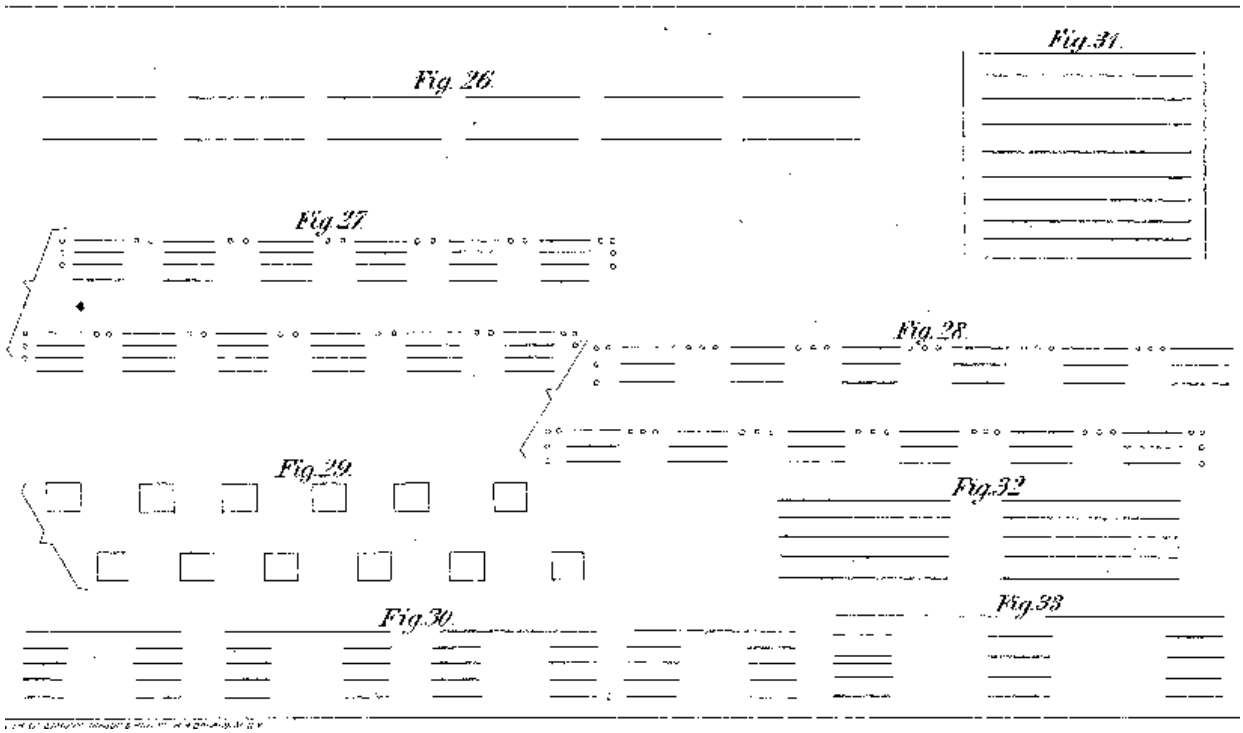

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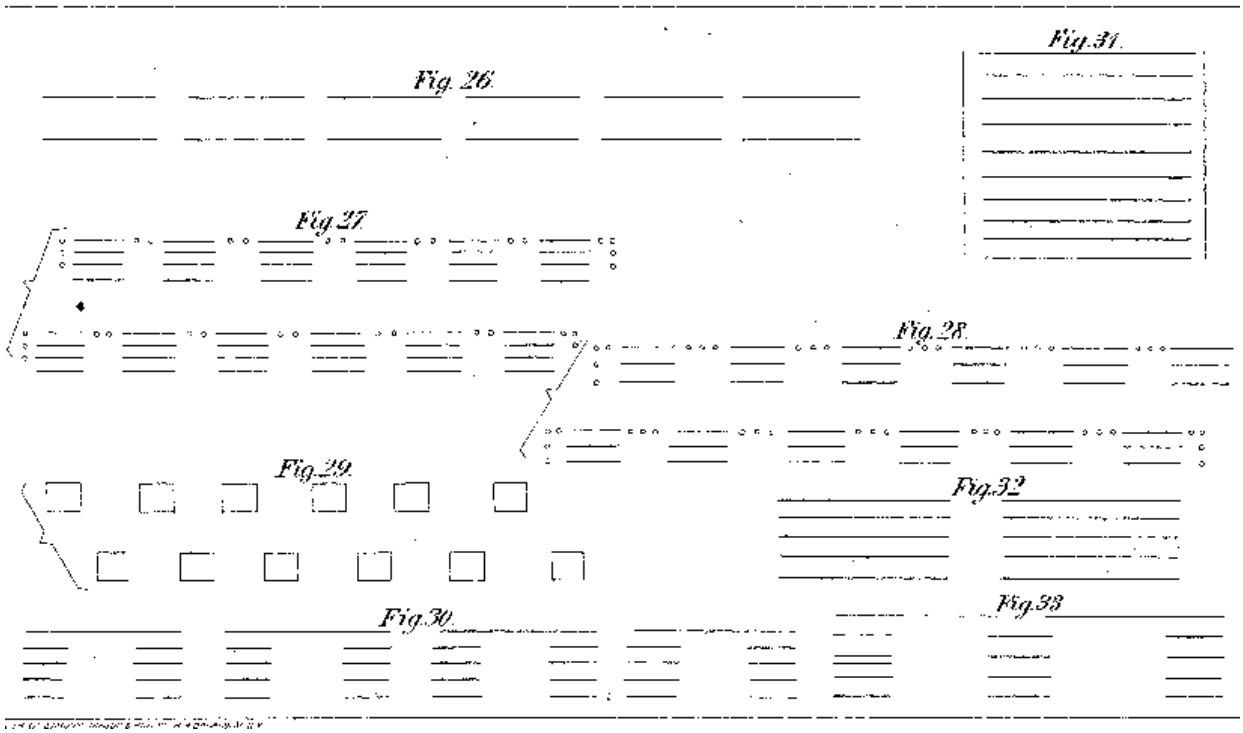

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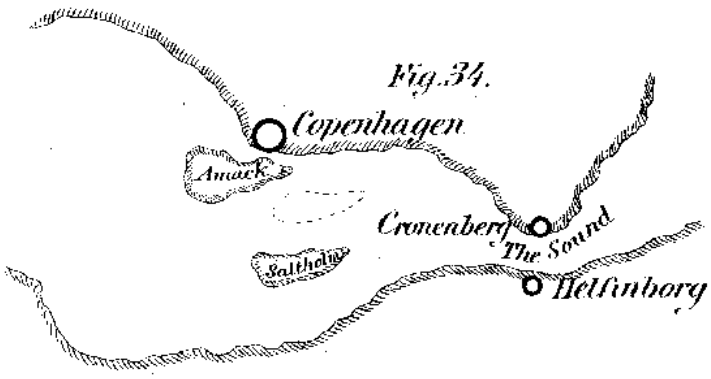
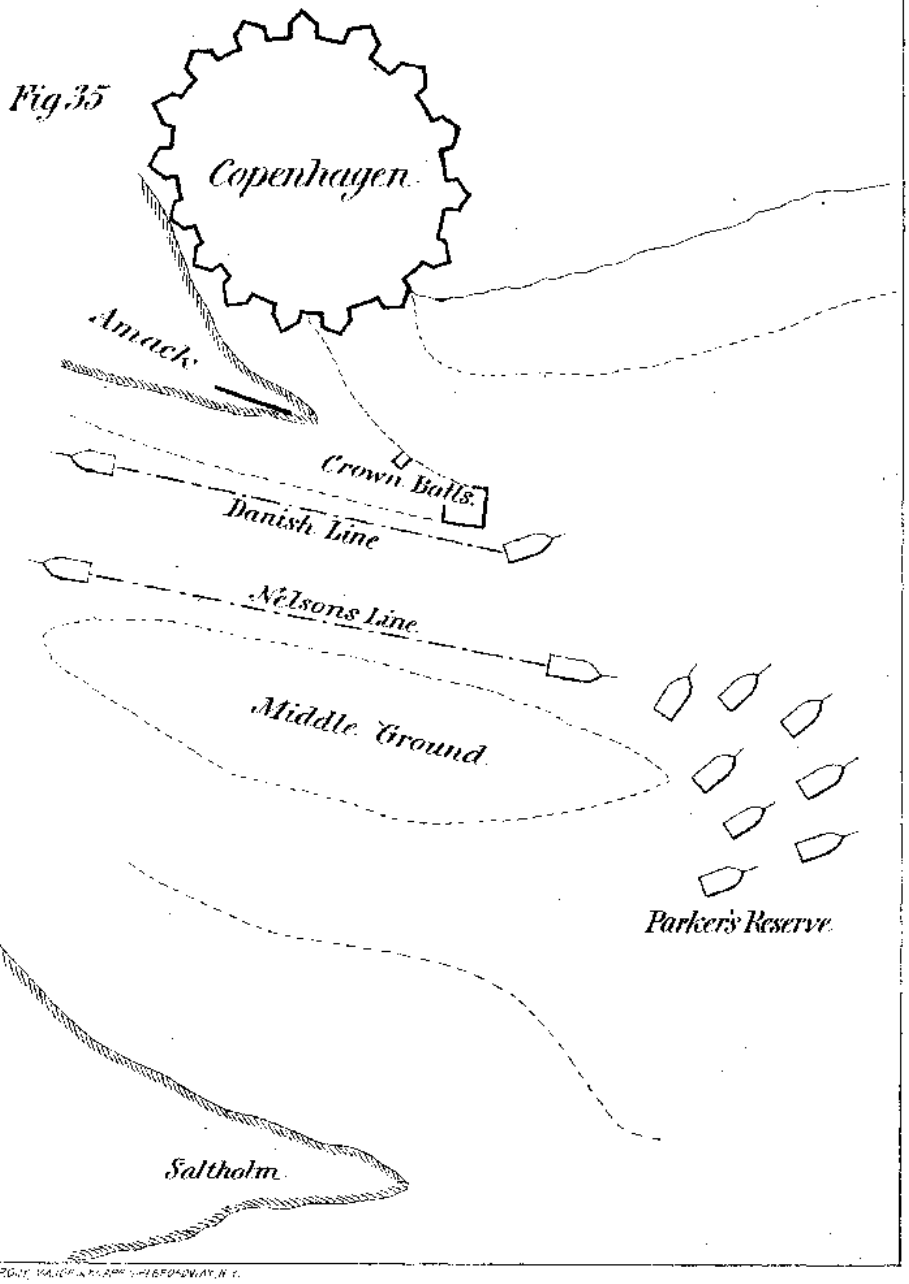

Copenhagen
Amack
Cronenberg
The Sound
Saltholm
Helsinborg

Fig. 35


Copenhagen
Amack
Crown Balls
Danish Line
Nelsons Line
Middle Ground
Parker's Reserve
Saltholm

back

Fig. 34.

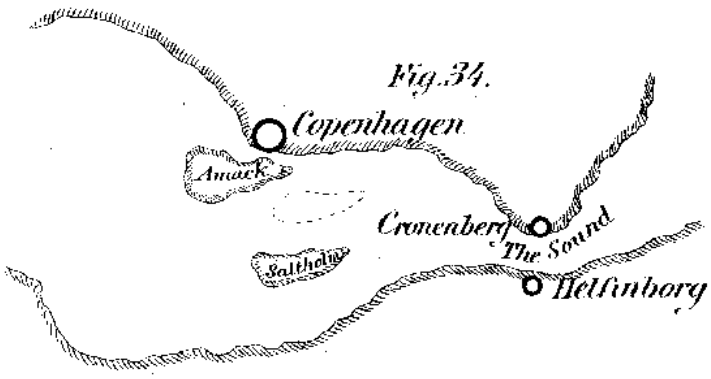
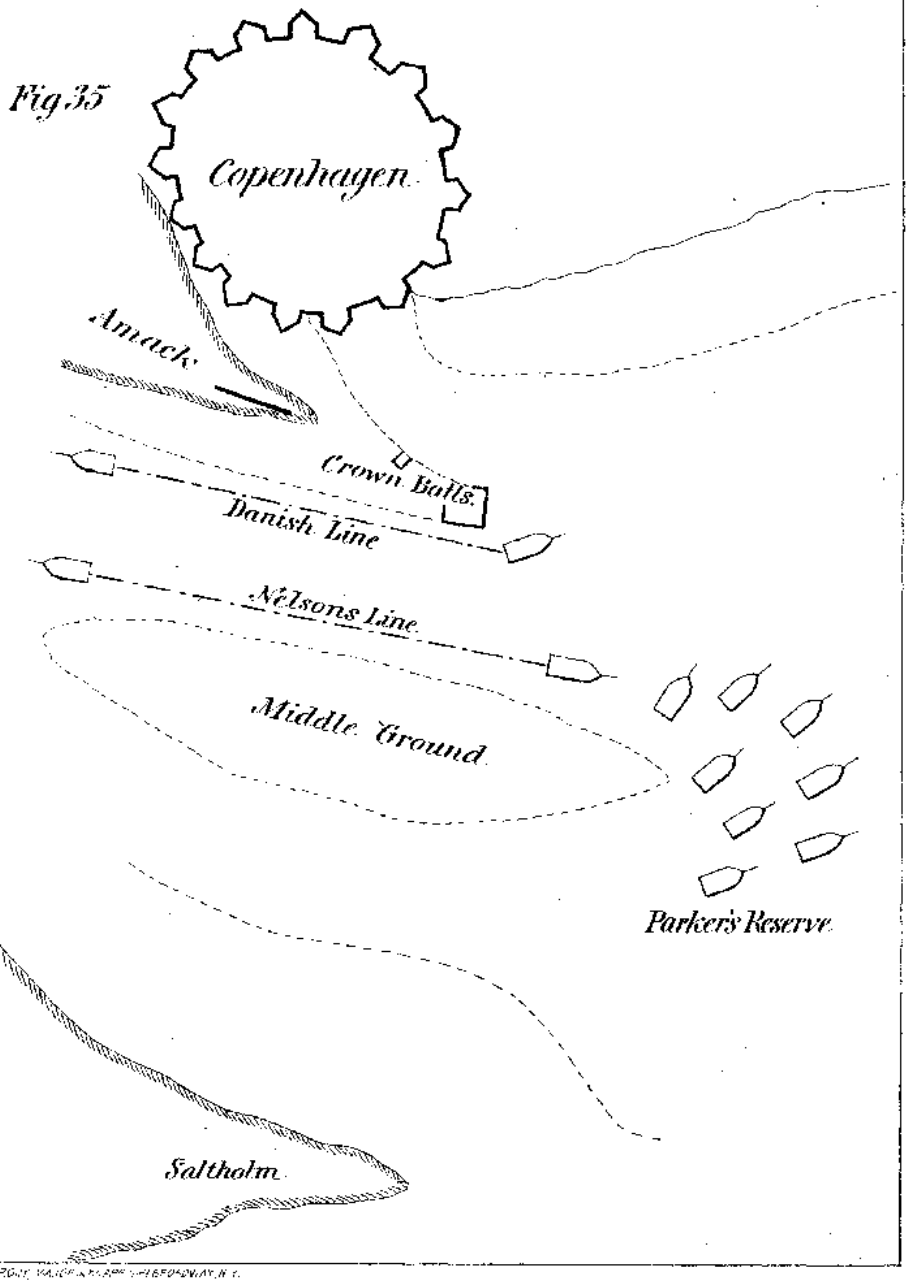

Copenhagen
Amack
Cronenberg
The Sound
Saltholm
Helsinborg

Fig. 35


Copenhagen
Amack
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Danish Line
Nelsons Line
Middle Ground
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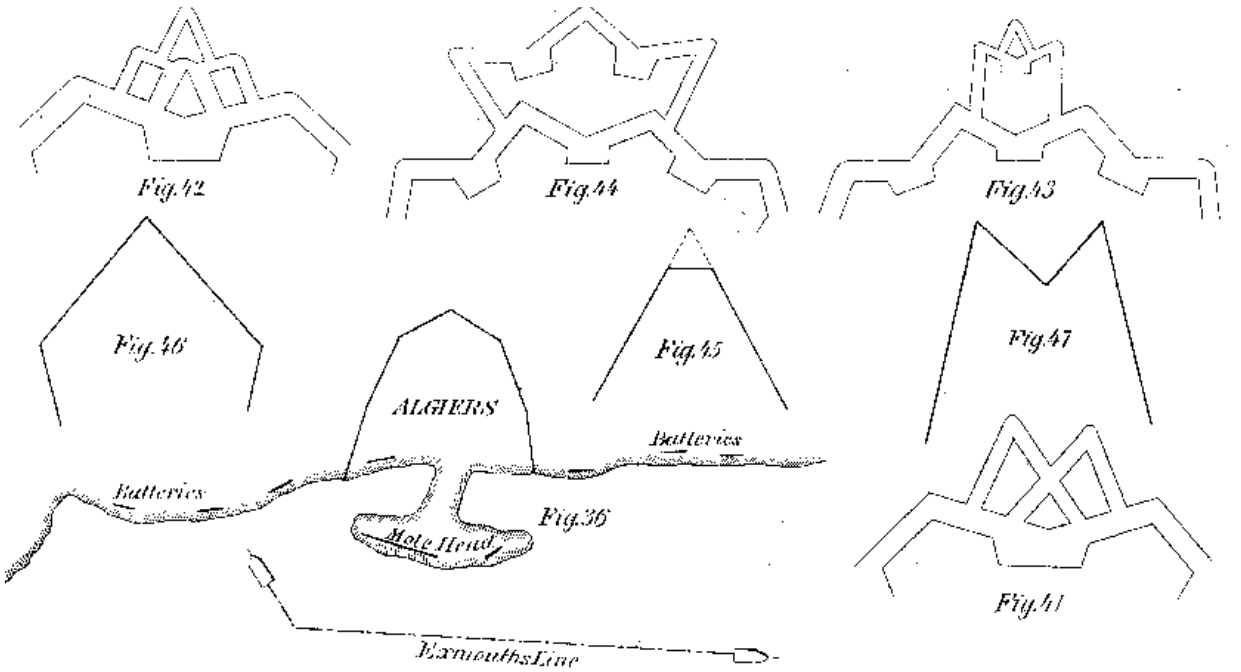
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Fig.47
ALGIERS
Batteries
Batteries
Fig.36
Mole Head
Fig.41
ExmouthsLine

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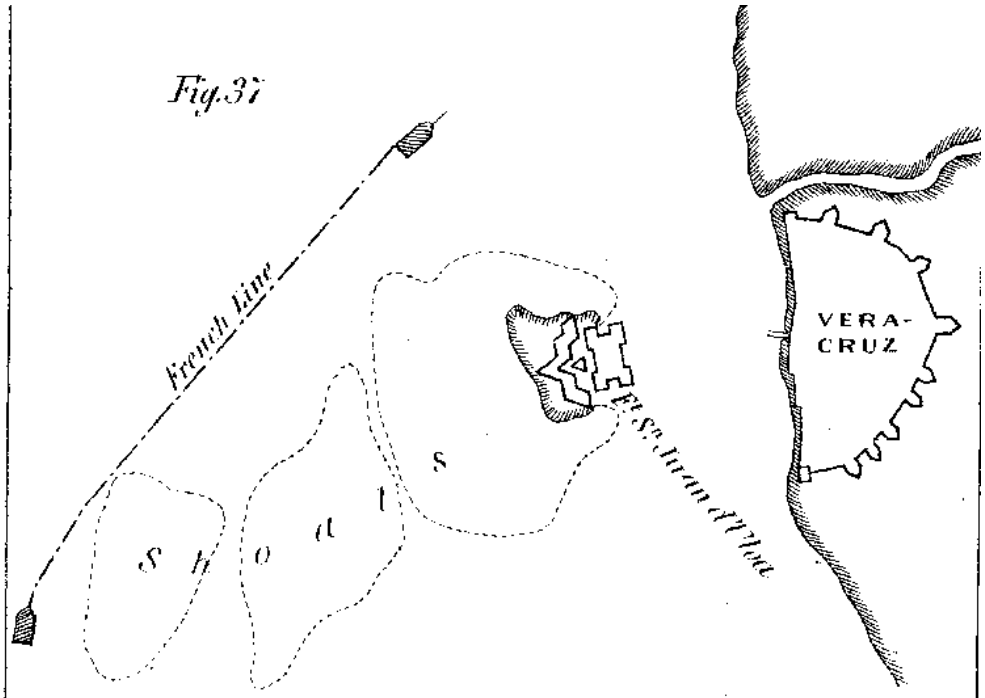

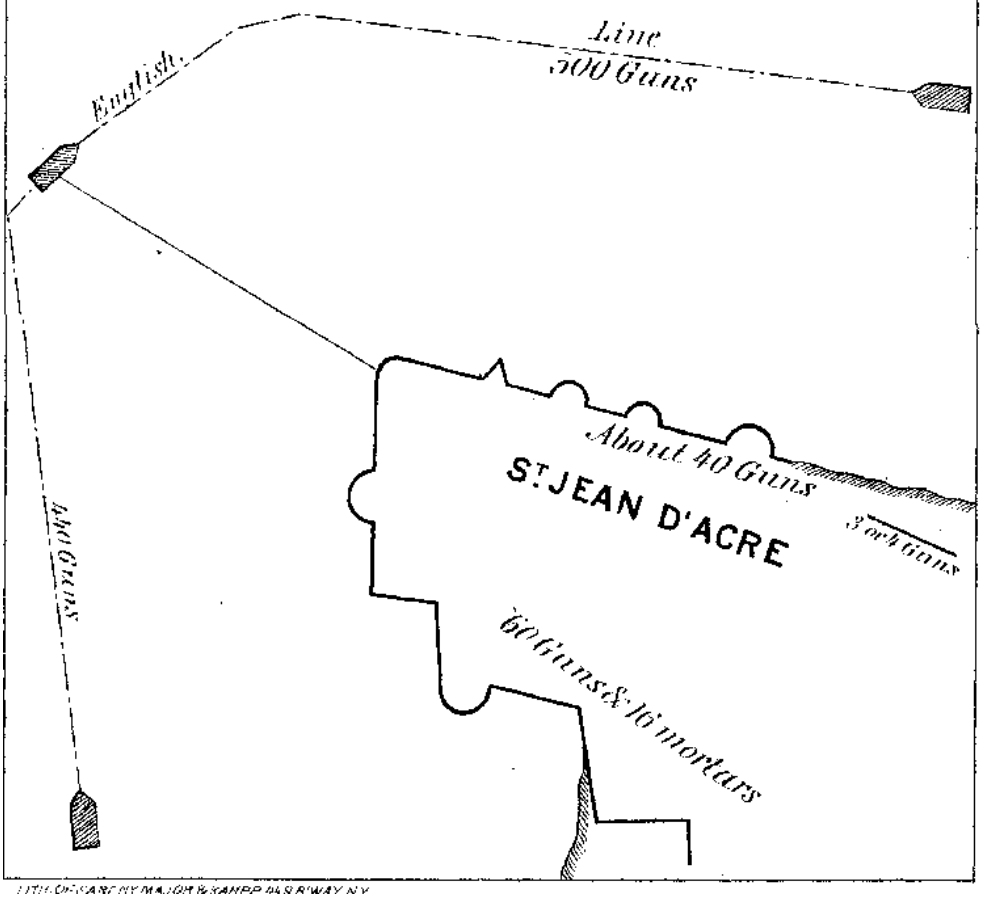

LITH. OF SARONY MAJOR & KNAPP 343 B'WAY N.Y.

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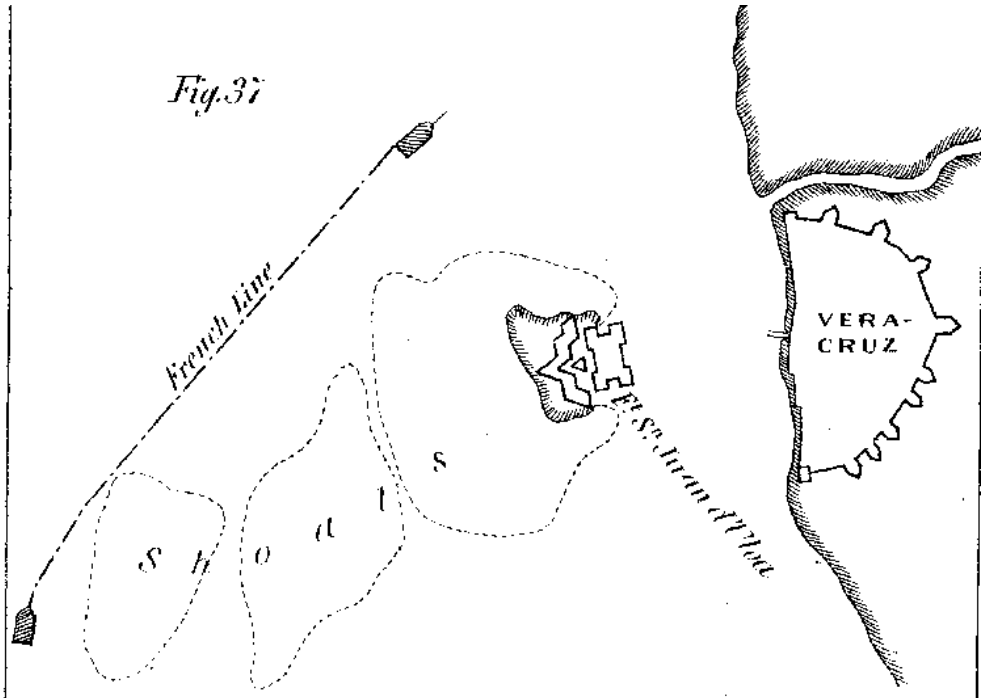

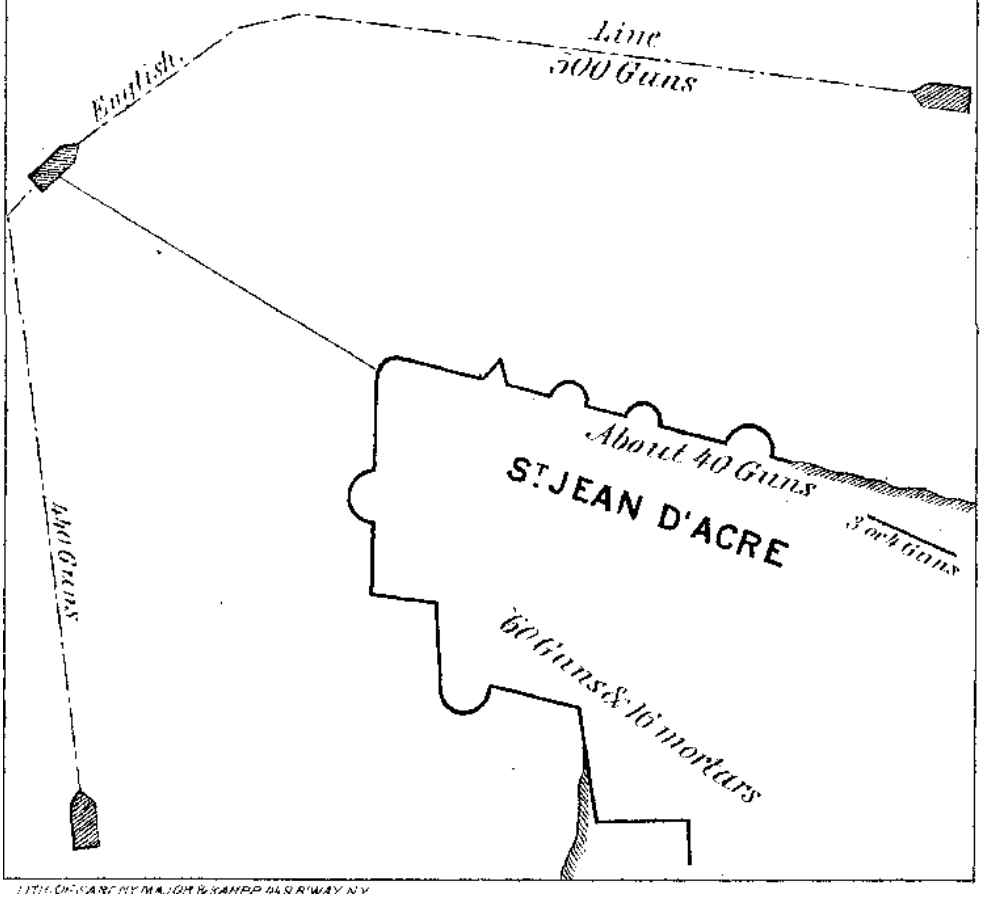

LITH. OF SARONY MAJOR & KNAPP 343 B'WAY N.Y.

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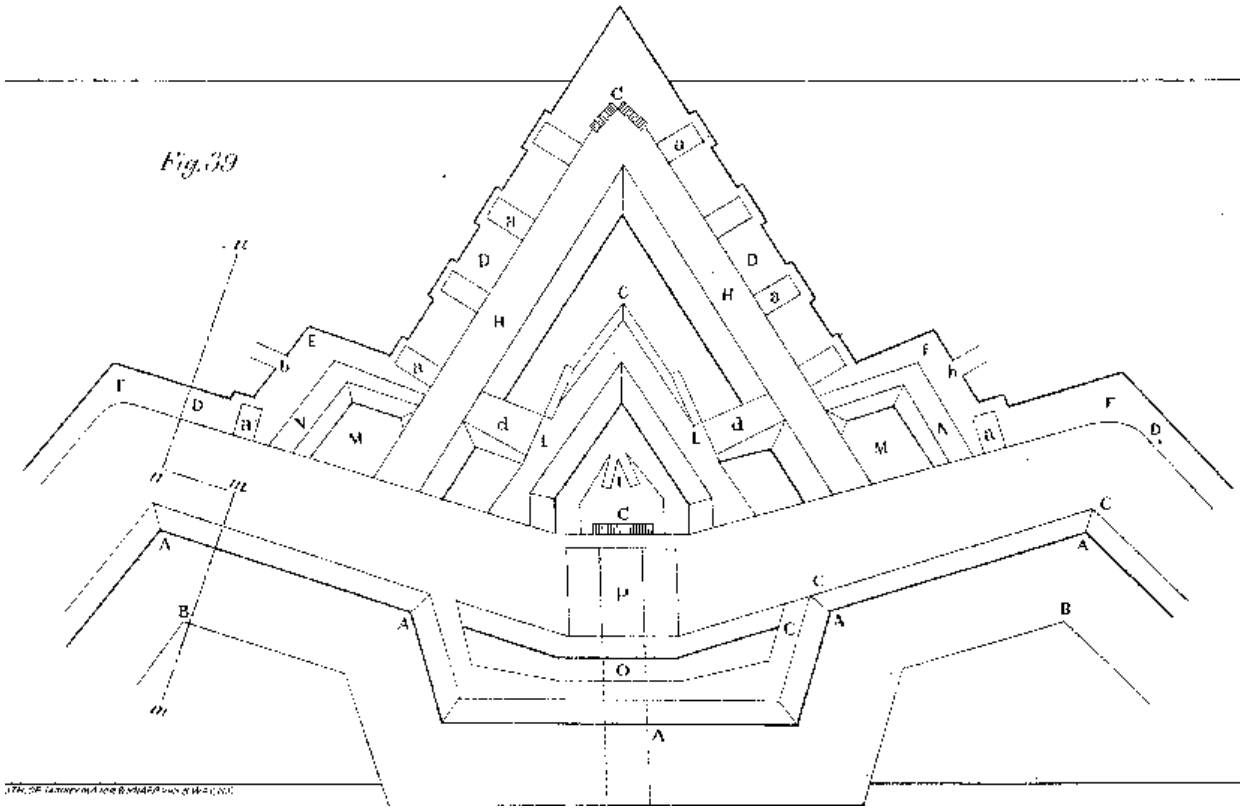

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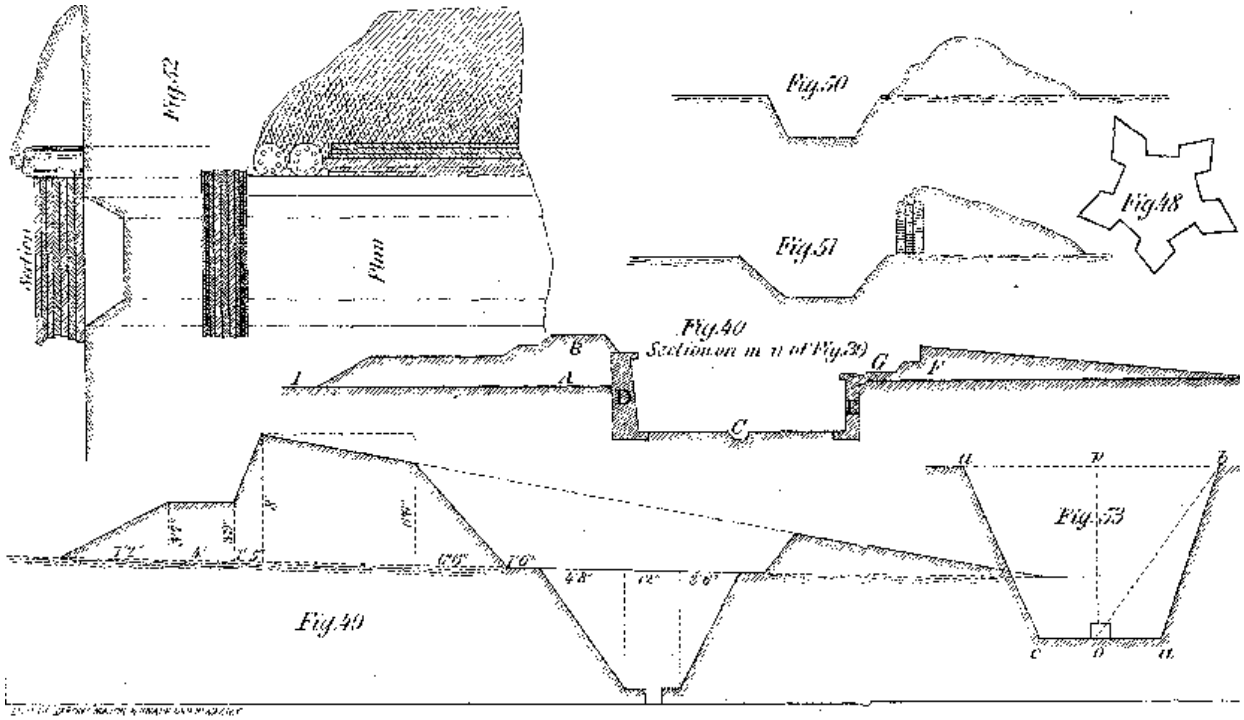
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Section
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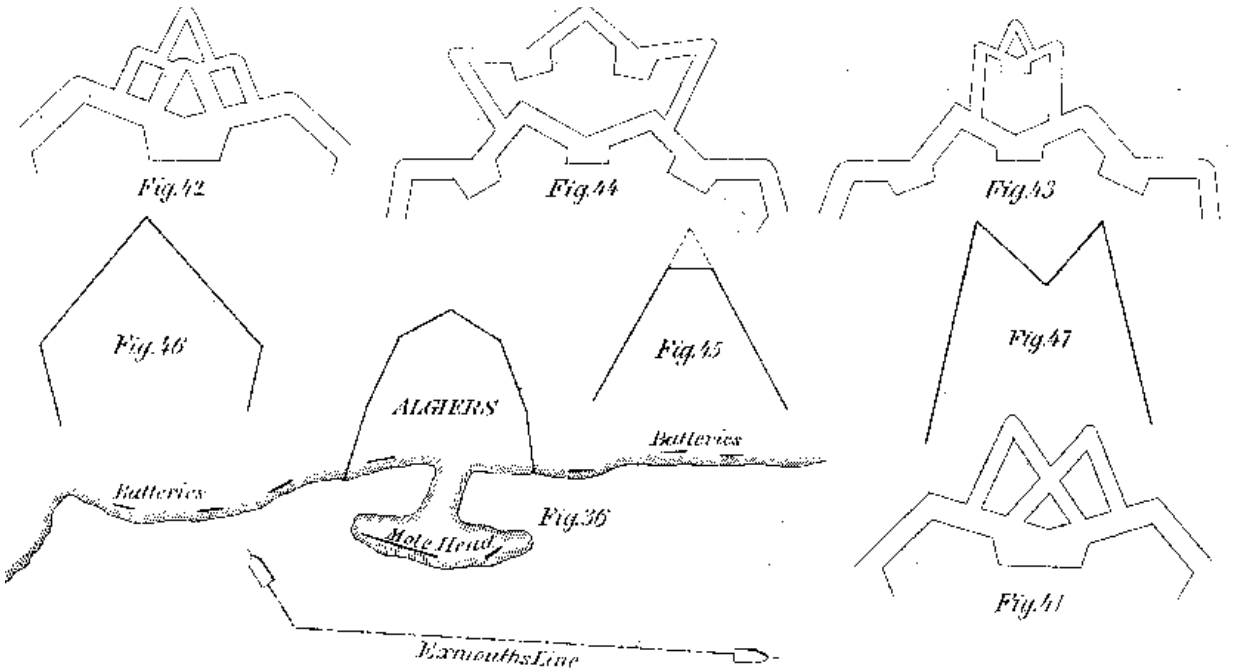
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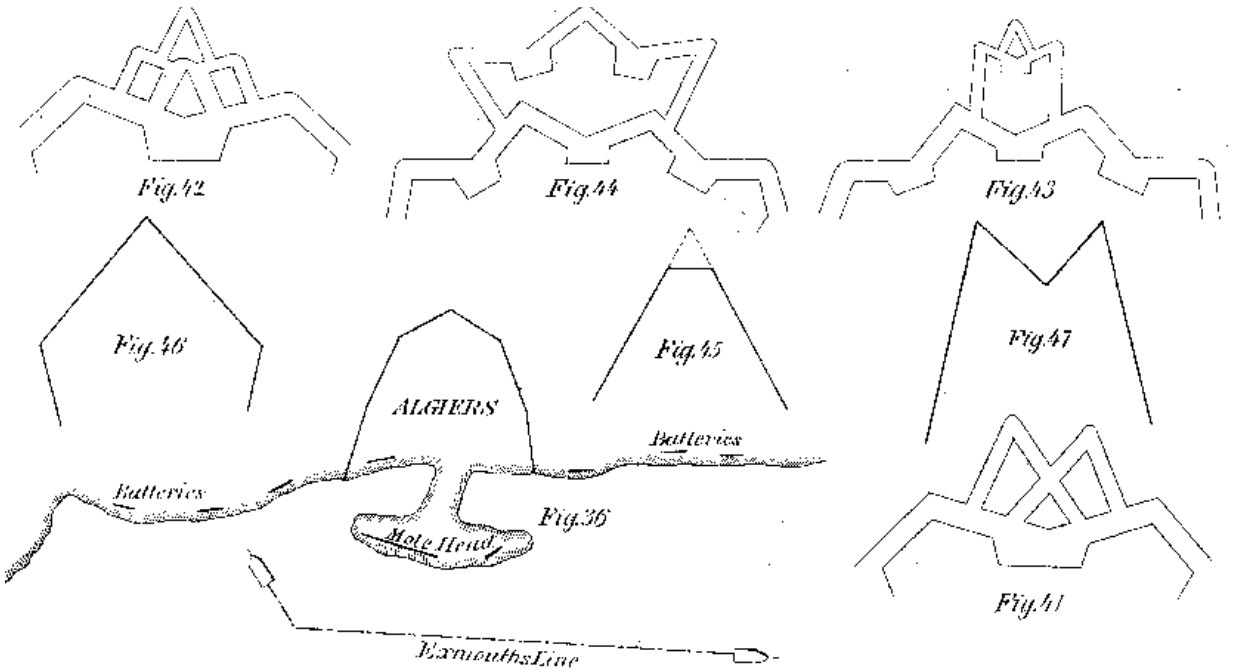
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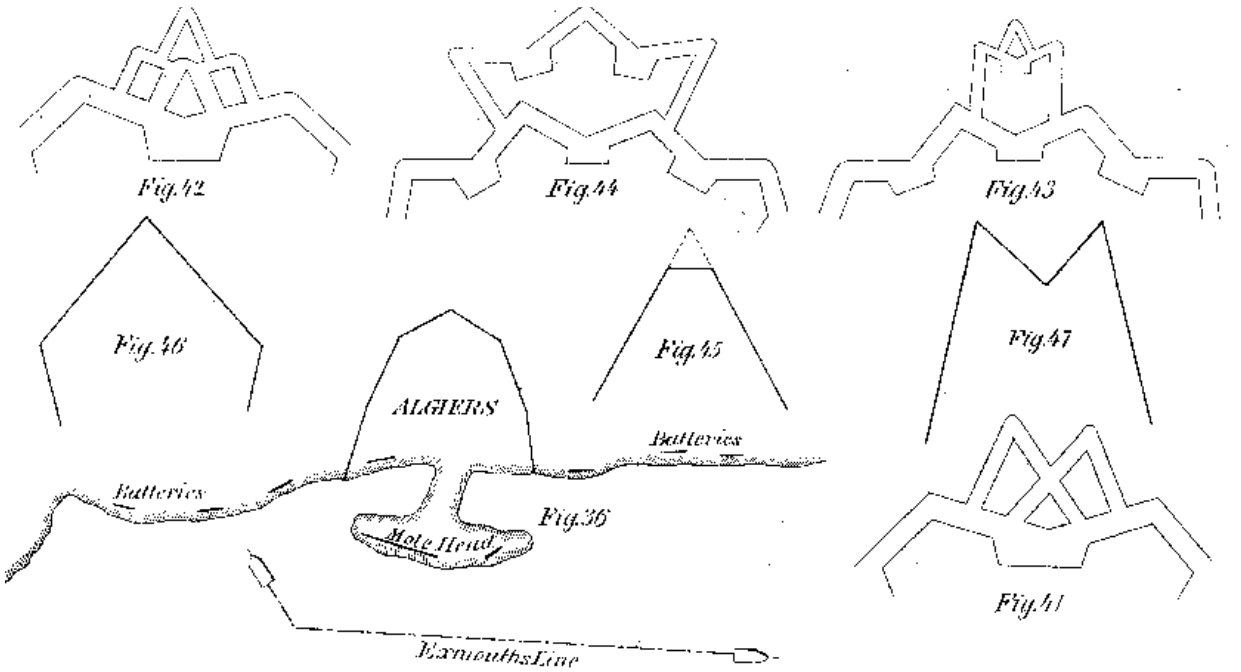
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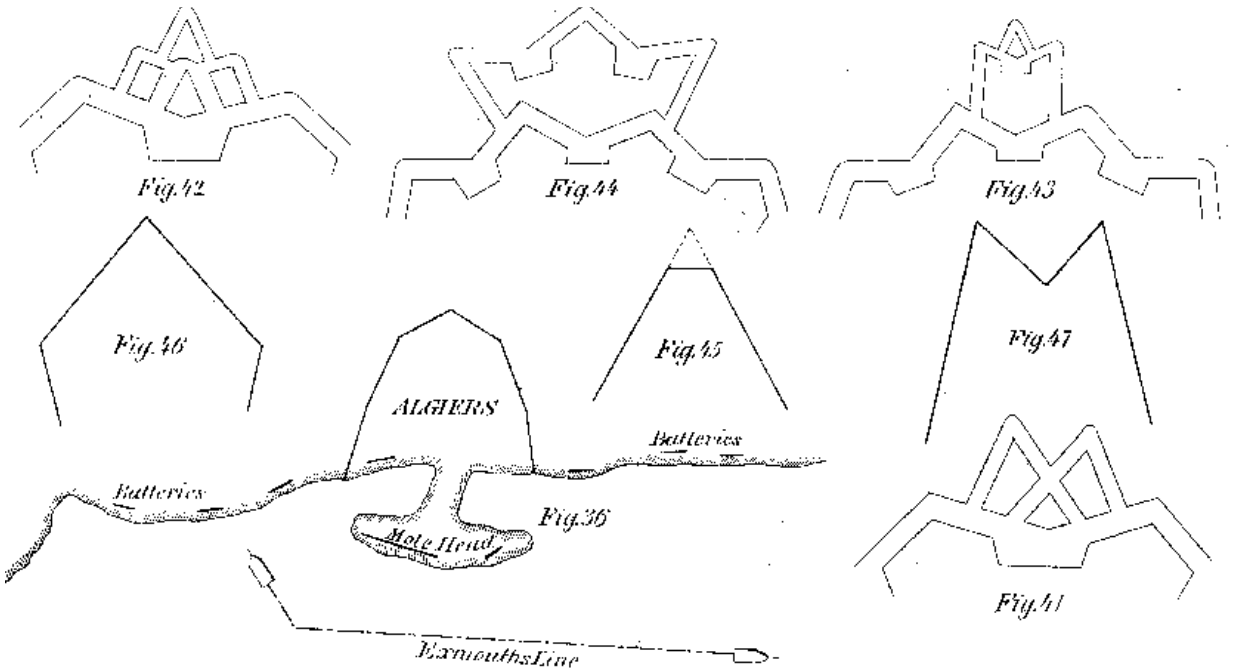
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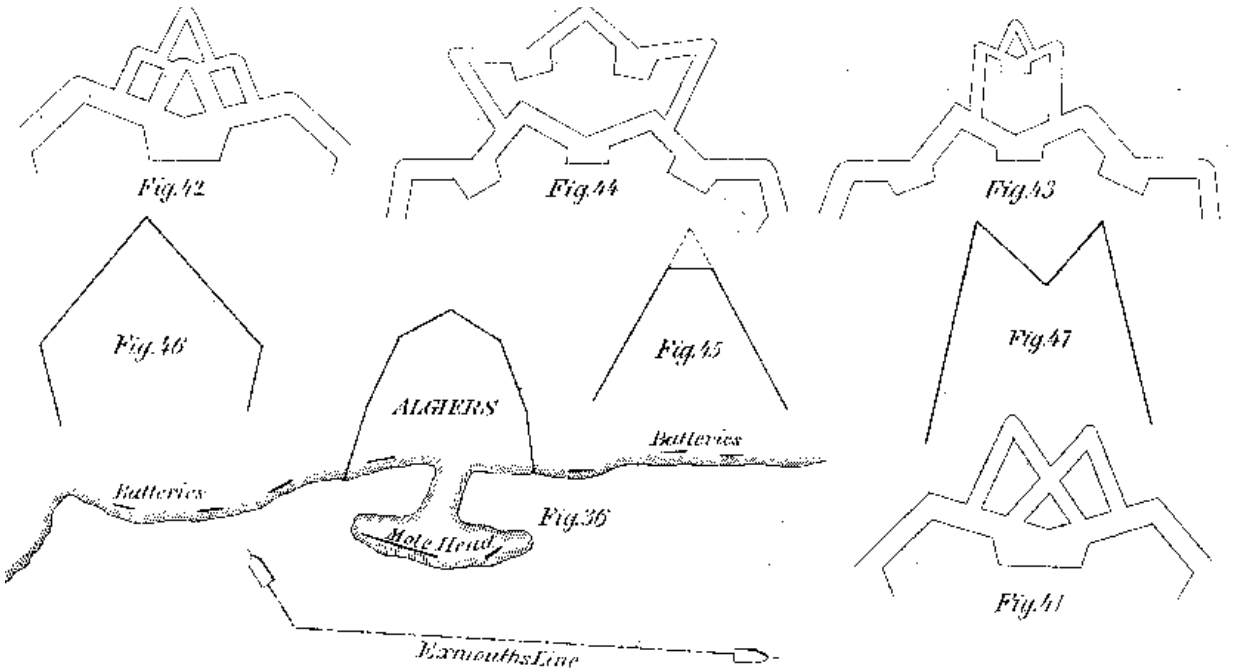
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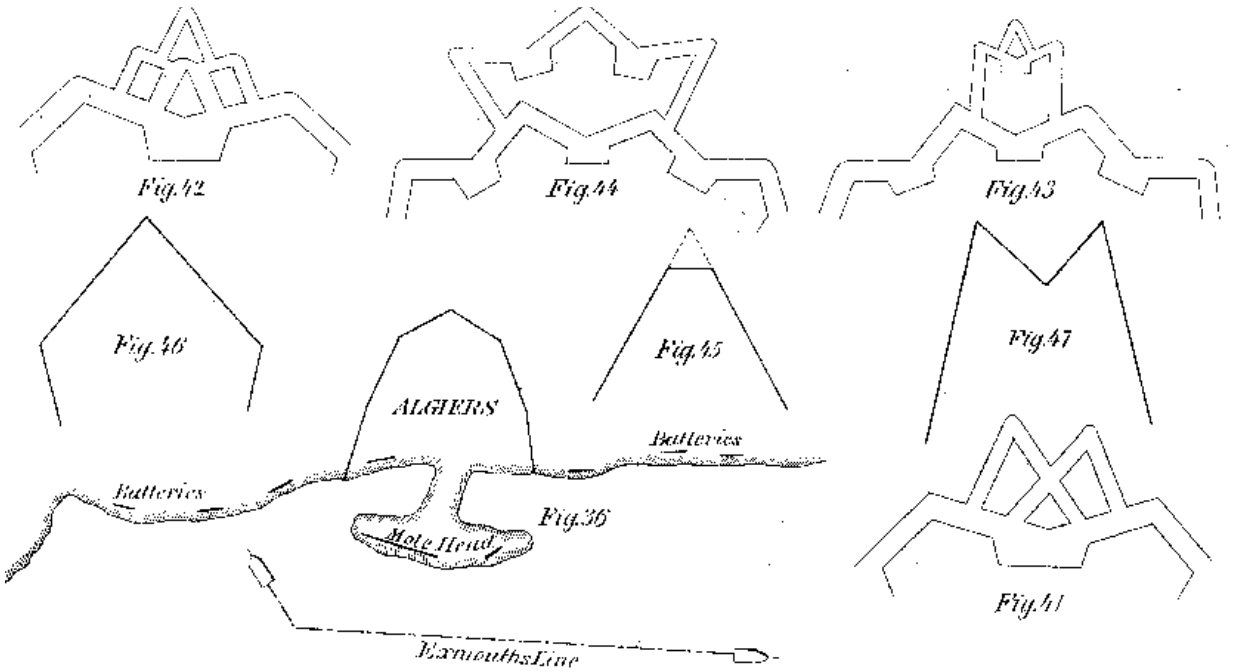
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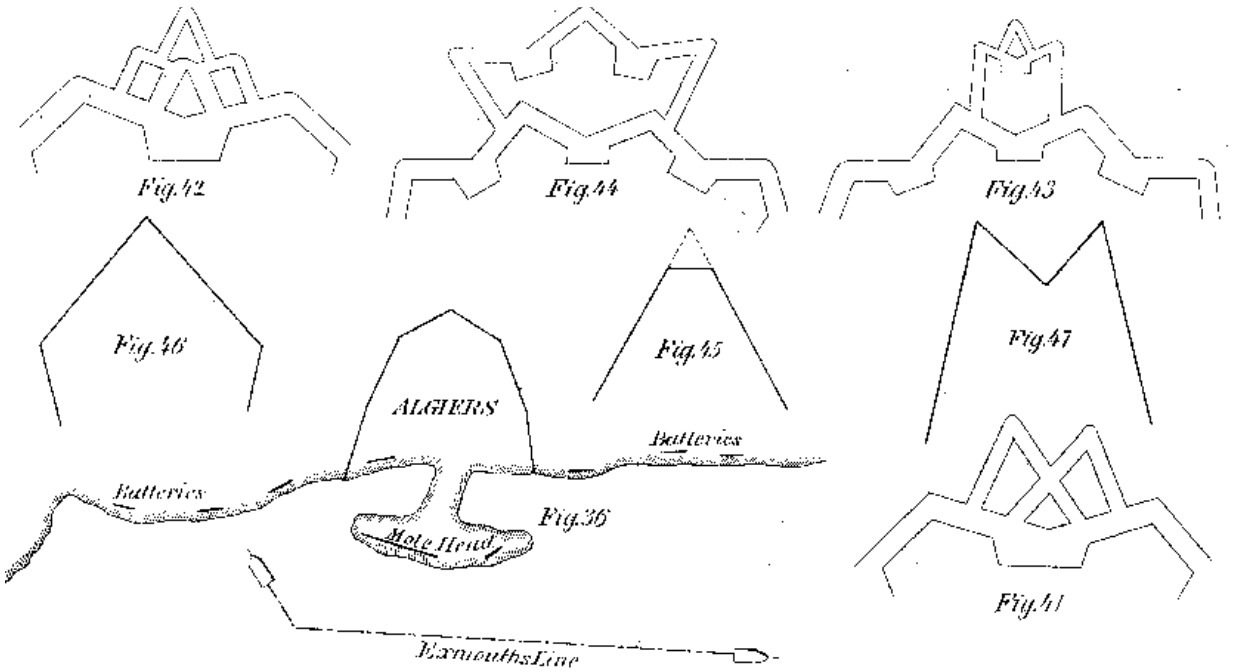
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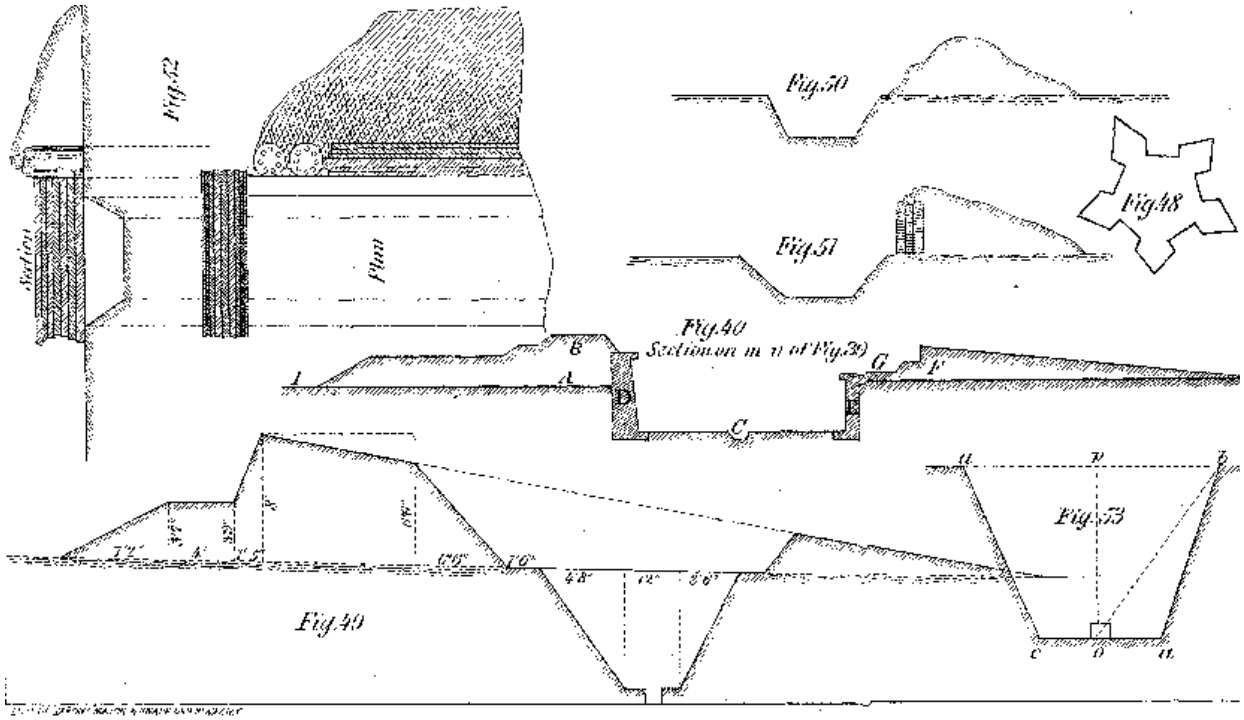
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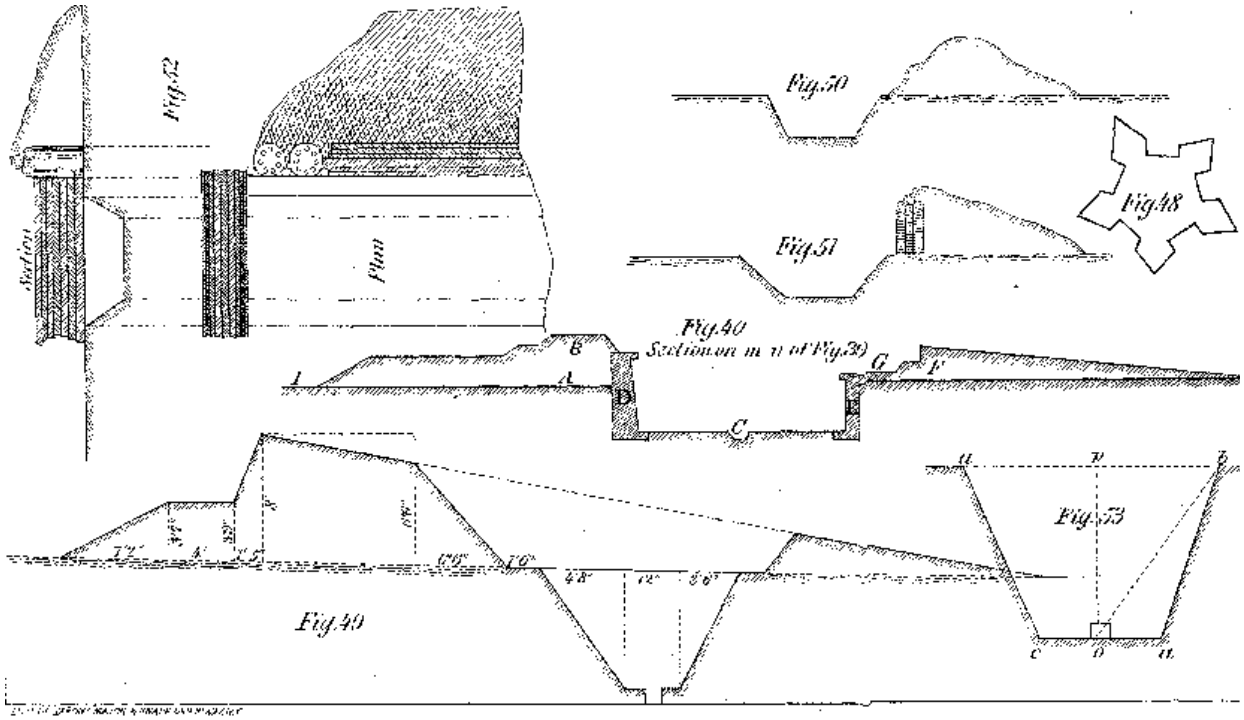
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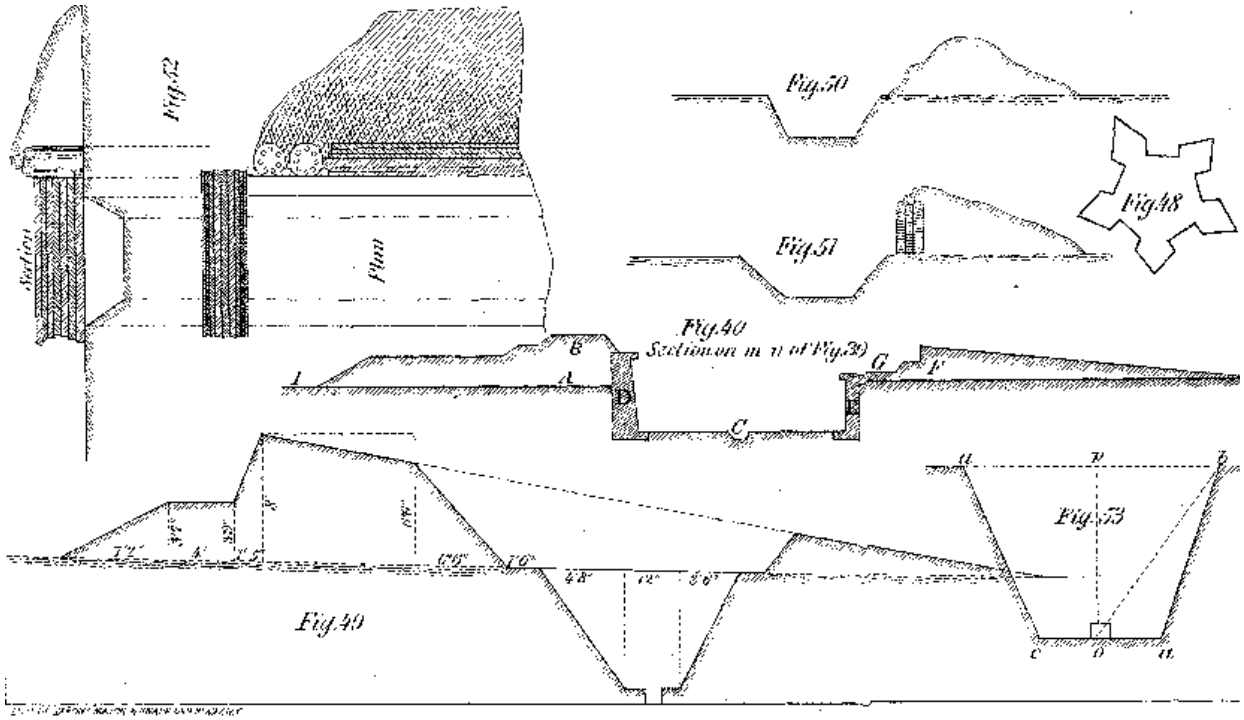
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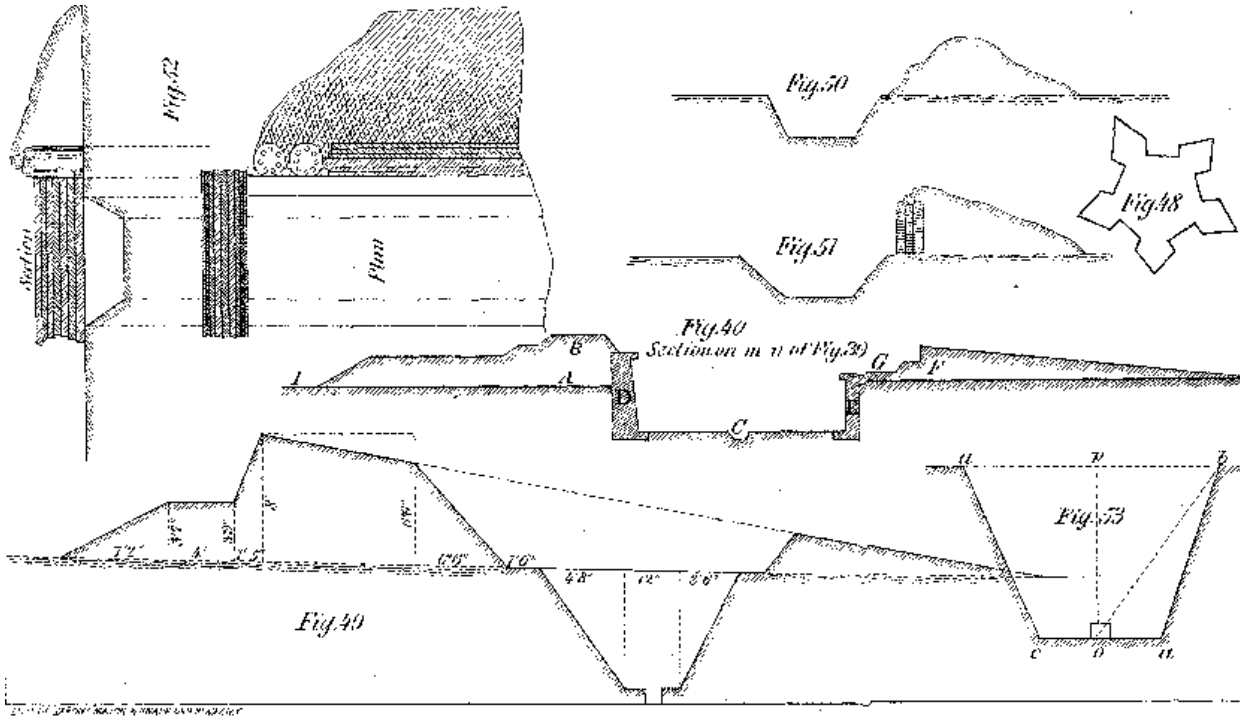
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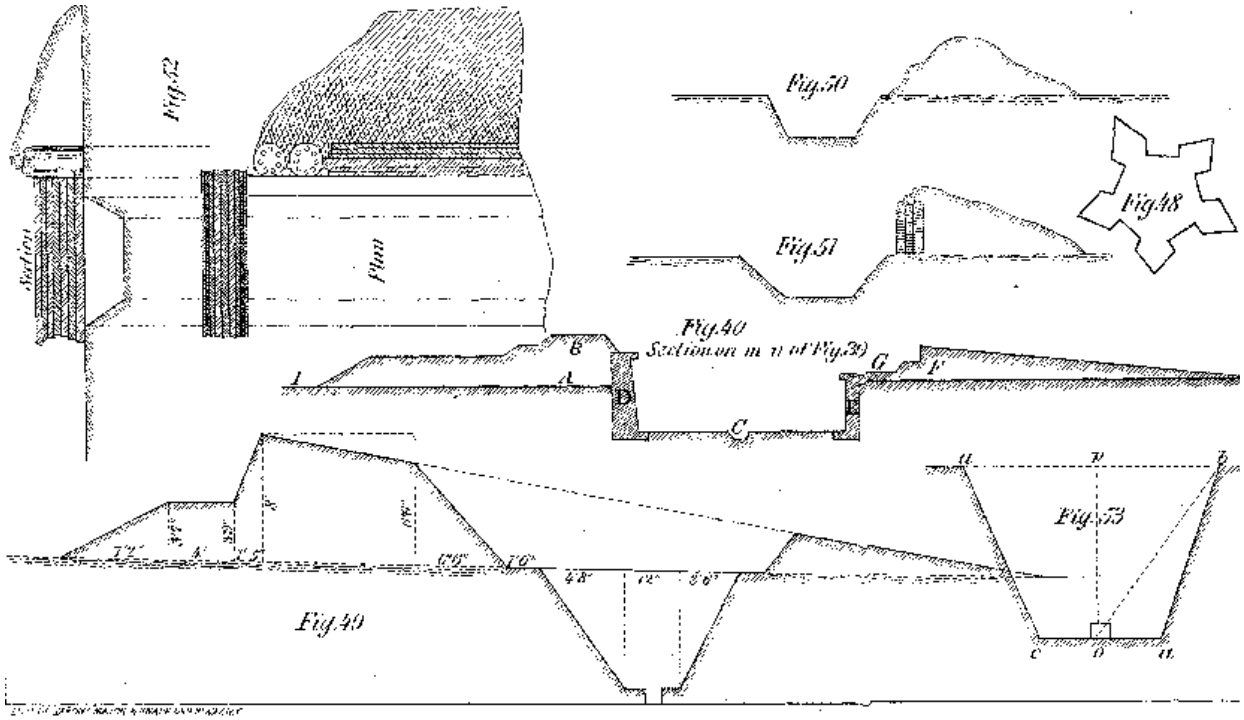
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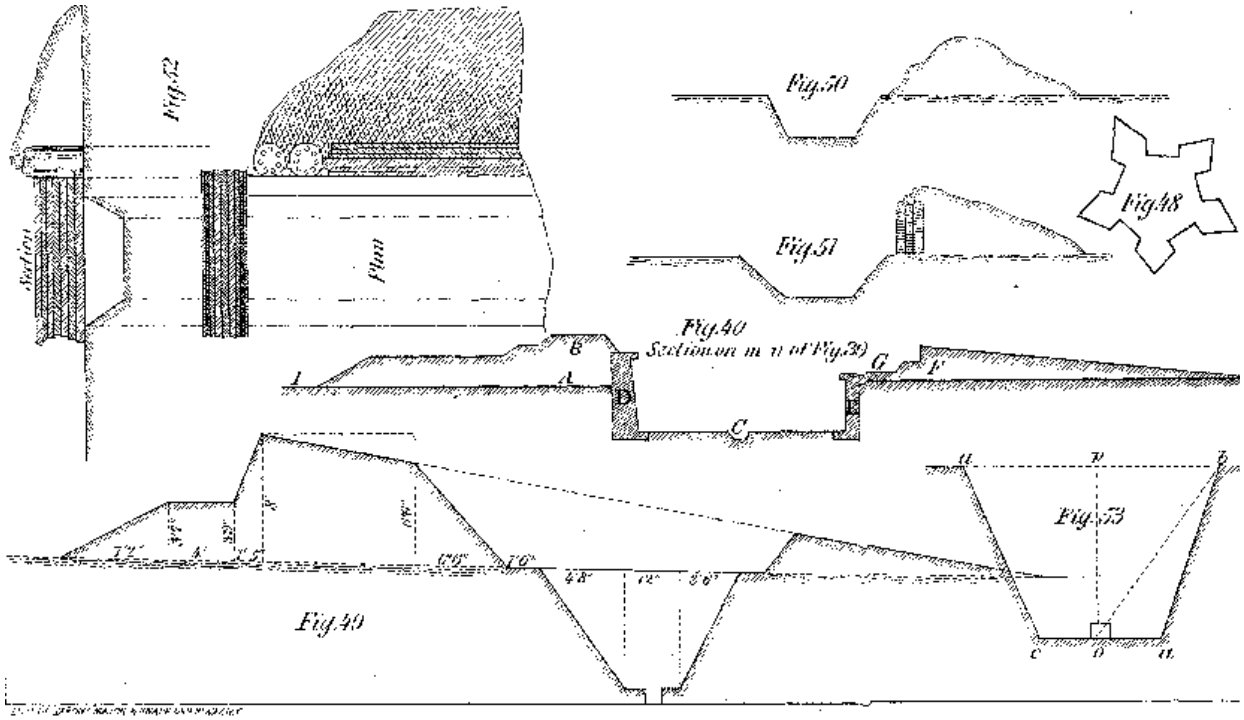
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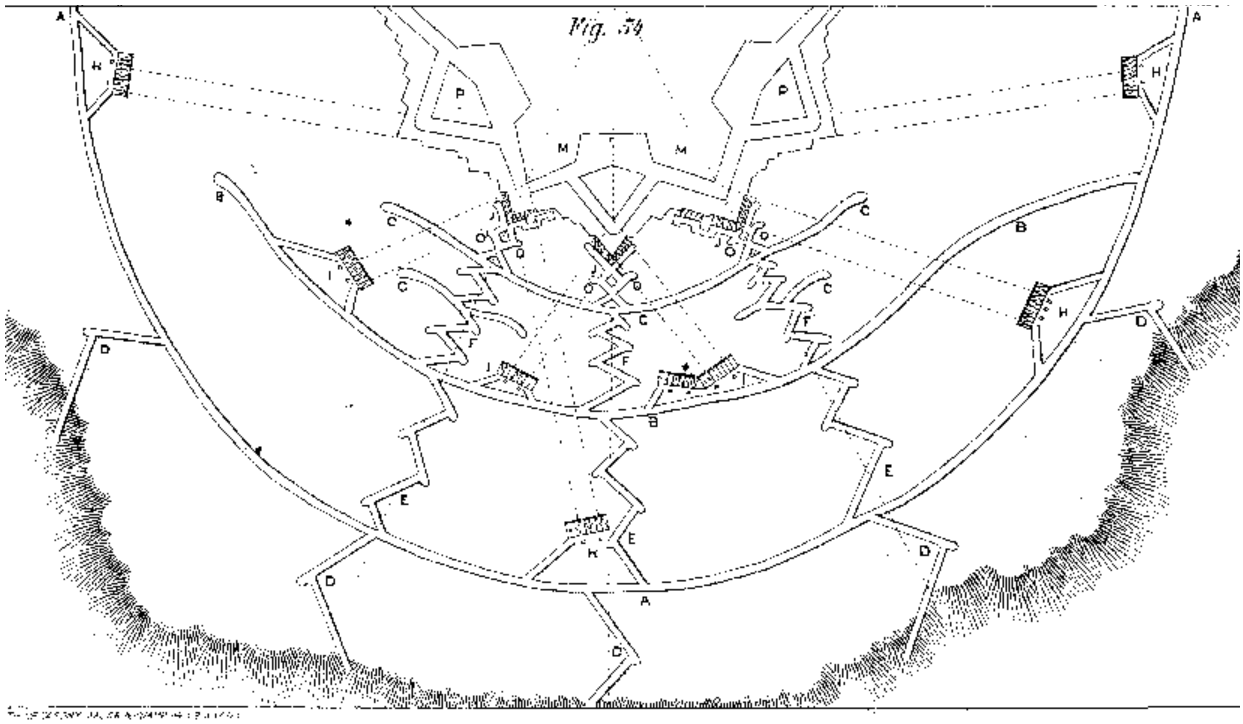

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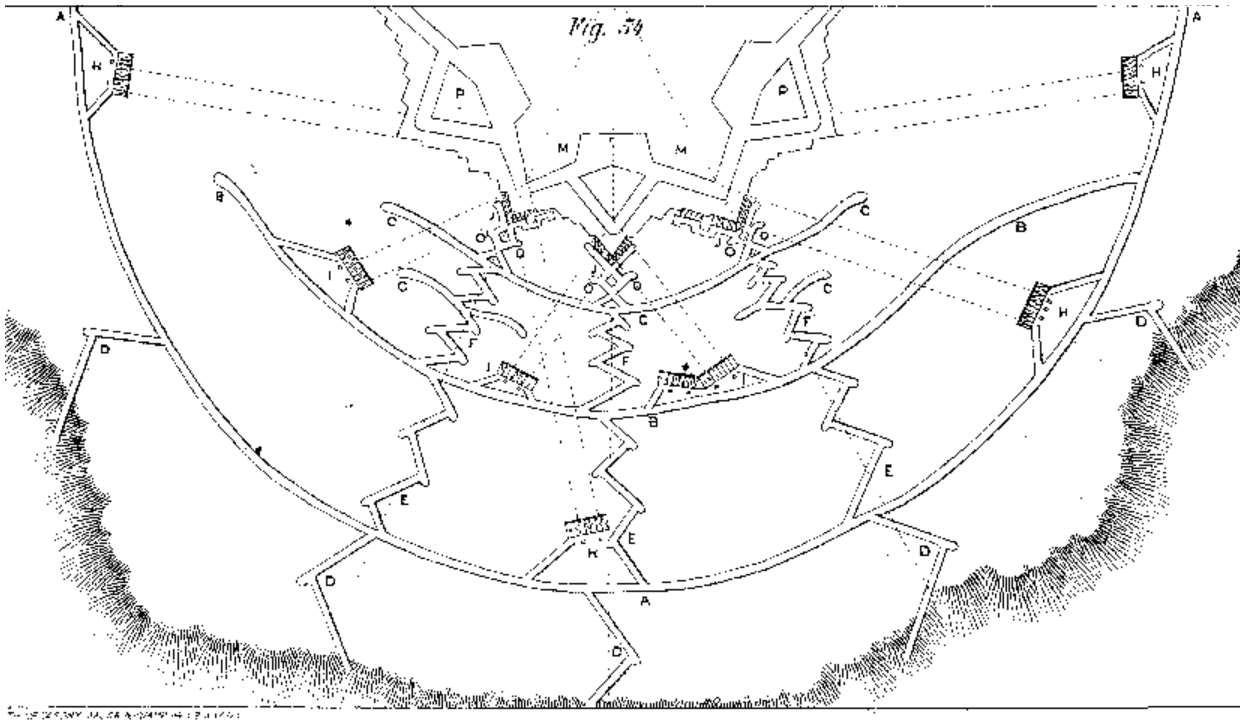

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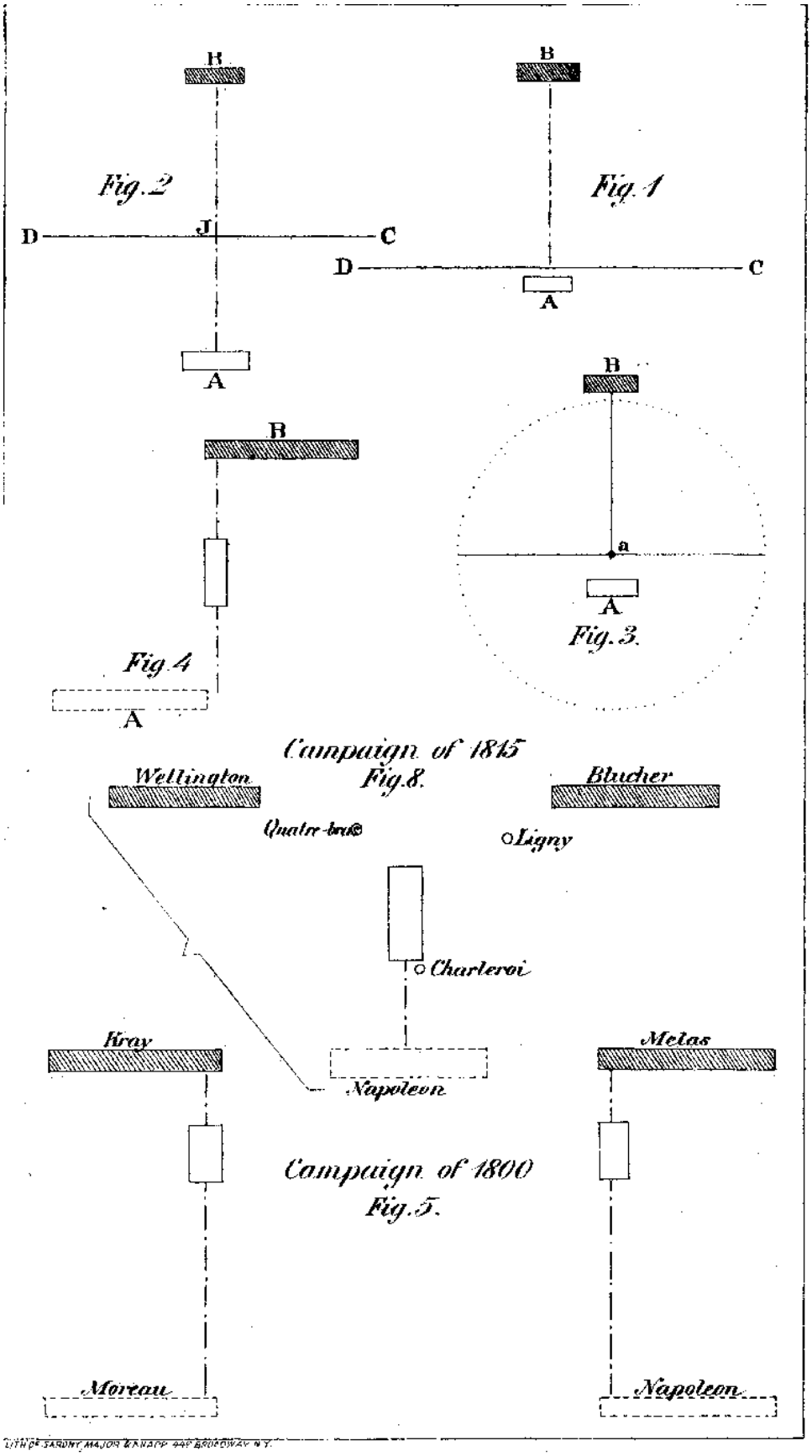

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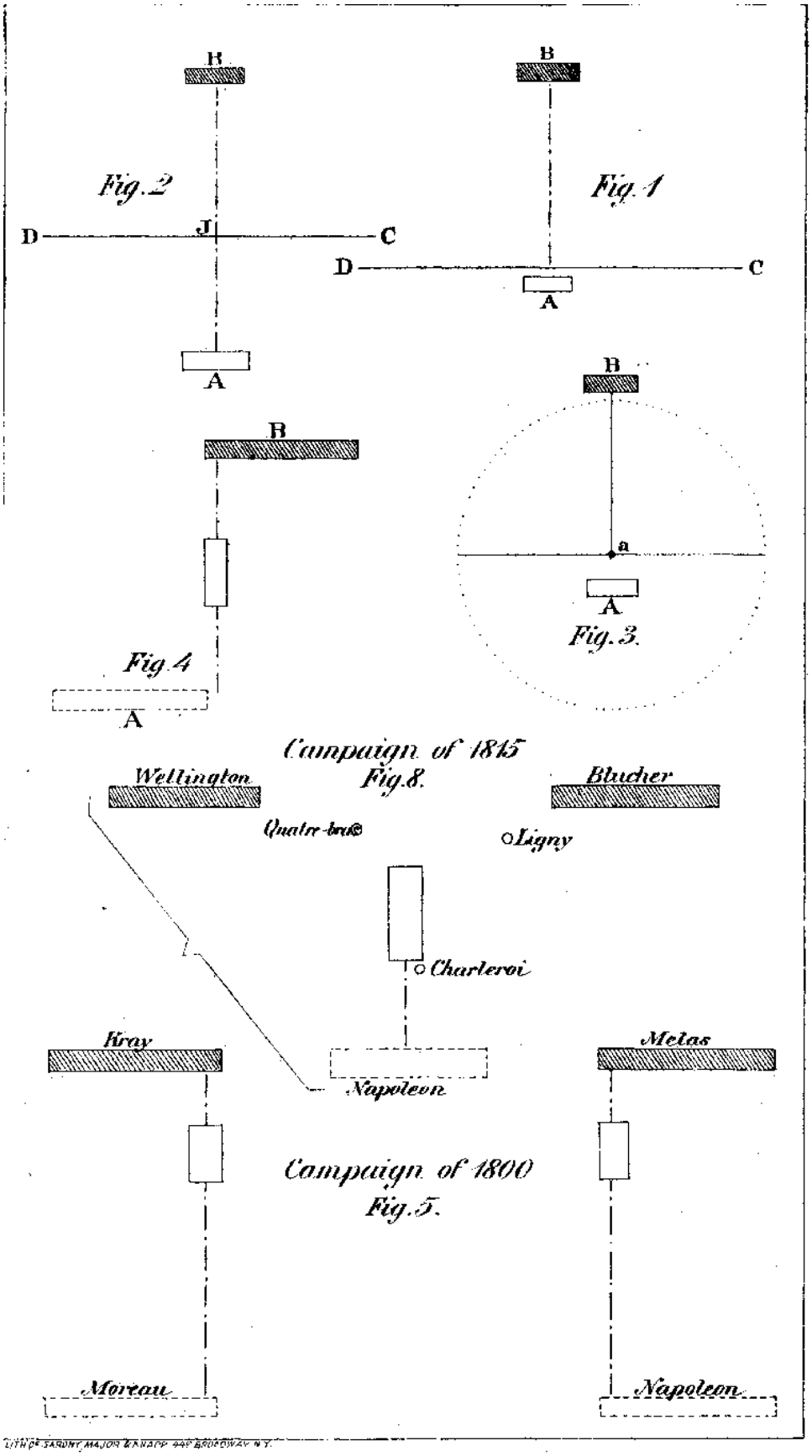

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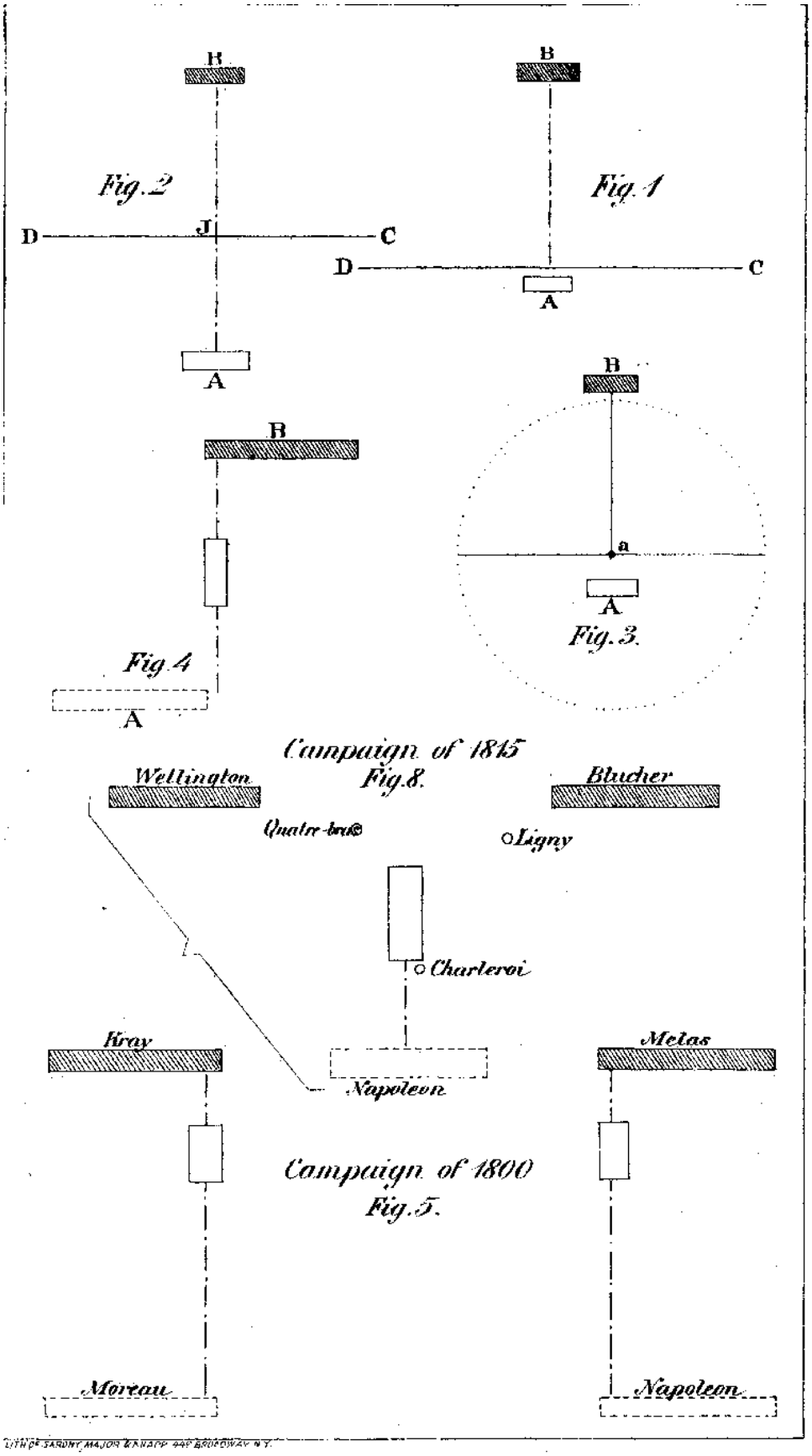

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Fig. 6. Marengo Campaign.

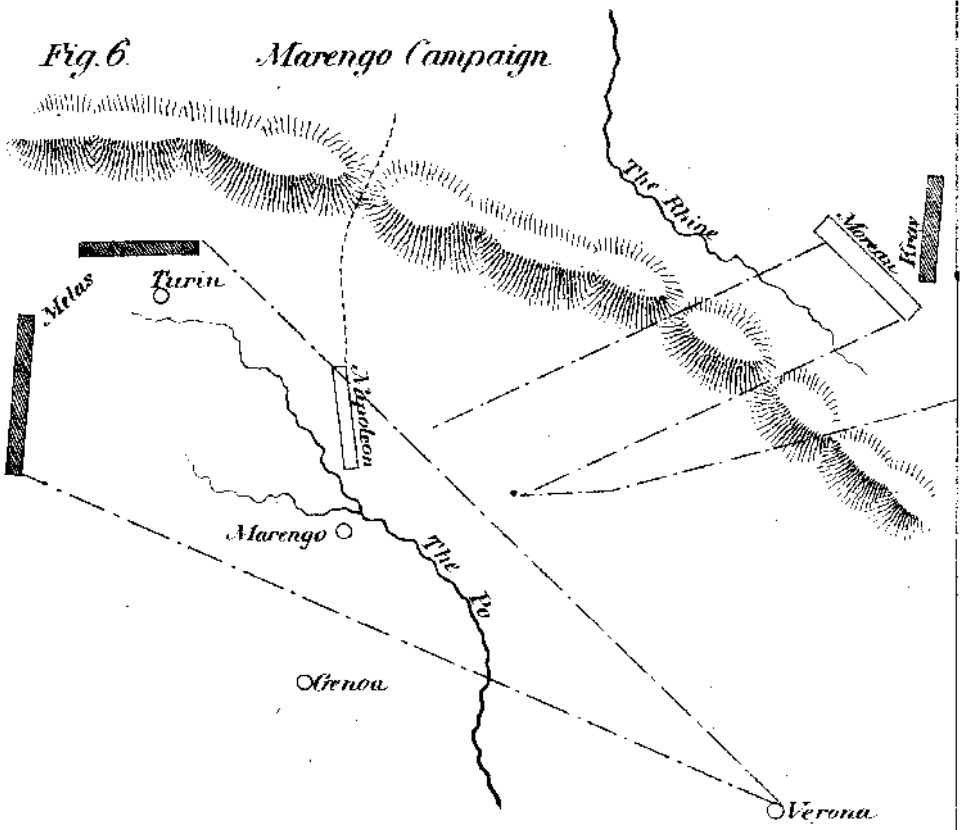
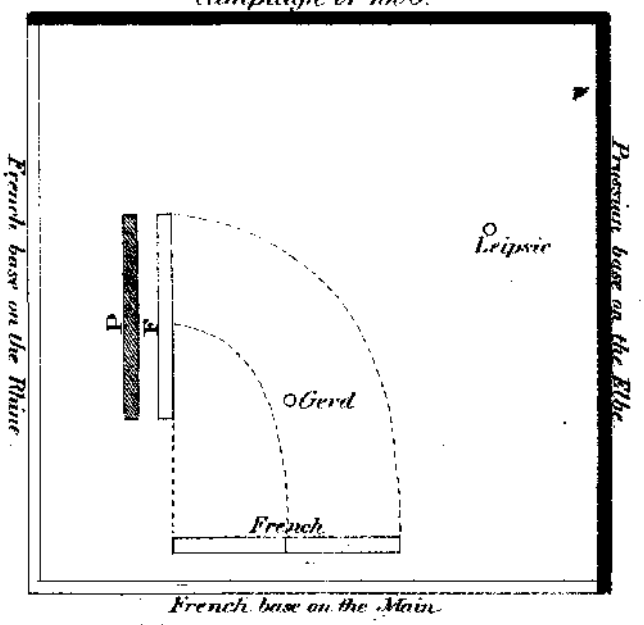


Fig 7.
Campaign of 1806.



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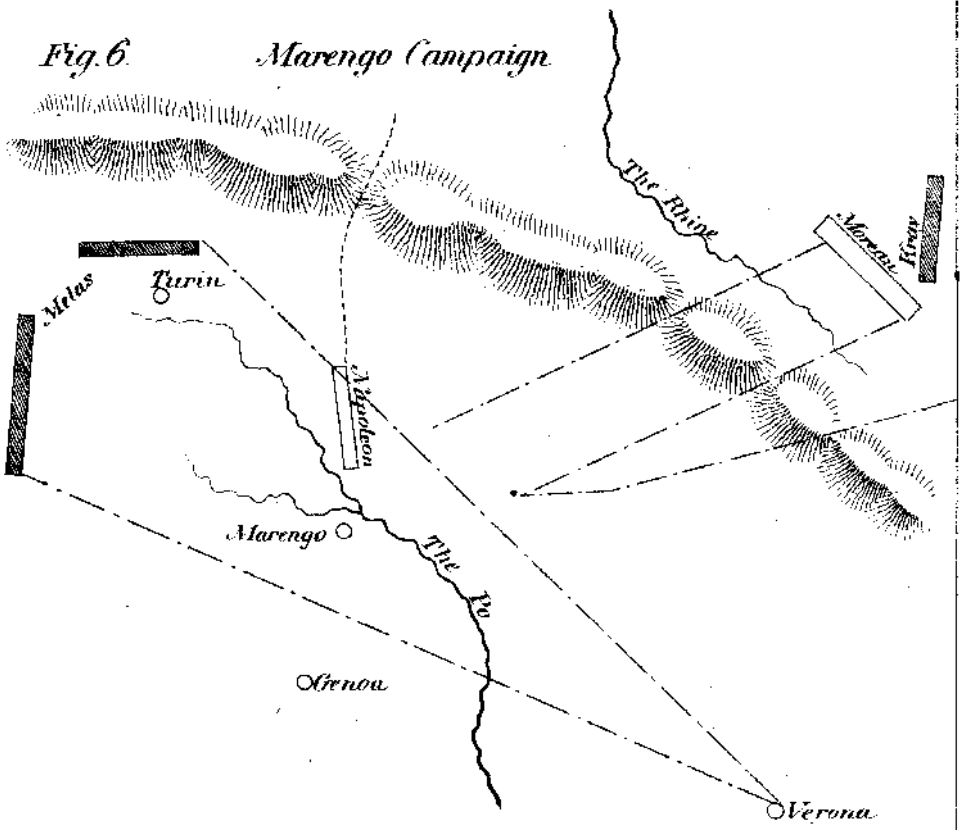

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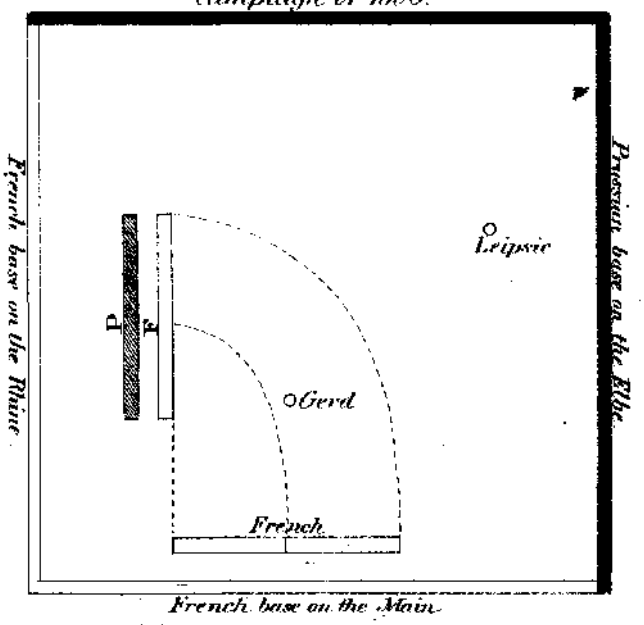

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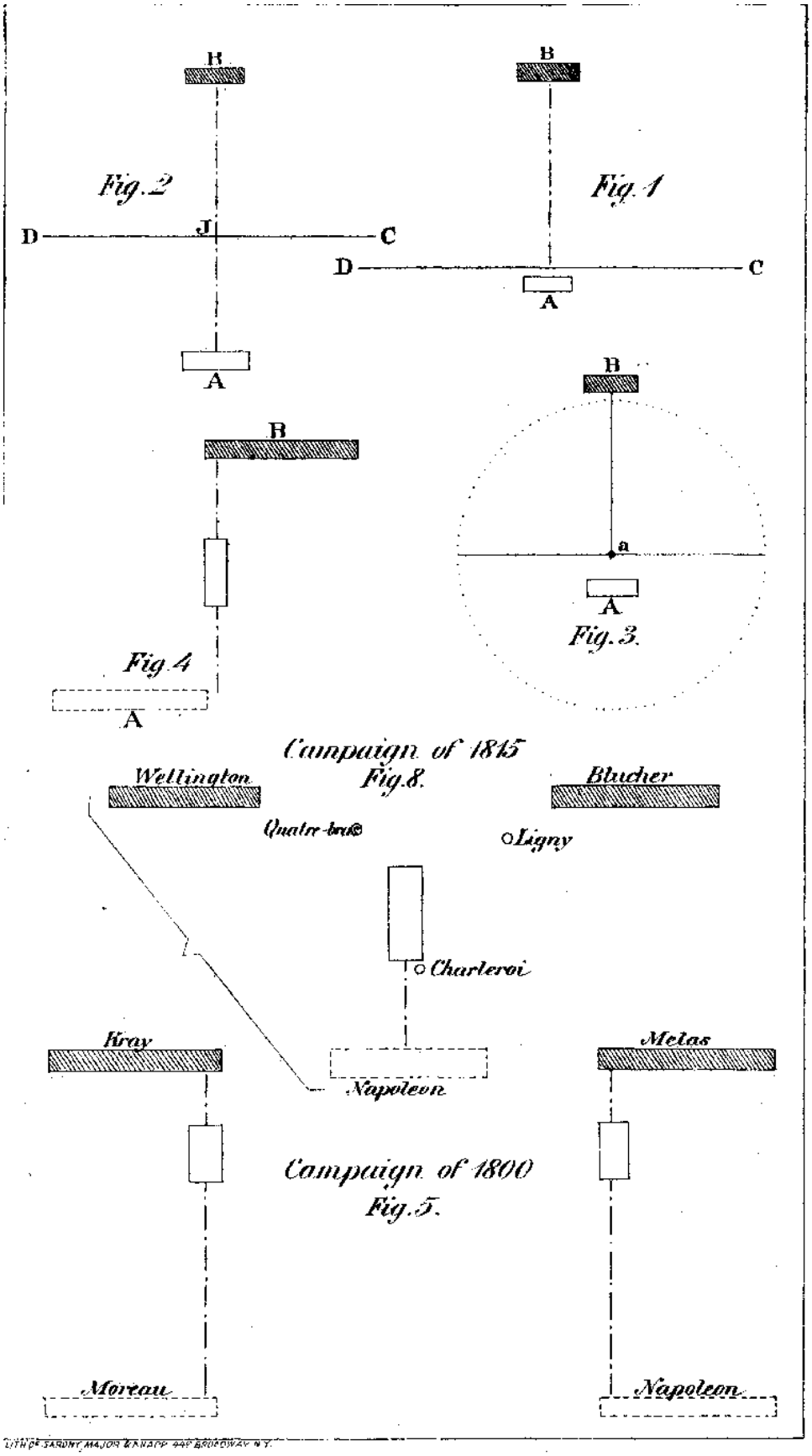

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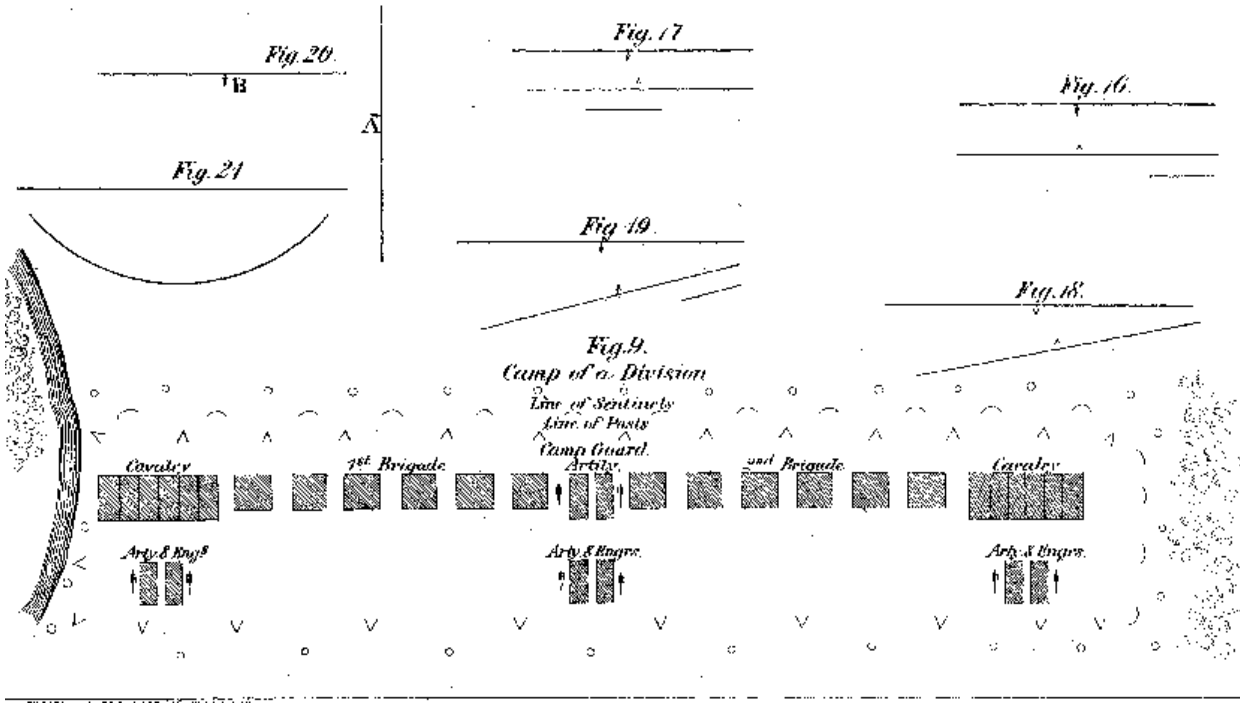
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Fig. 10.
Battalion of Infantry.

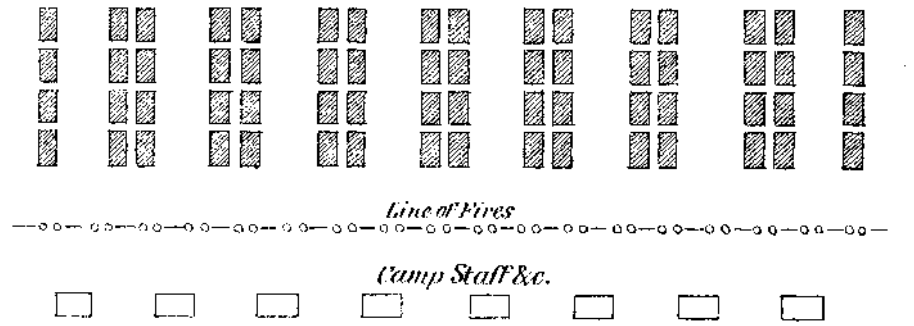


Fig. 12
2 Comps. of Foot Arty. or Engrs.

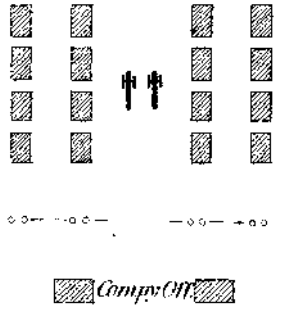
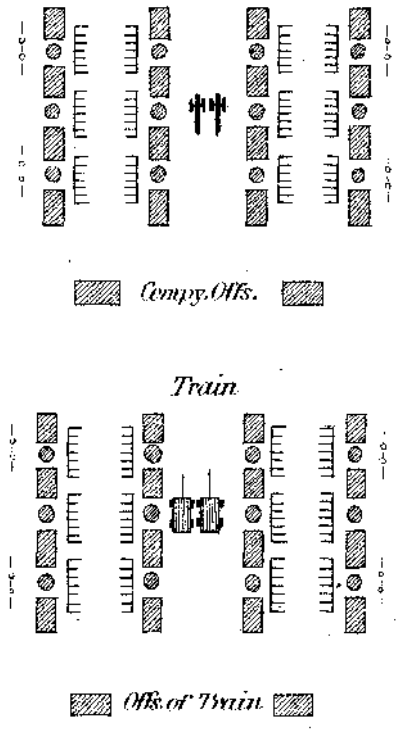


Fig. 13
2 Comps. of Mounted Arty. or Engrs.



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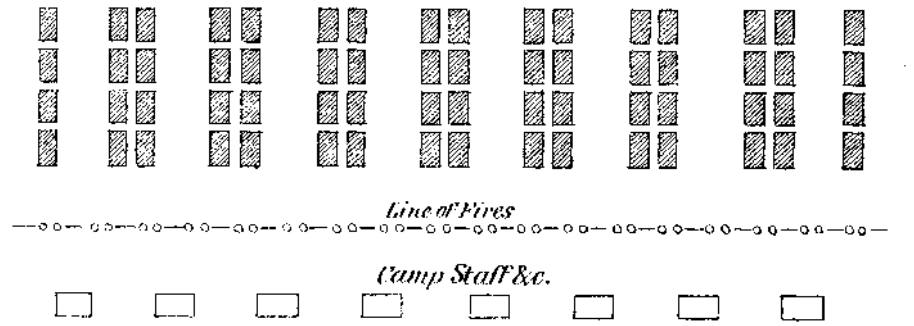

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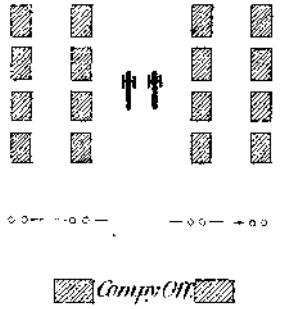

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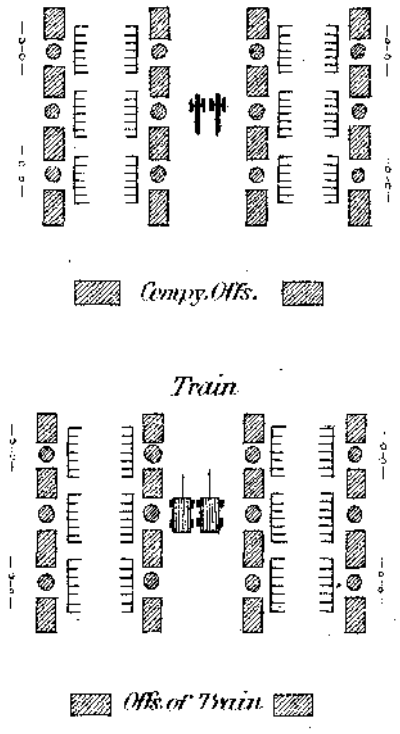

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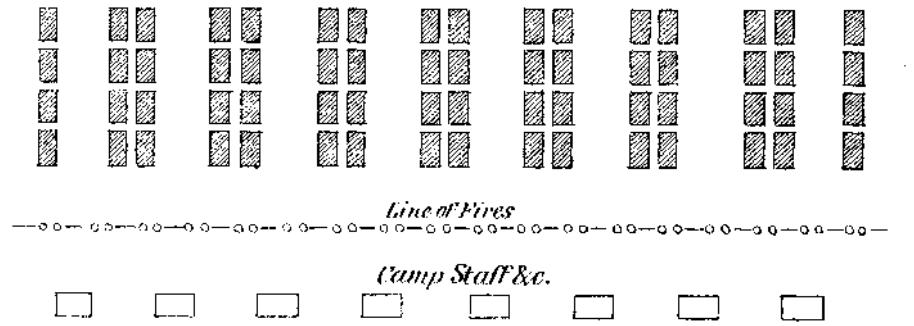

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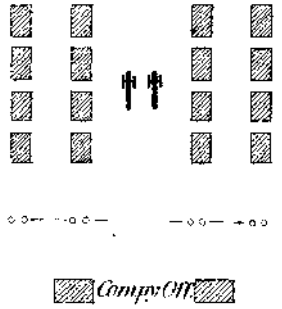

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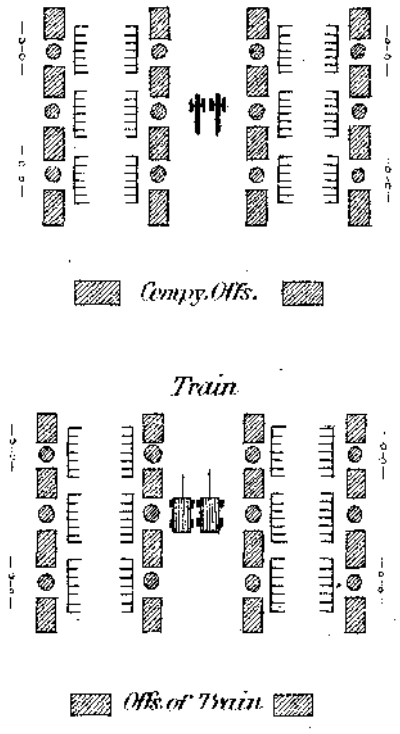

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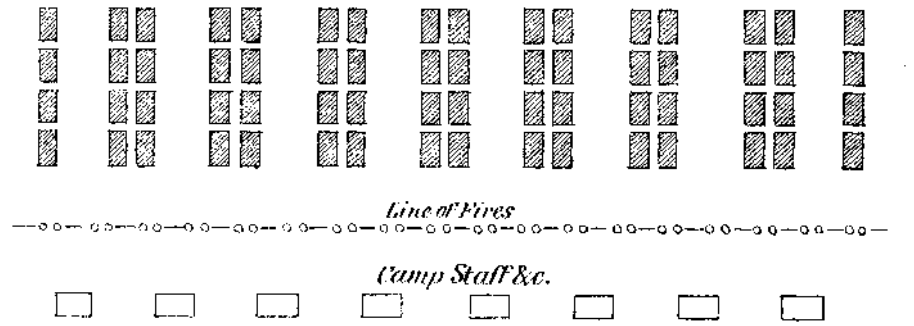

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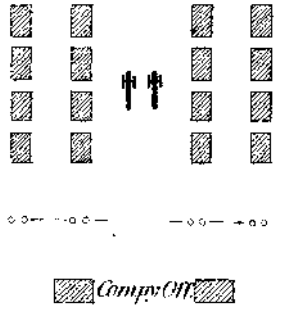

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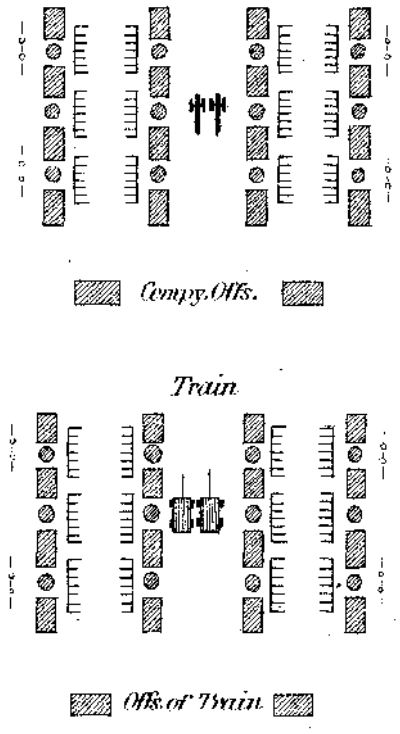

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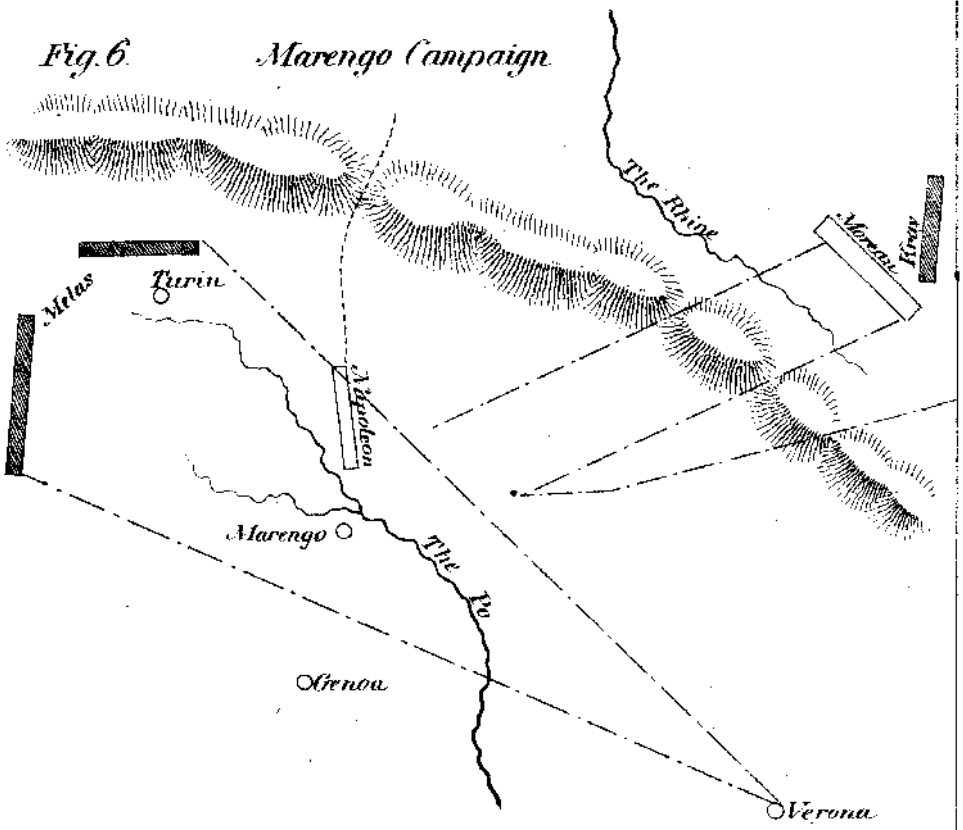

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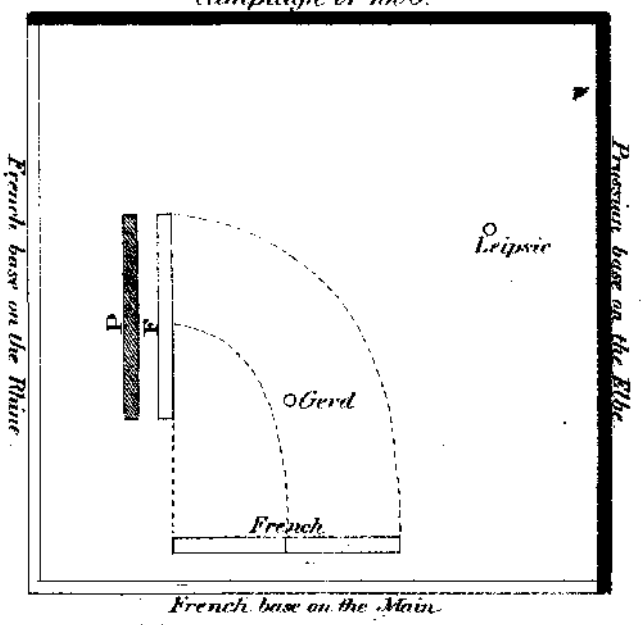

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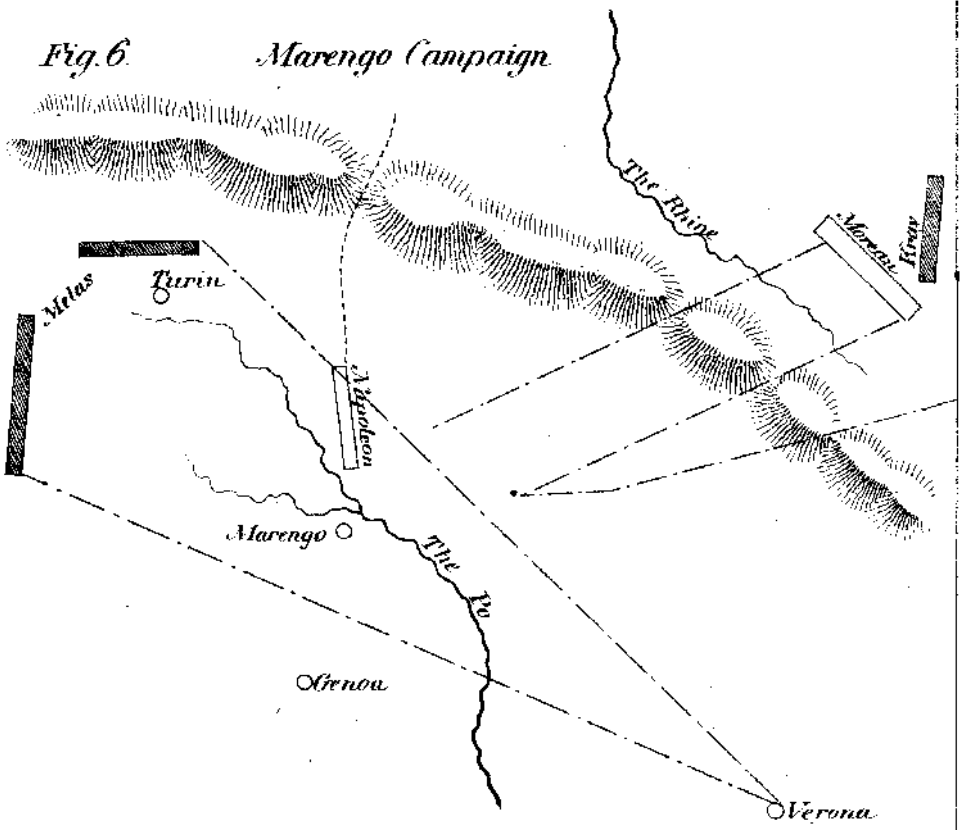

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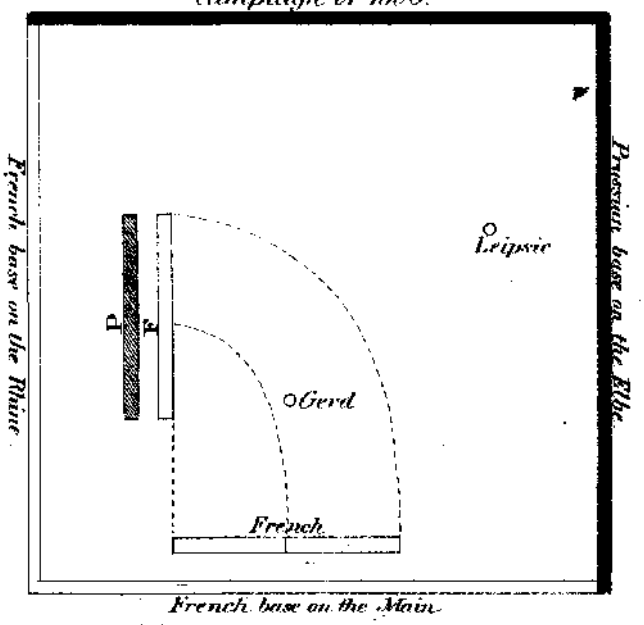

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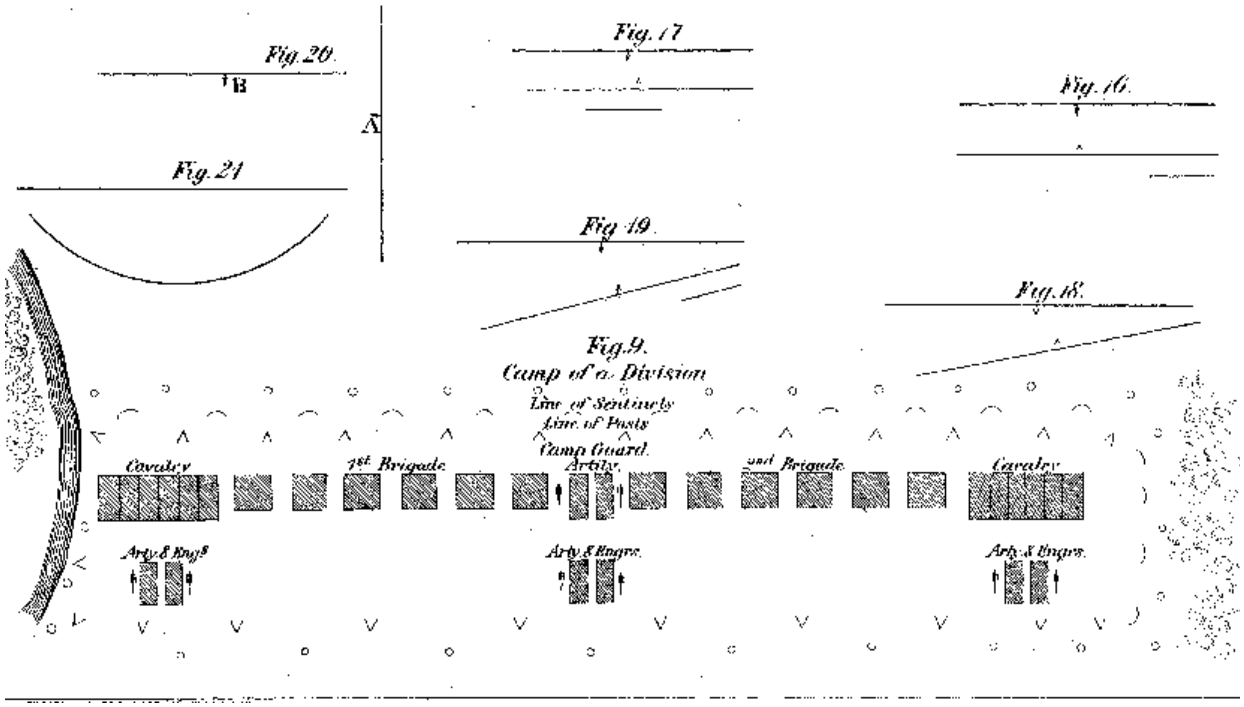
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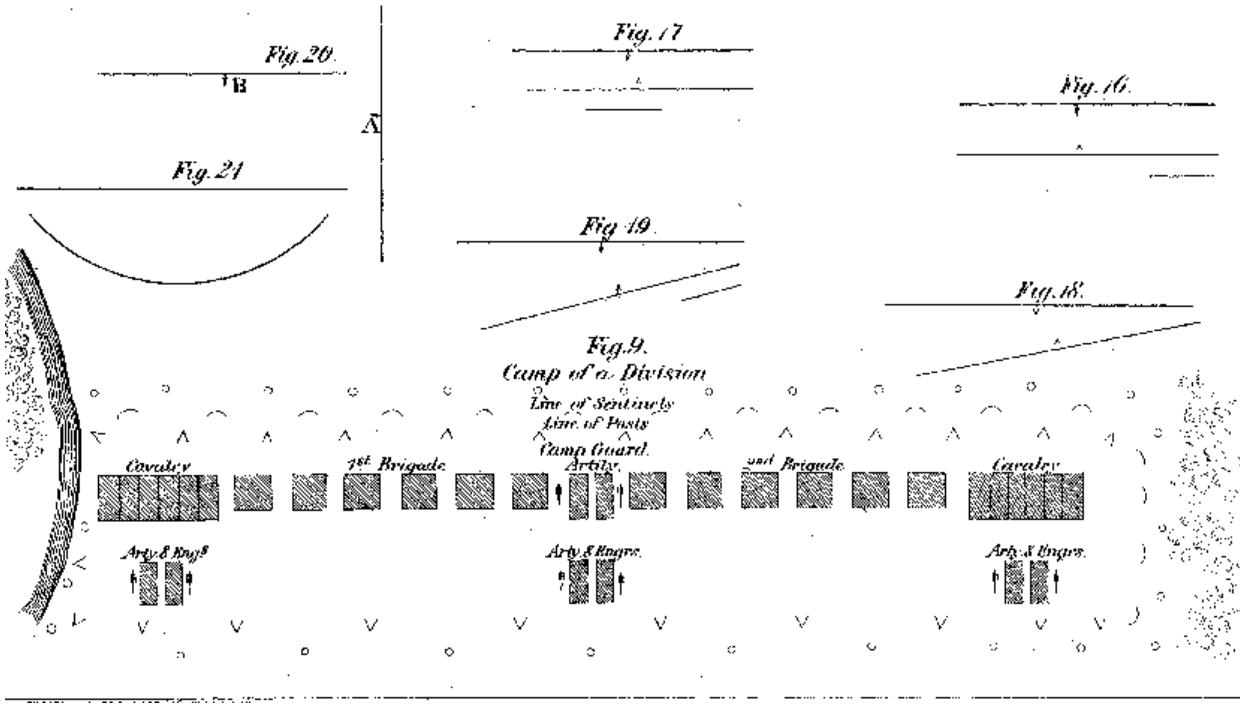
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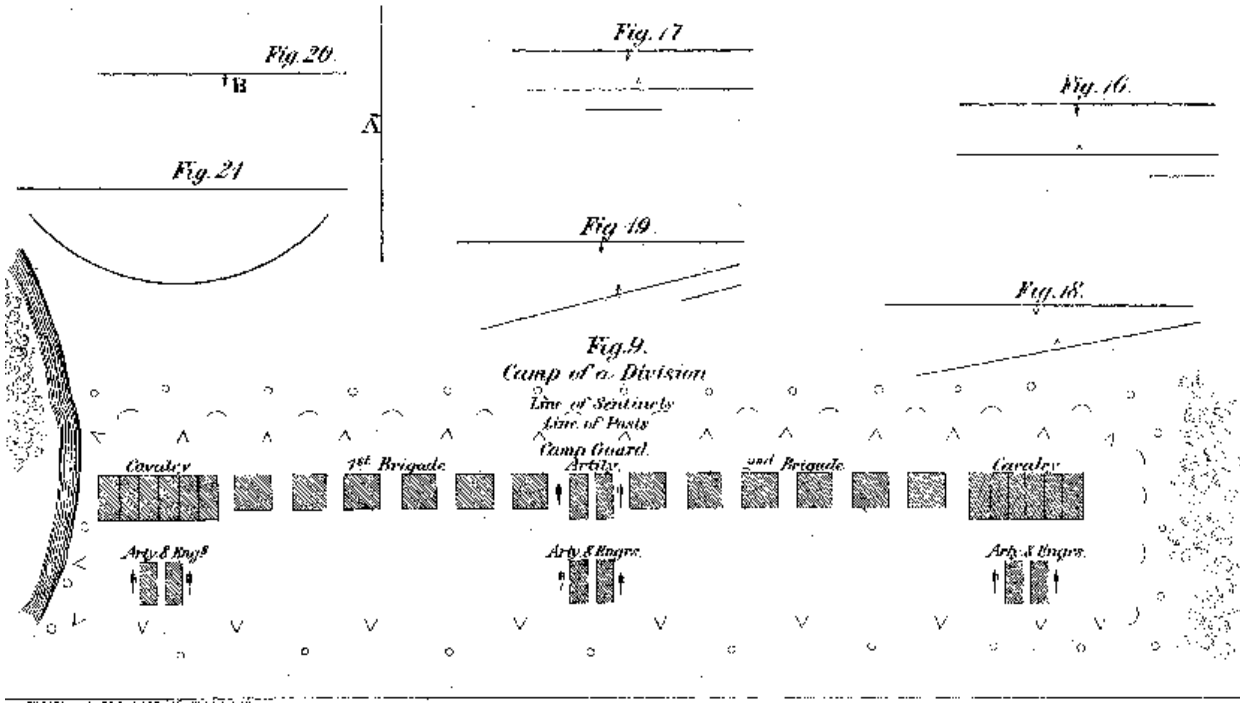
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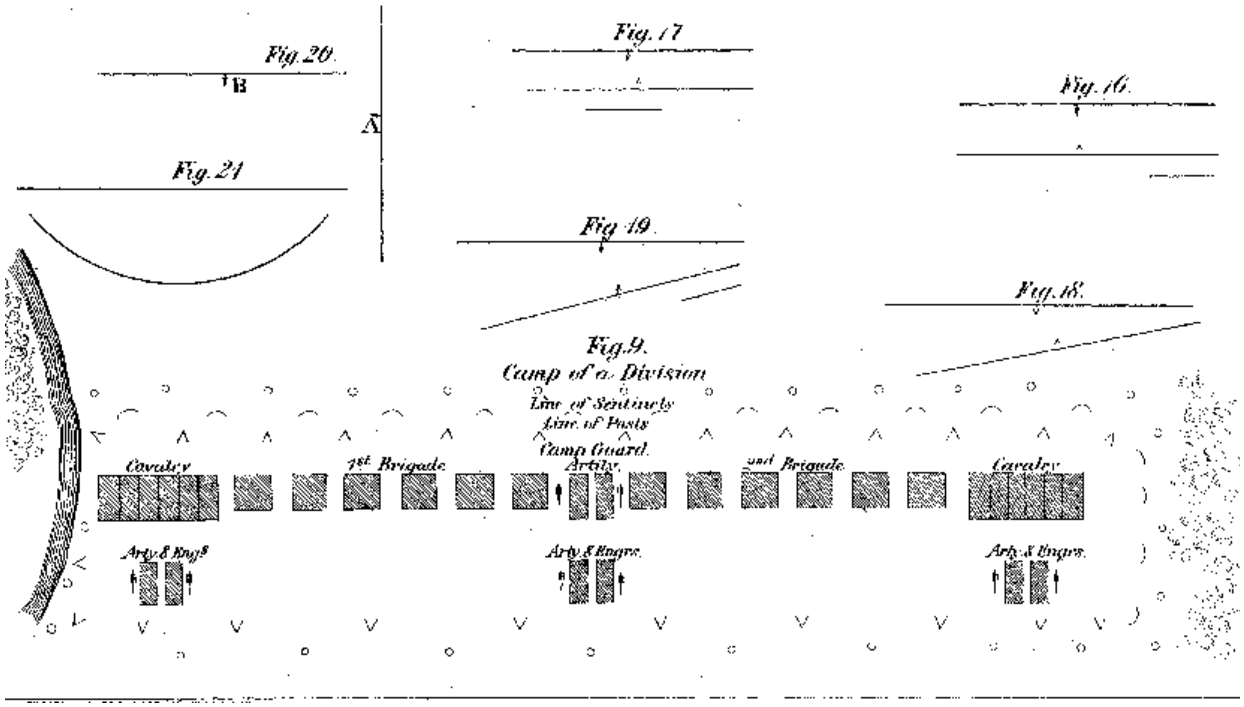
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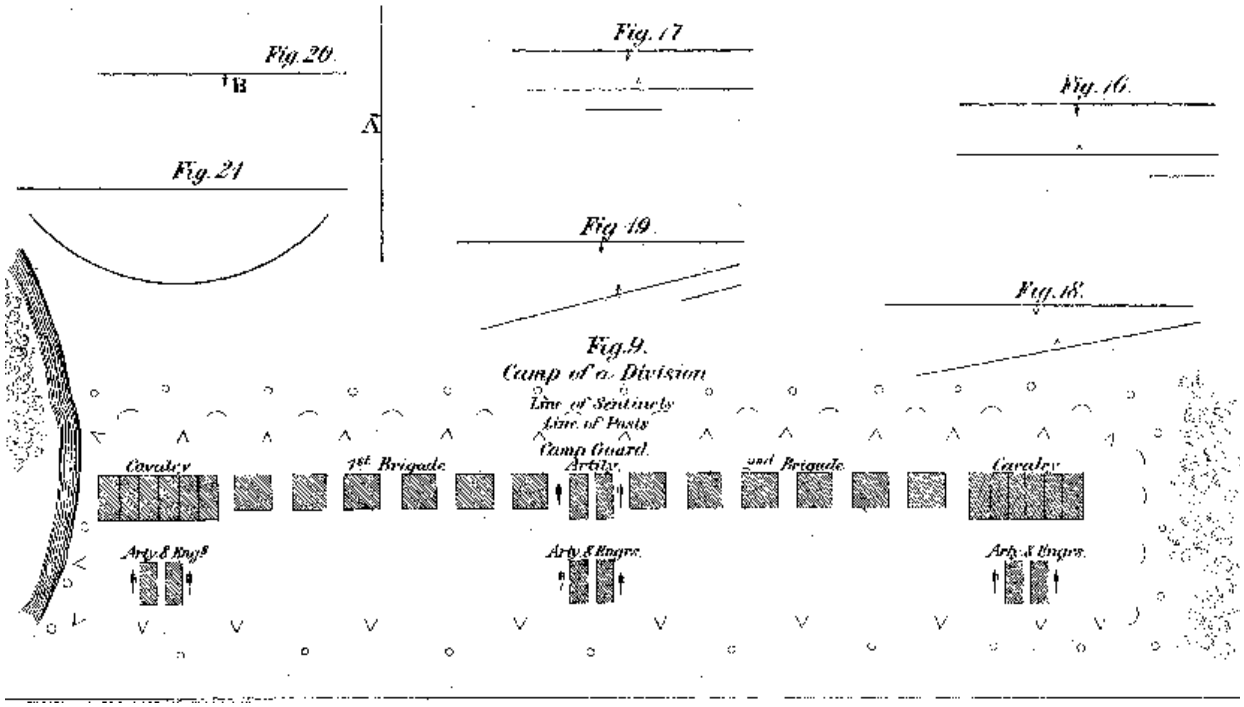
Fig. 20.
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Fig. 17
Fig. 16.
A
Fig. 21
Fig. 19.
Fig. 18.
Fig. 9.
Camp of a Division
Line of Sentinels
Line of Posts
Camp Guard.
Artilry.
Cavalry
1st. Brigade
2nd Brigade
Cavalry
Artly & Engrs
Artly & Engrs
Artly & Engrs

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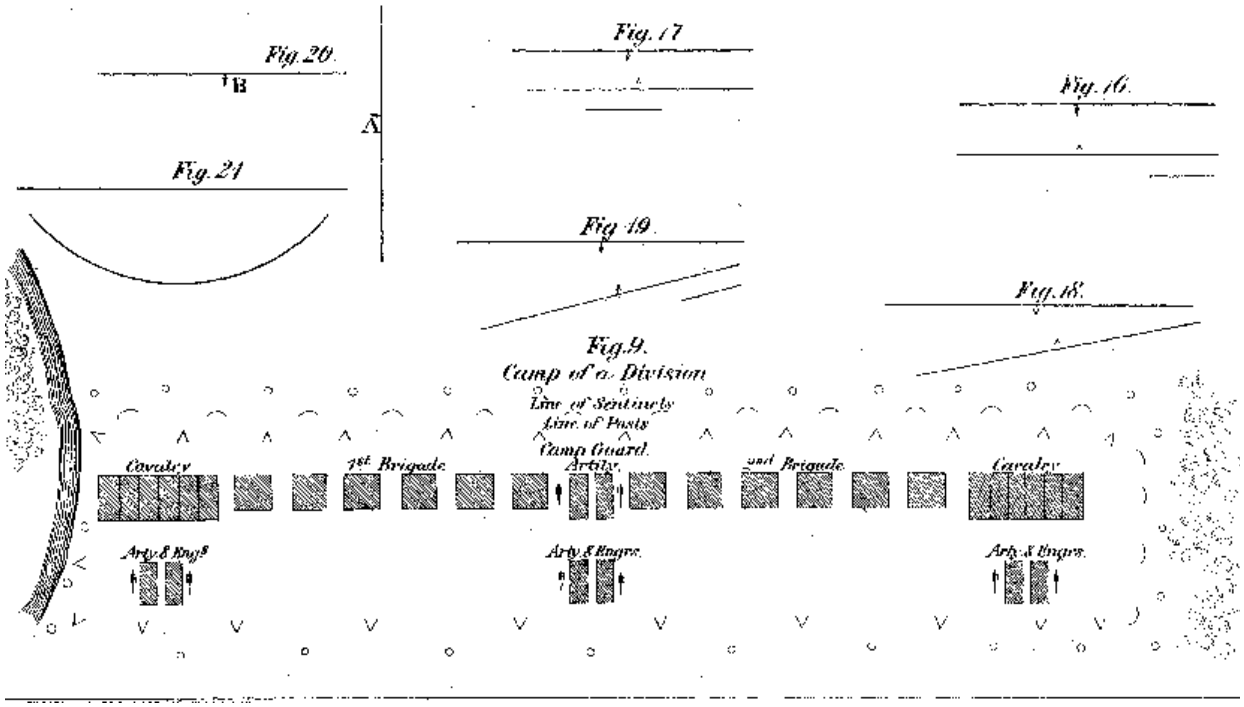
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Fig. 11.
Squadron of Cavalry.

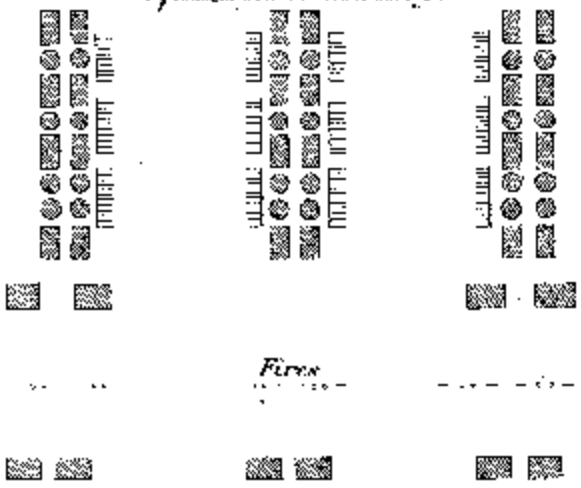
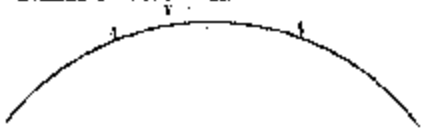


Fig. 24

Fig. 22



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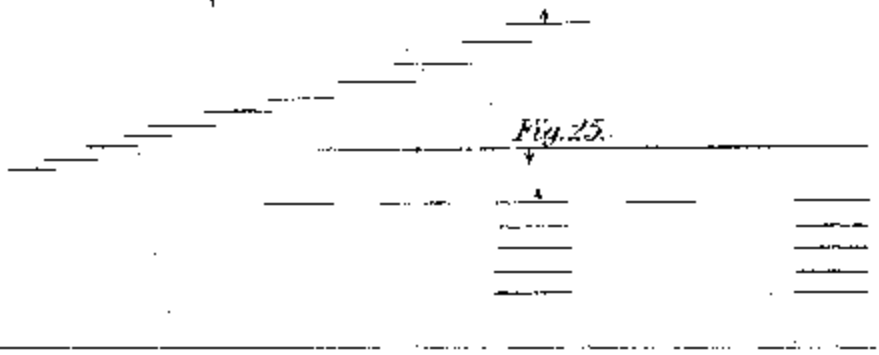

Fig. 25.

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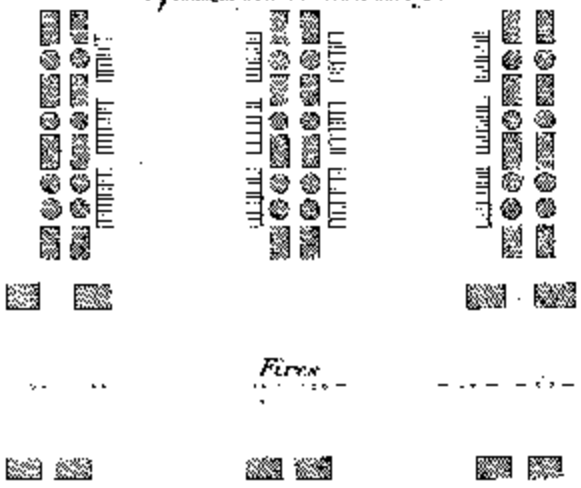
Fig. 11.
Squadron of Cavalry.



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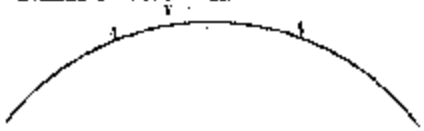

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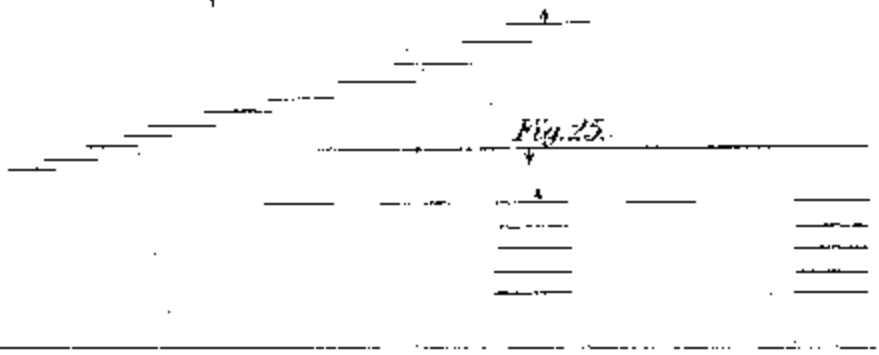

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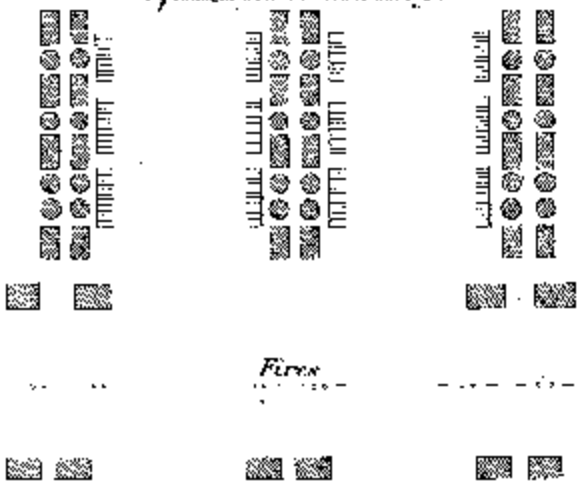

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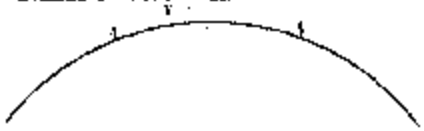

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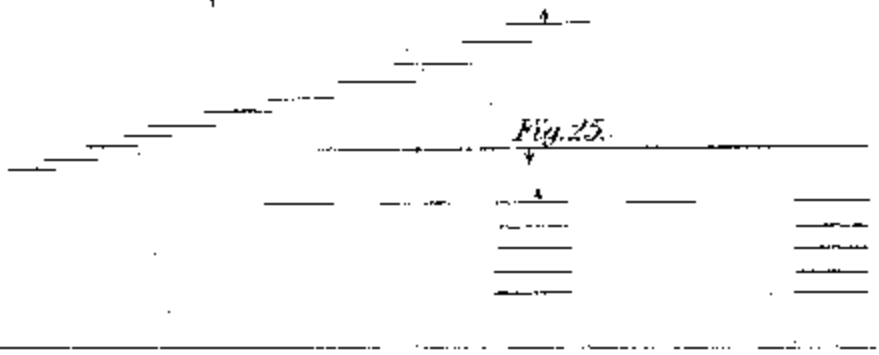

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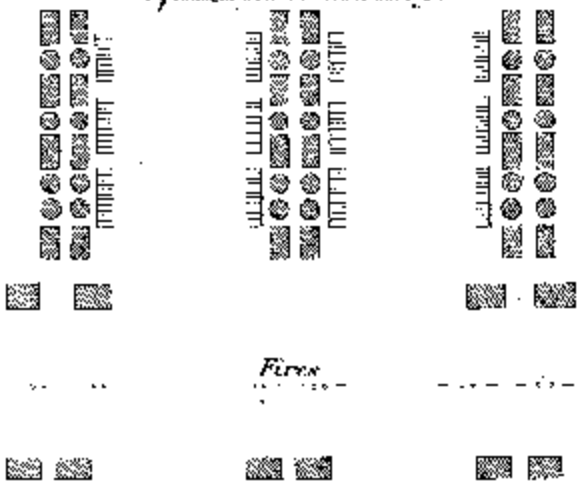

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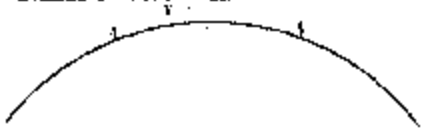

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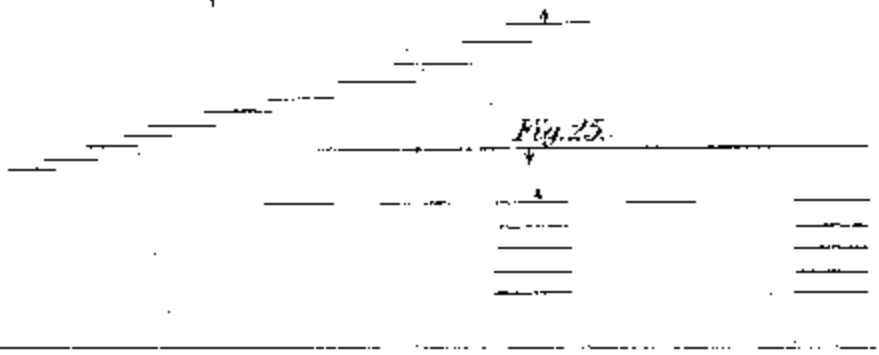

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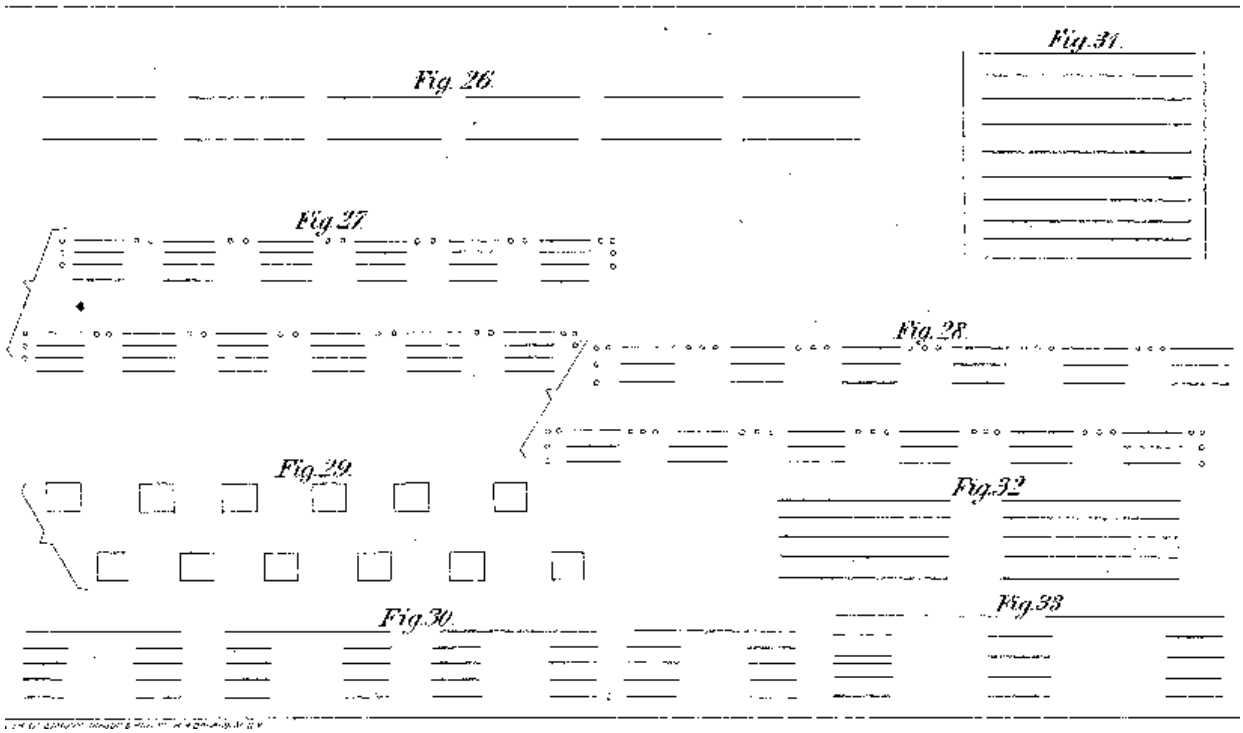

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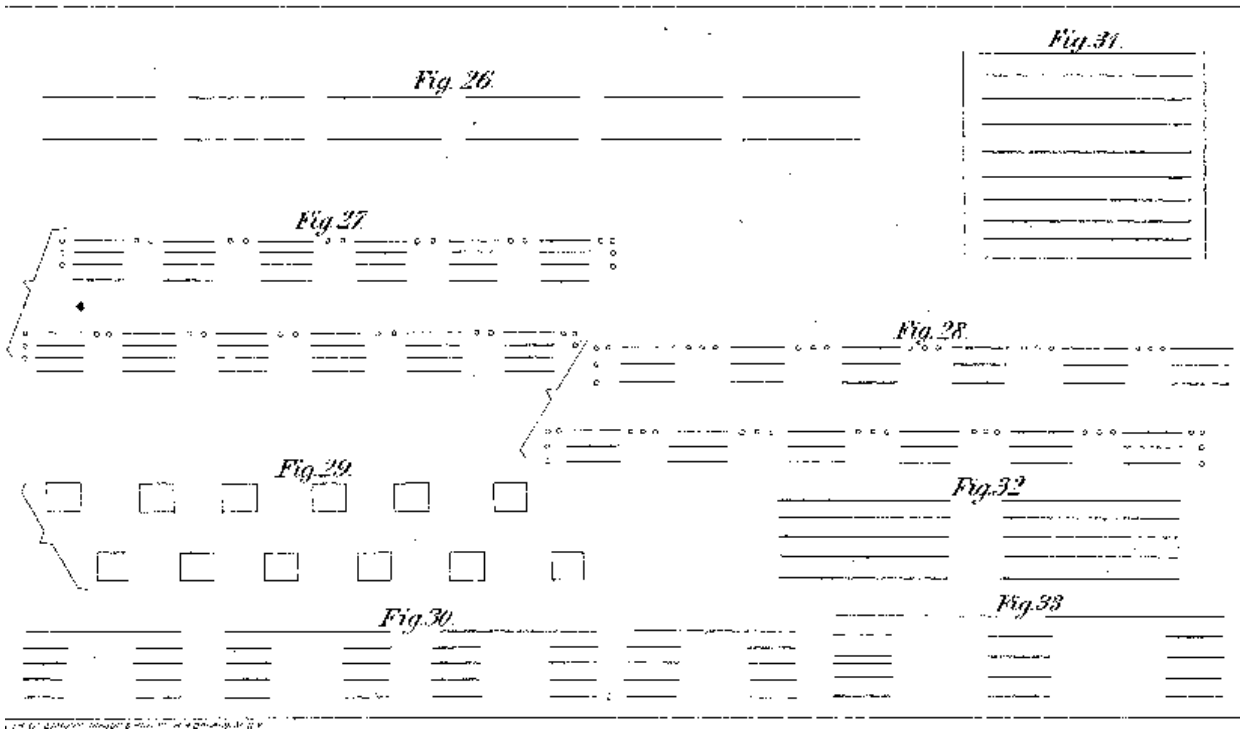

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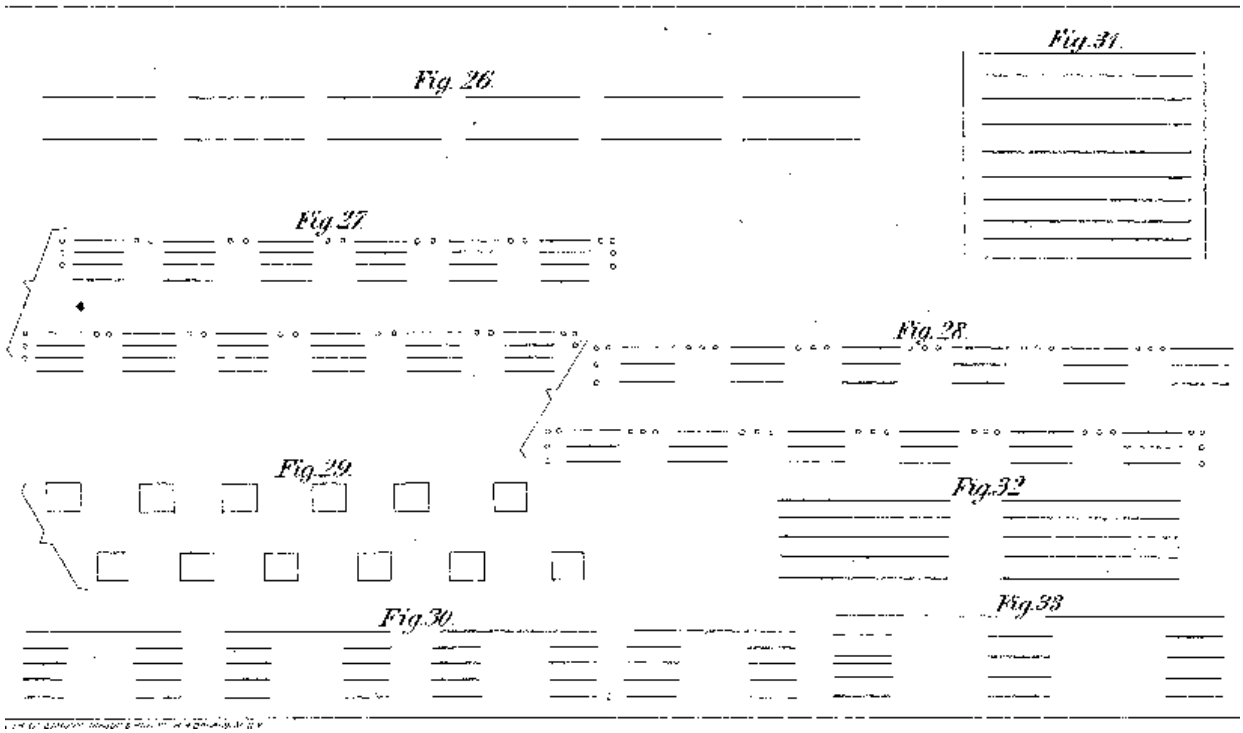

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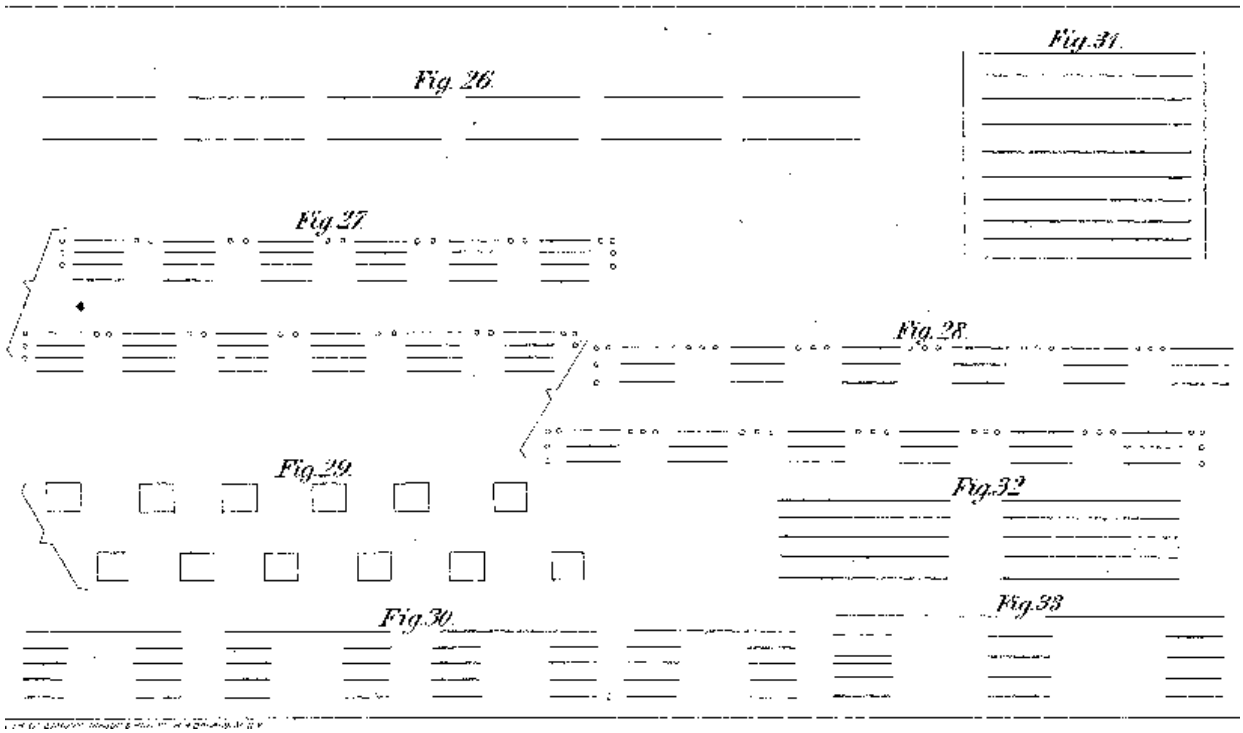

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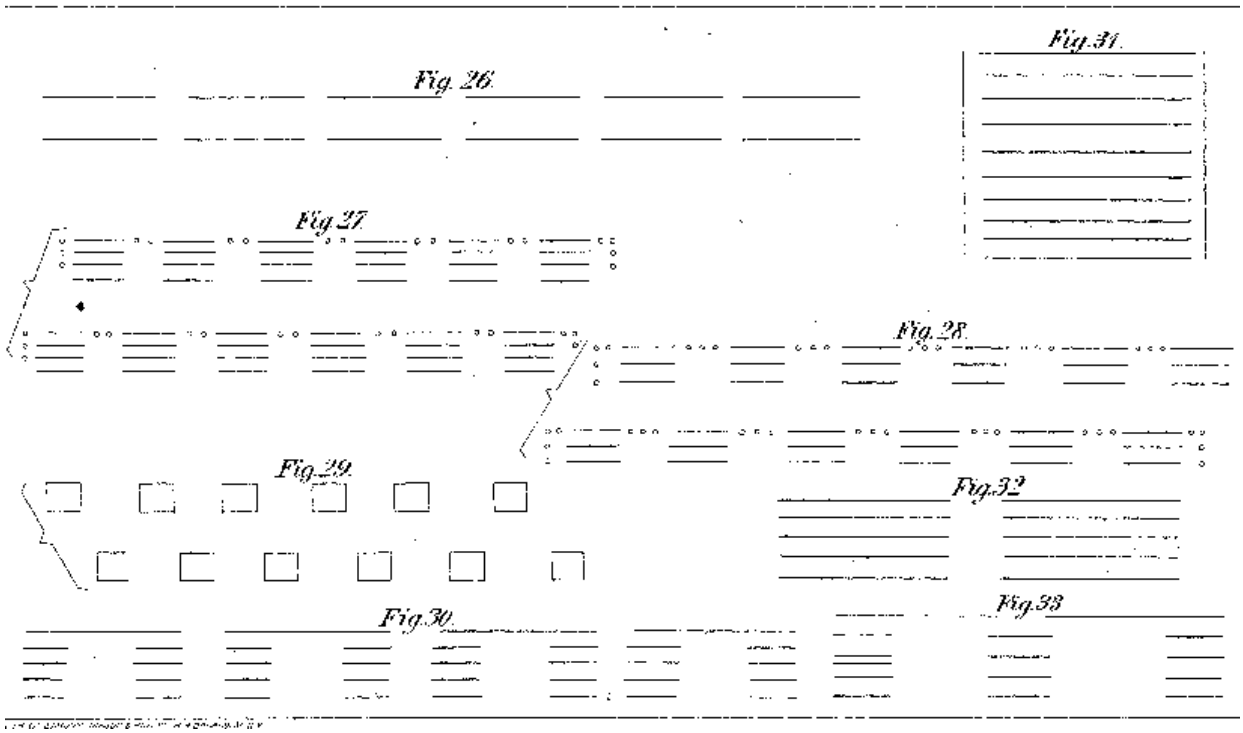

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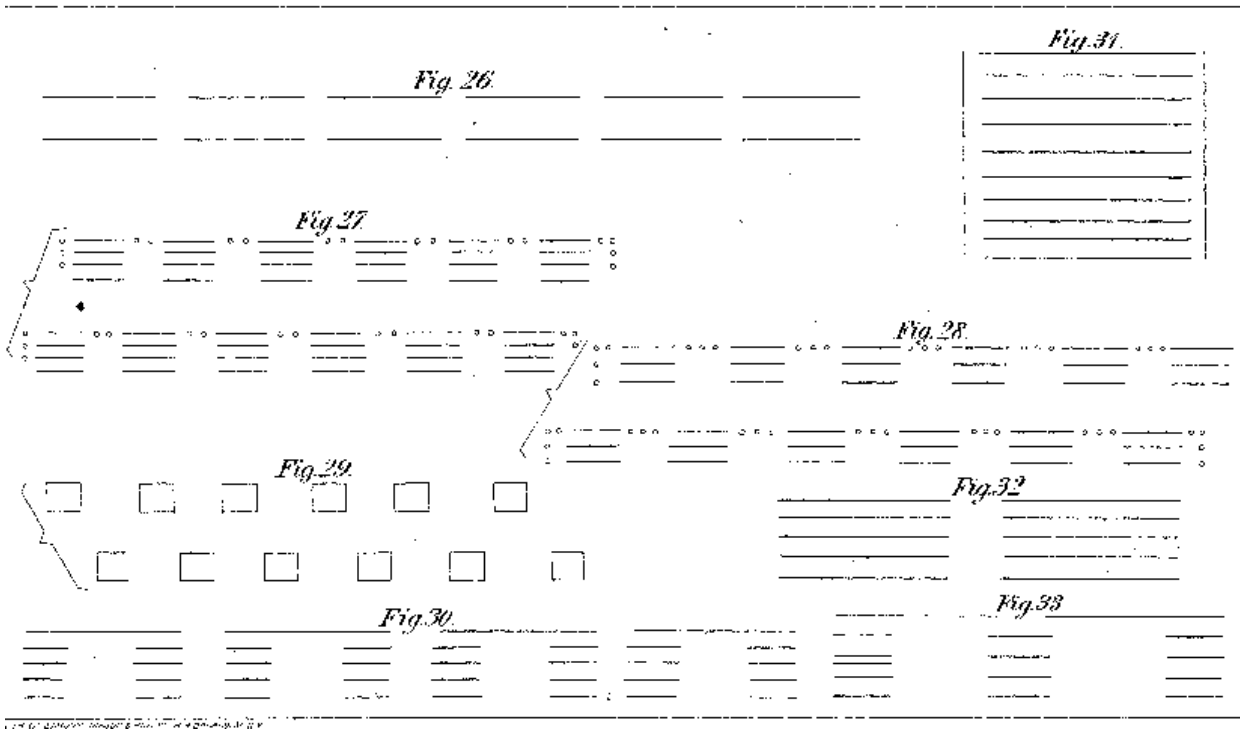

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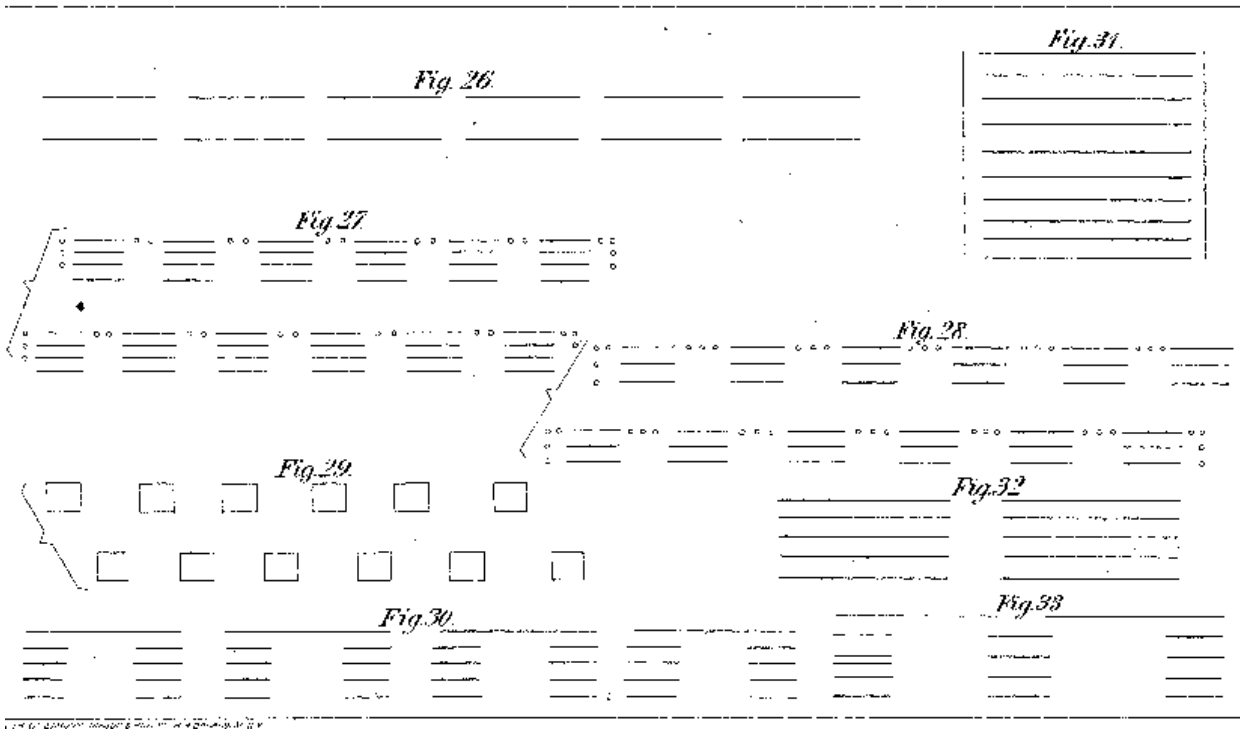

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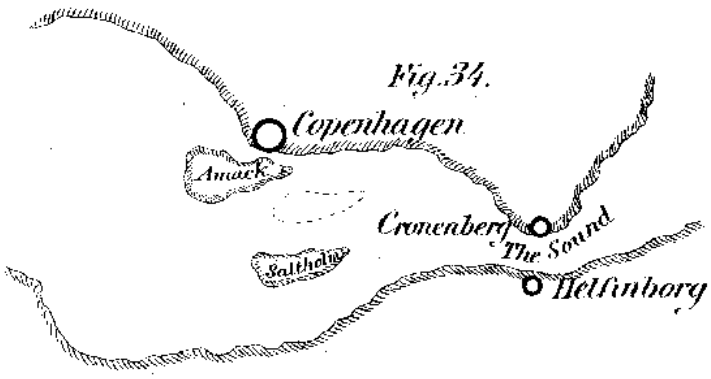
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Amack
Cronenberg
The Sound
Saltholm
Helsinborg

Fig. 35

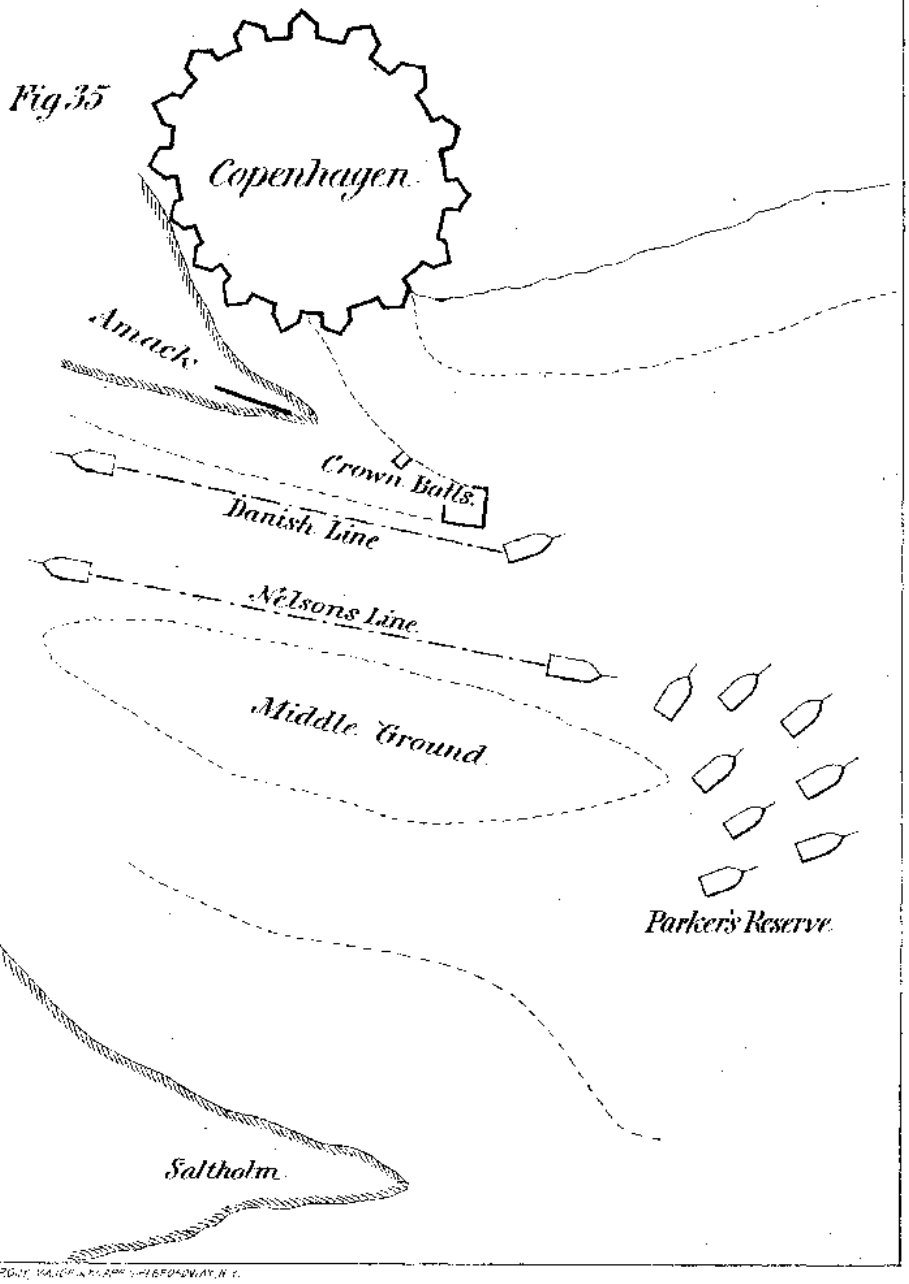
Copenhagen
Amack
Crown Balls
Danish Line
Nelsons Line
Middle Ground
Parker's Reserve
Saltholm

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Fig. 34.

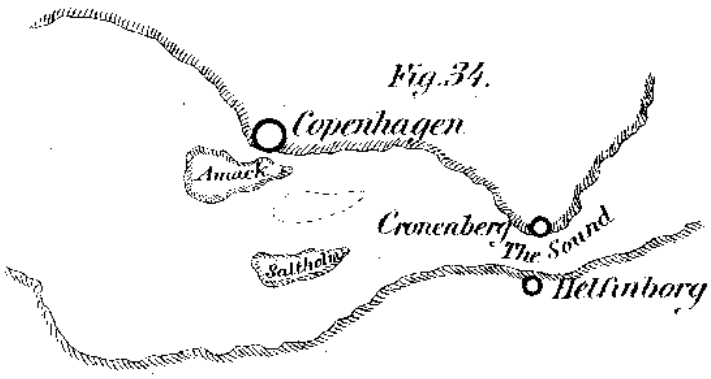
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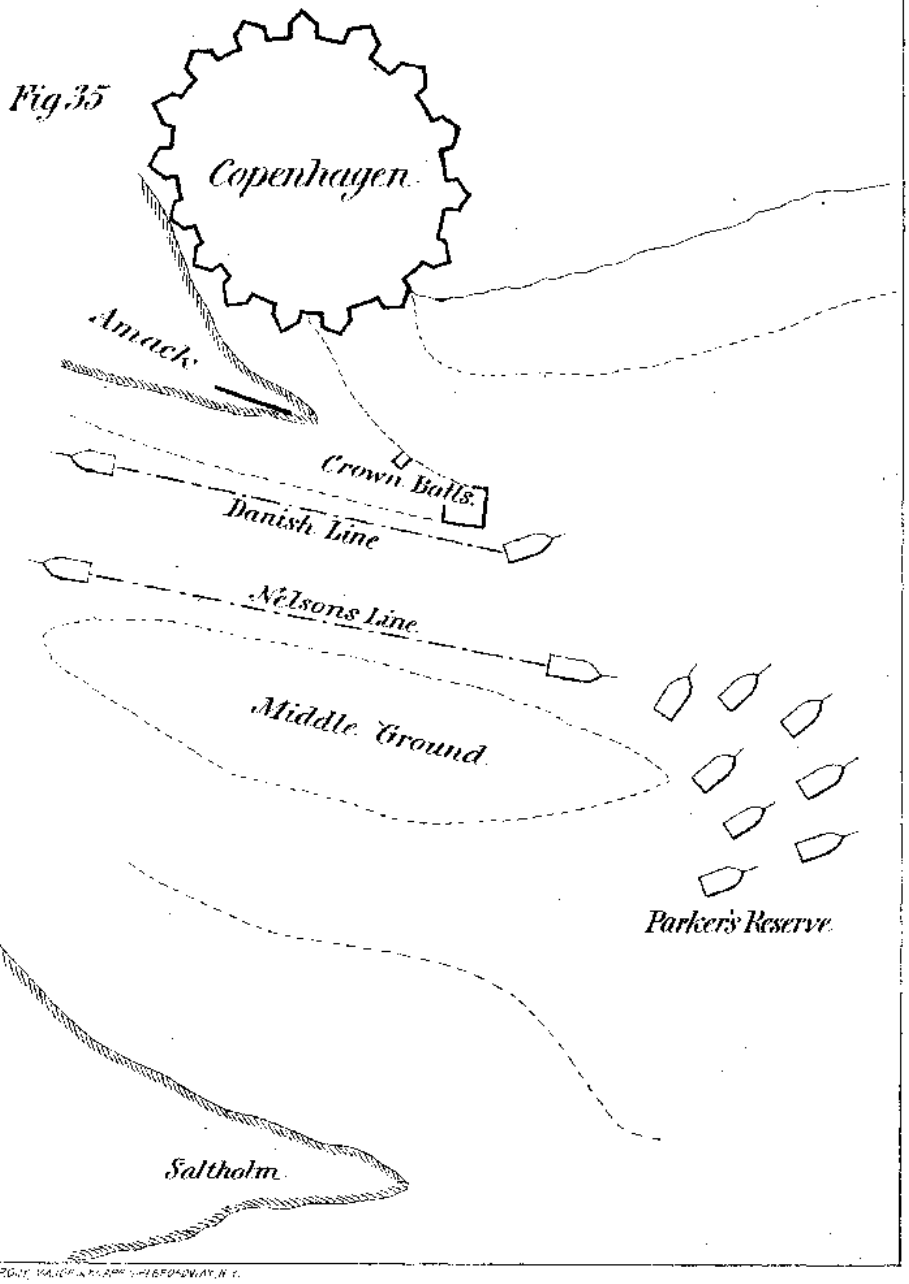
Fig. 35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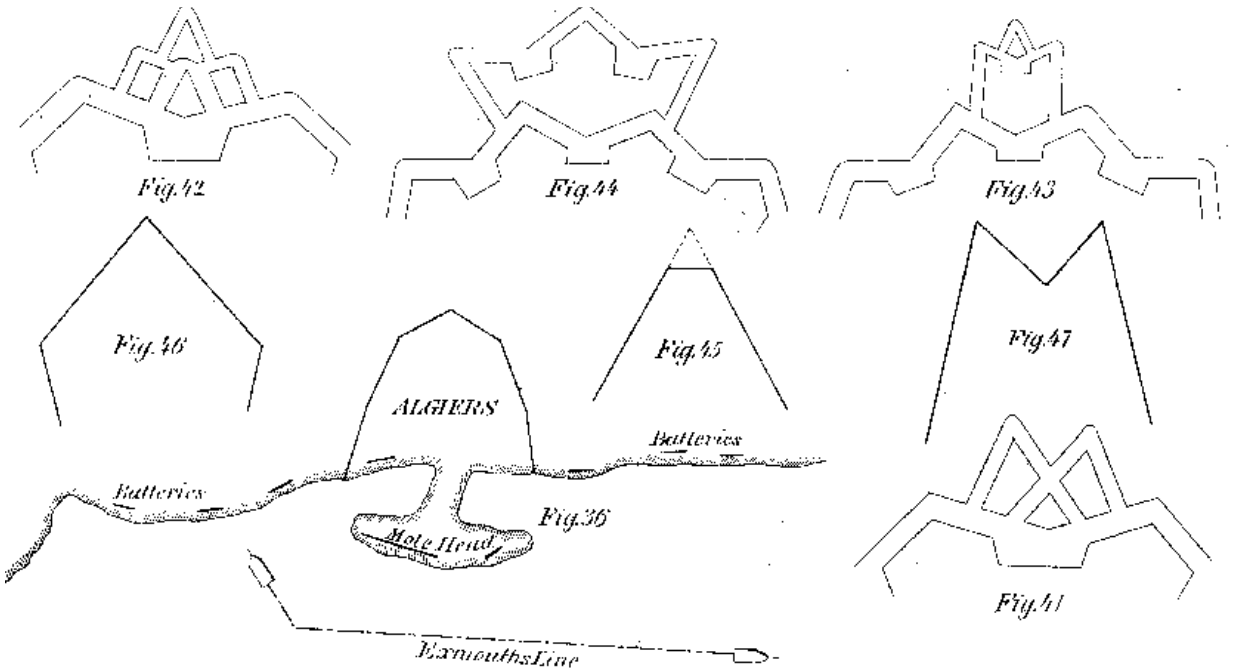
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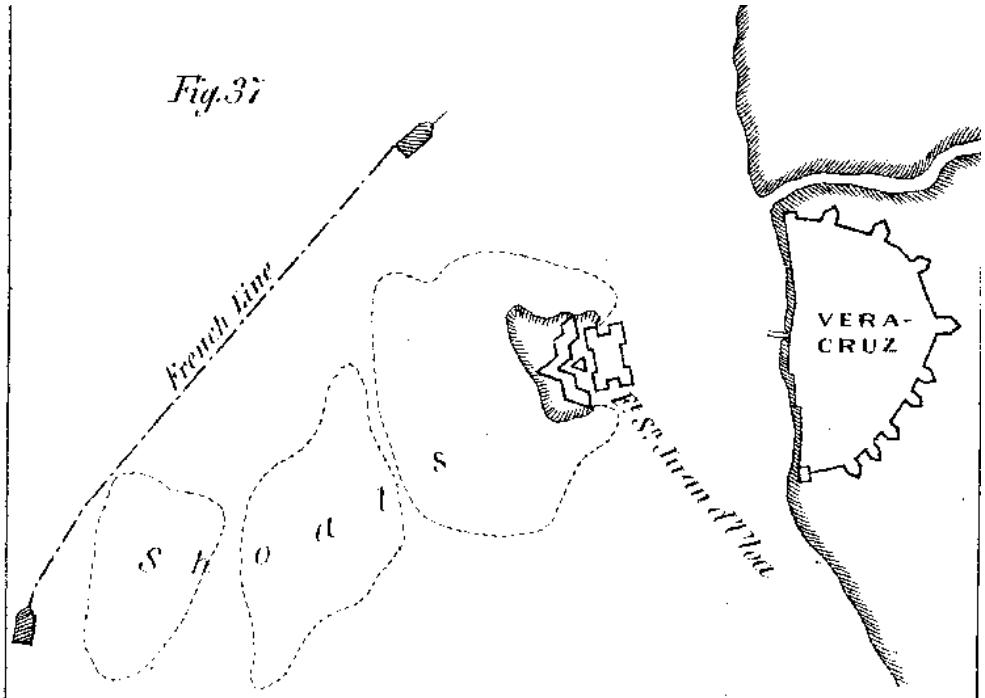

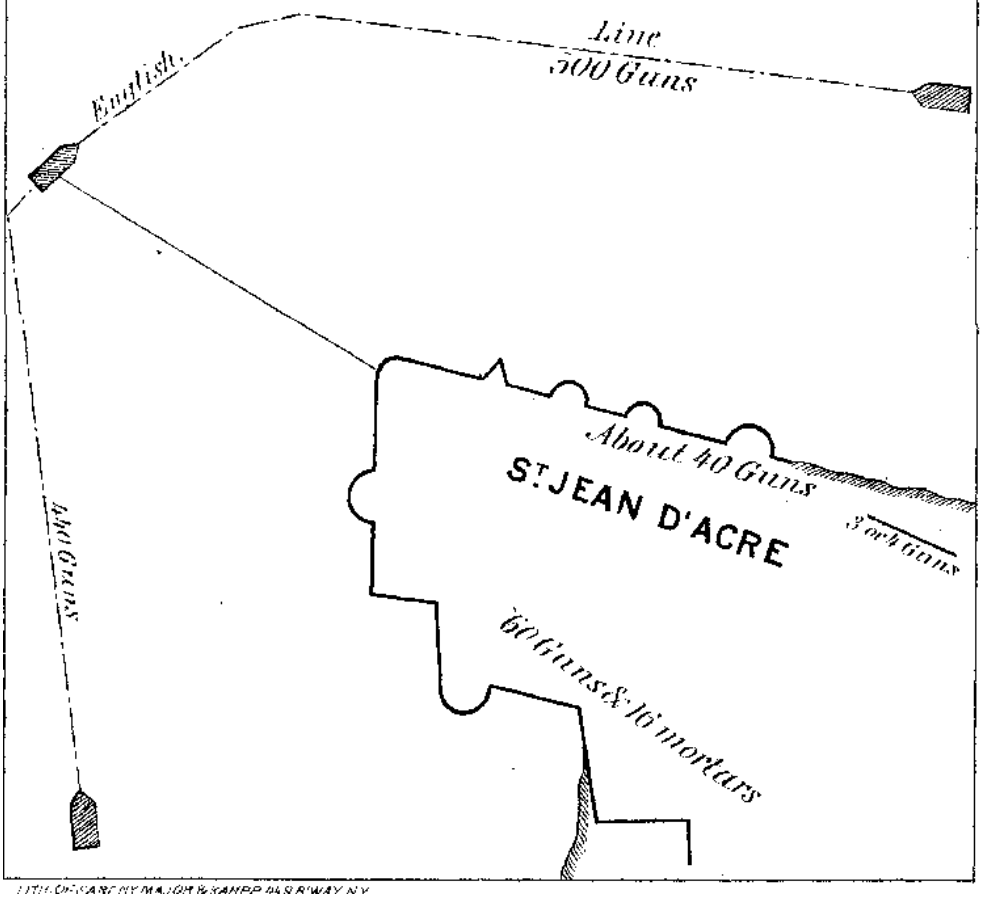

LITH. OF SARONY MAJOR & KNAPP 343 B'WAY N.Y.

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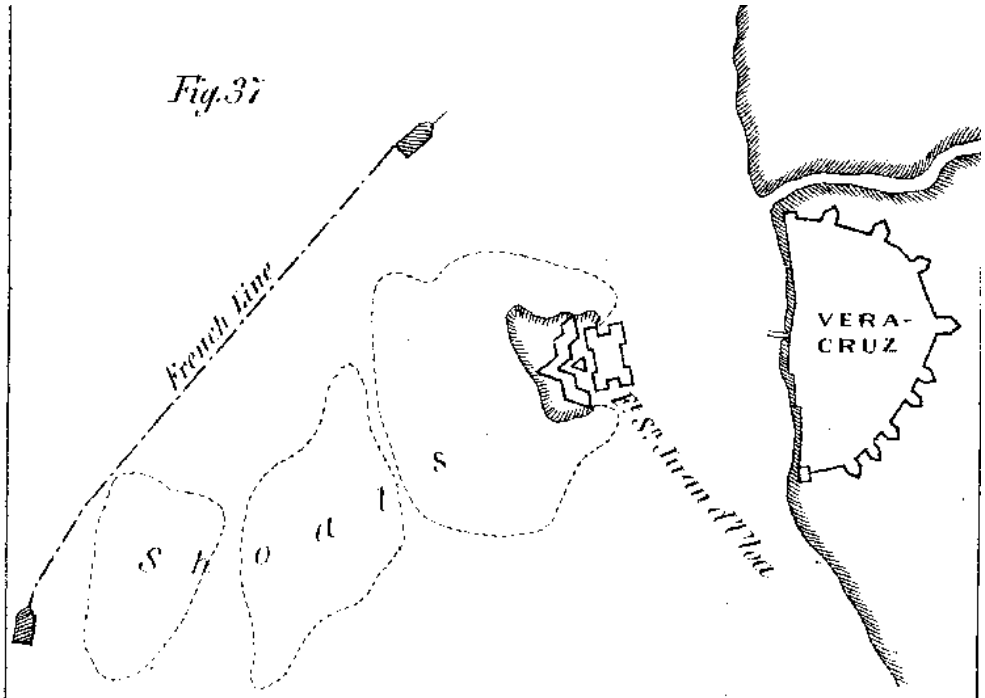

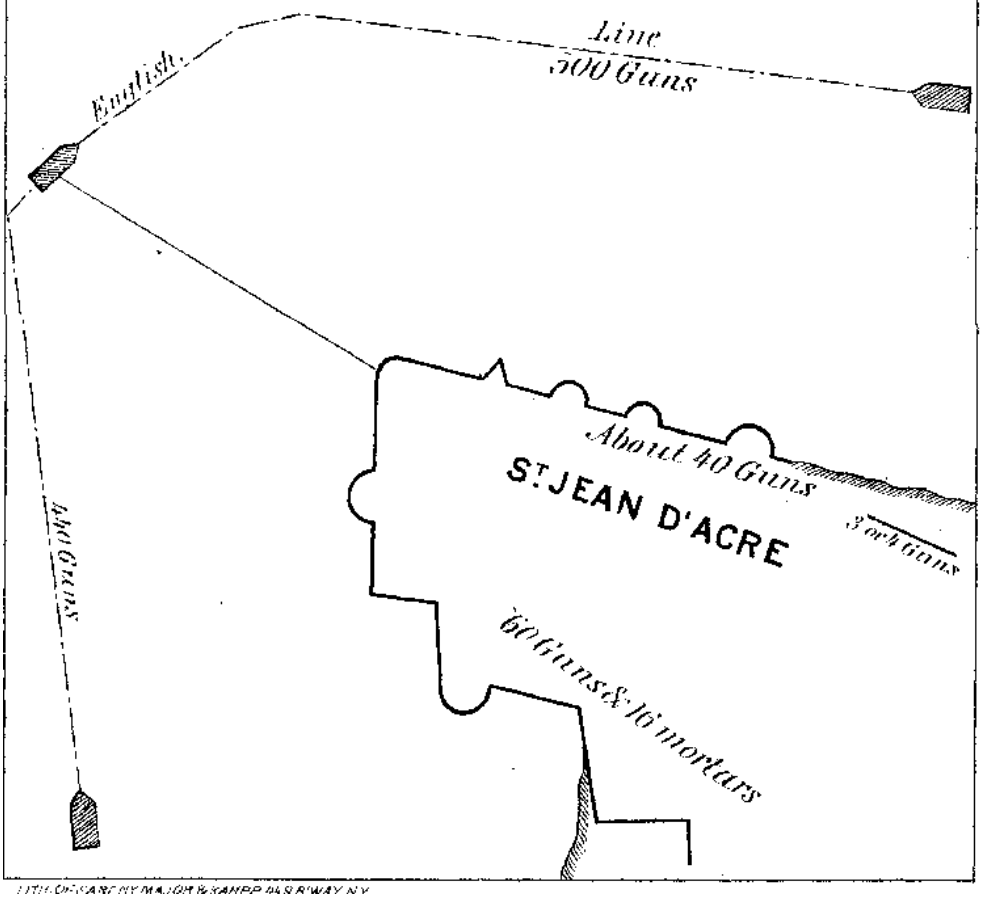

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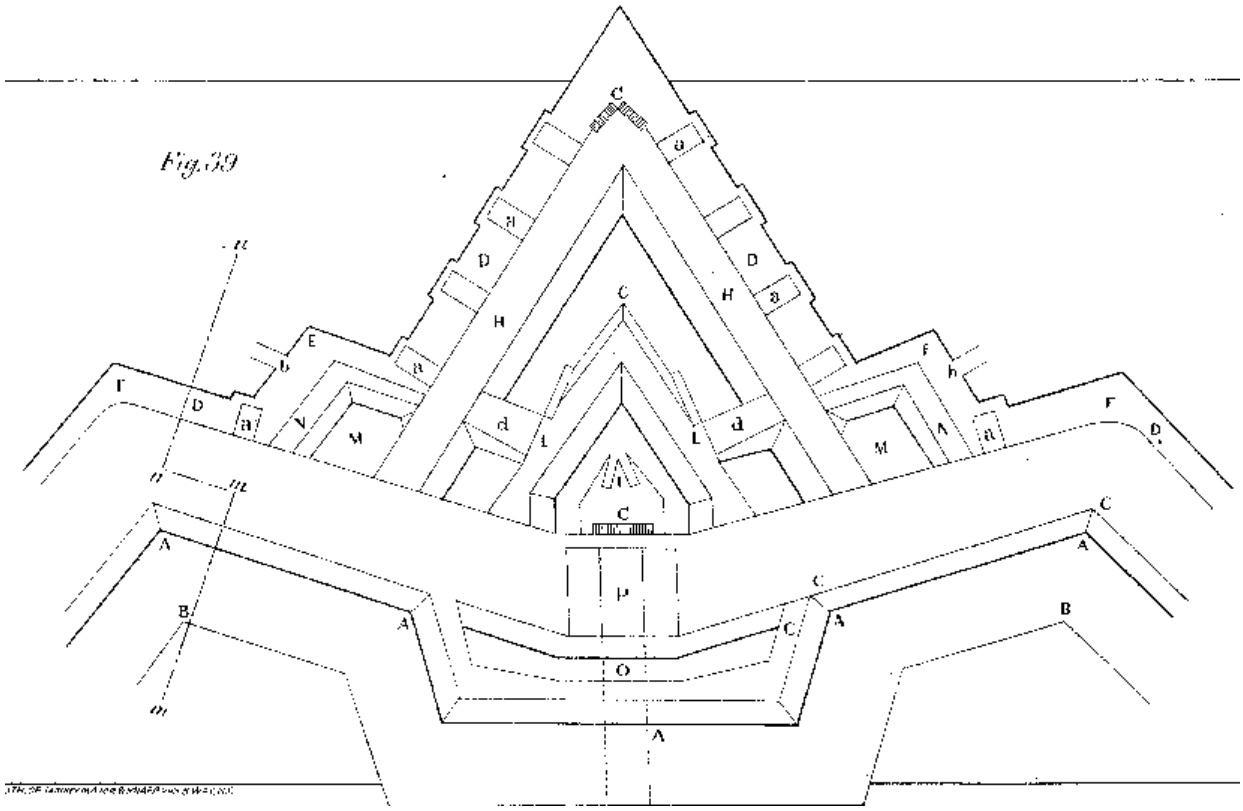

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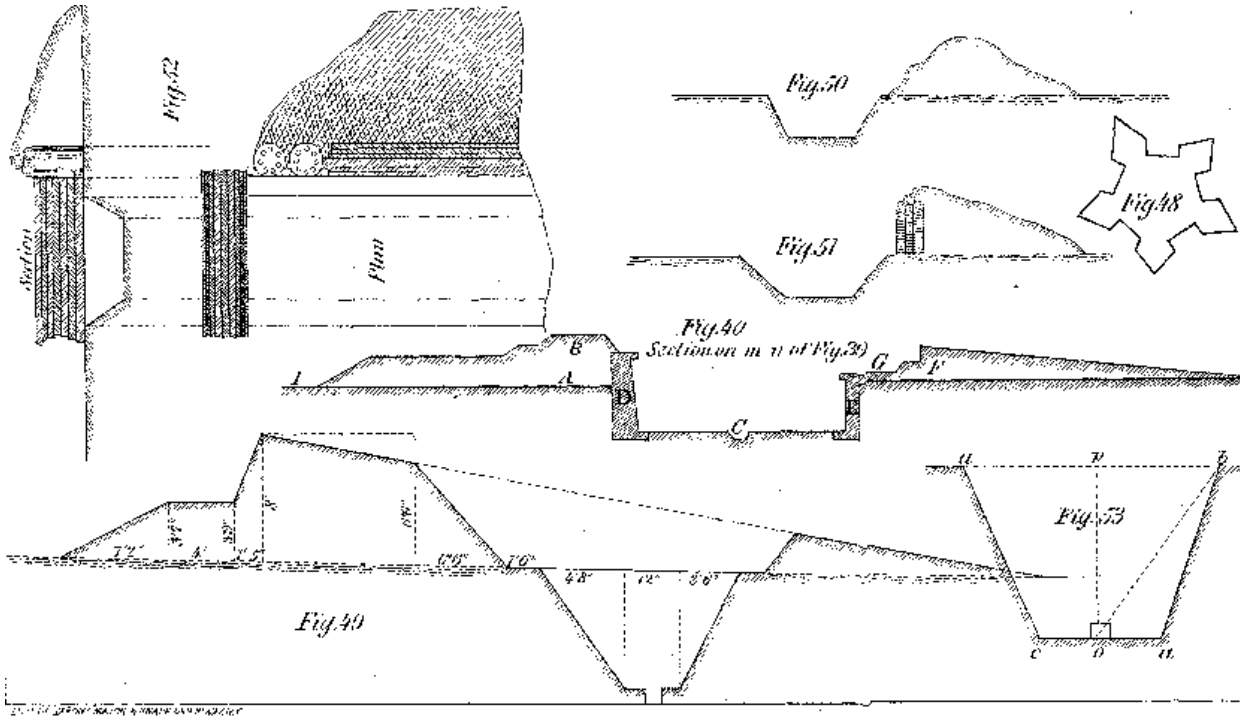
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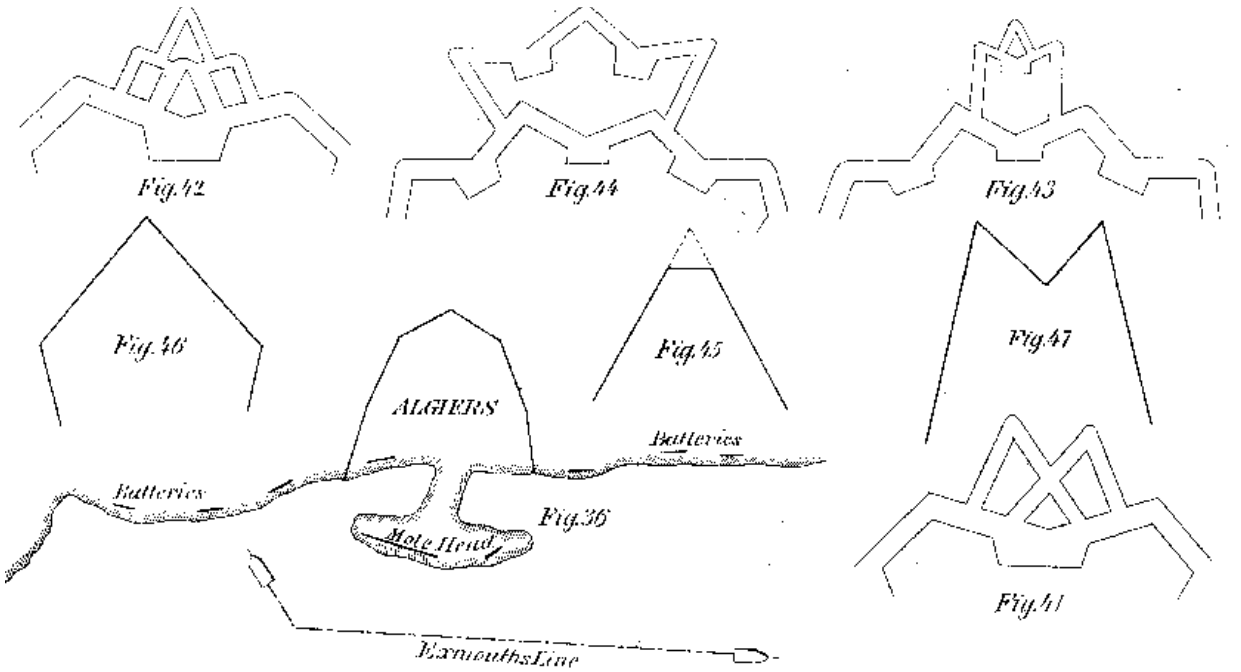
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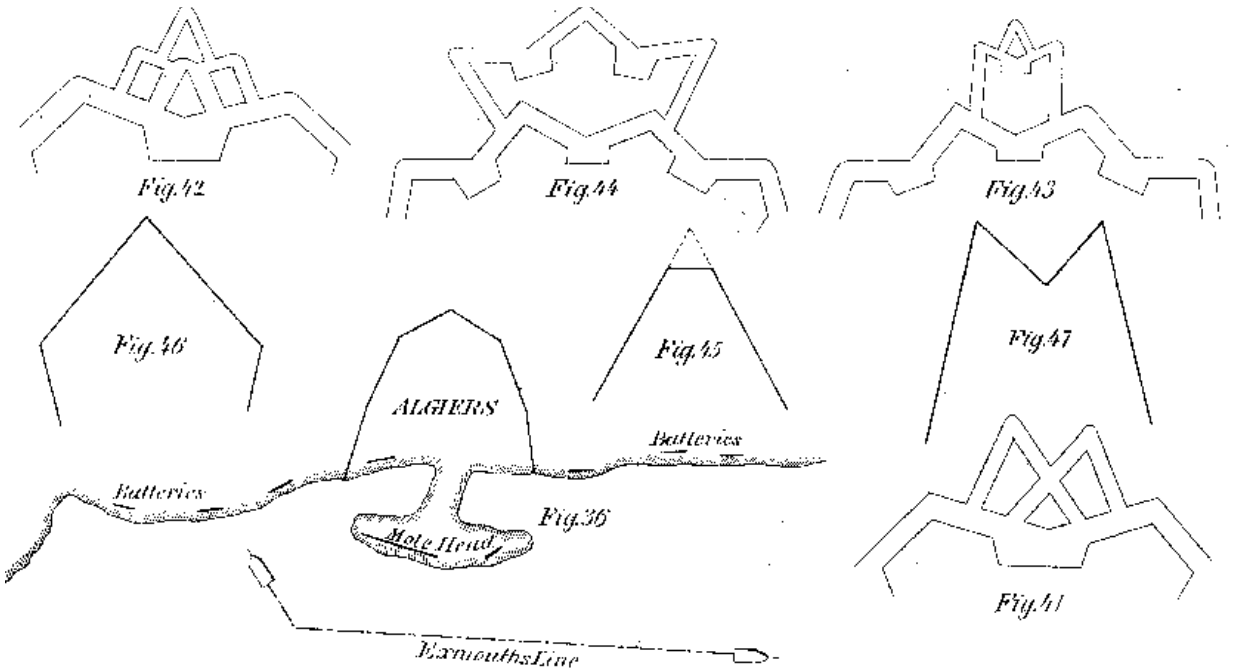
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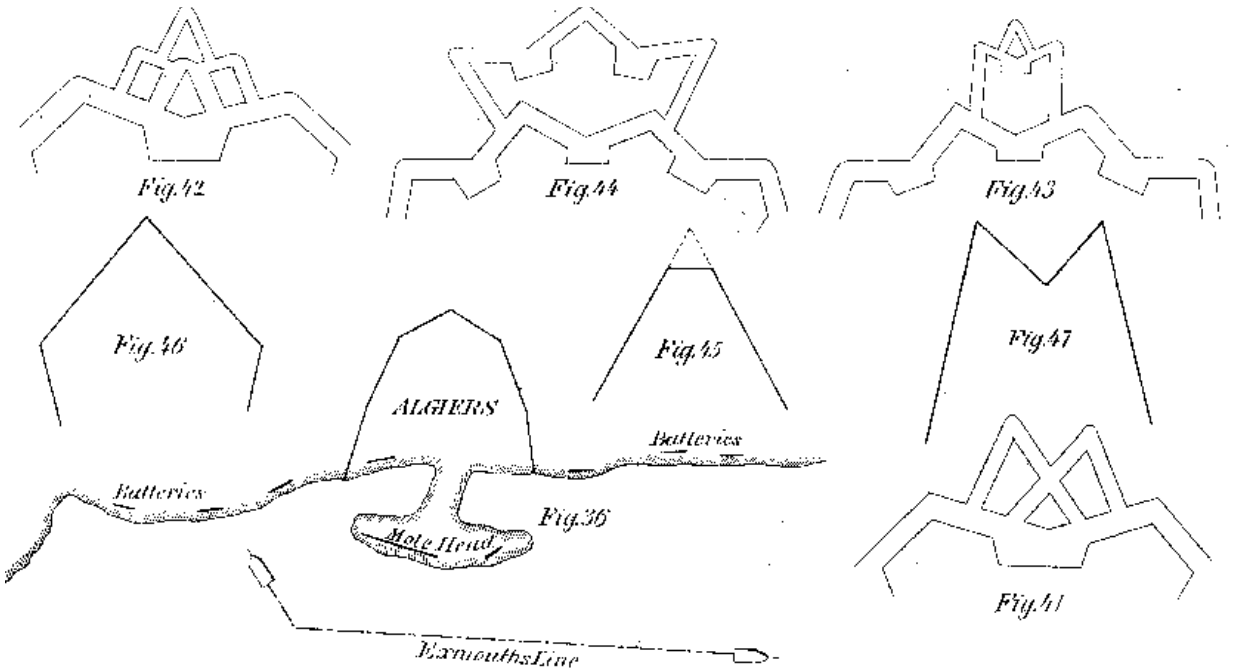
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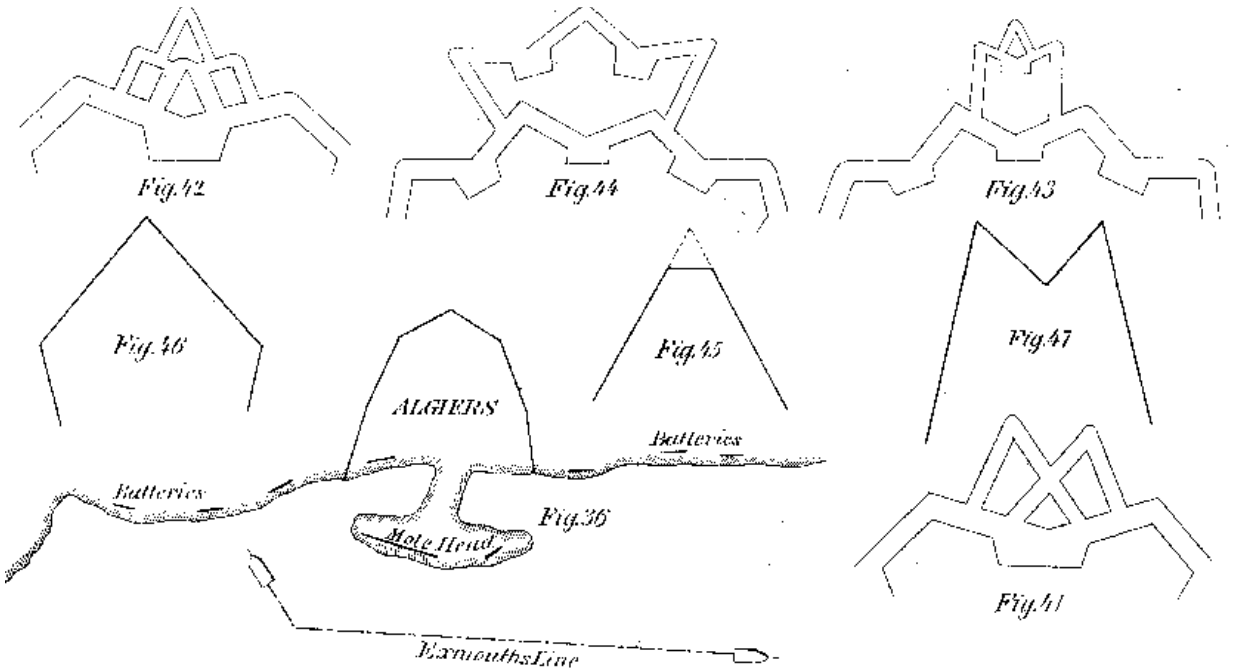
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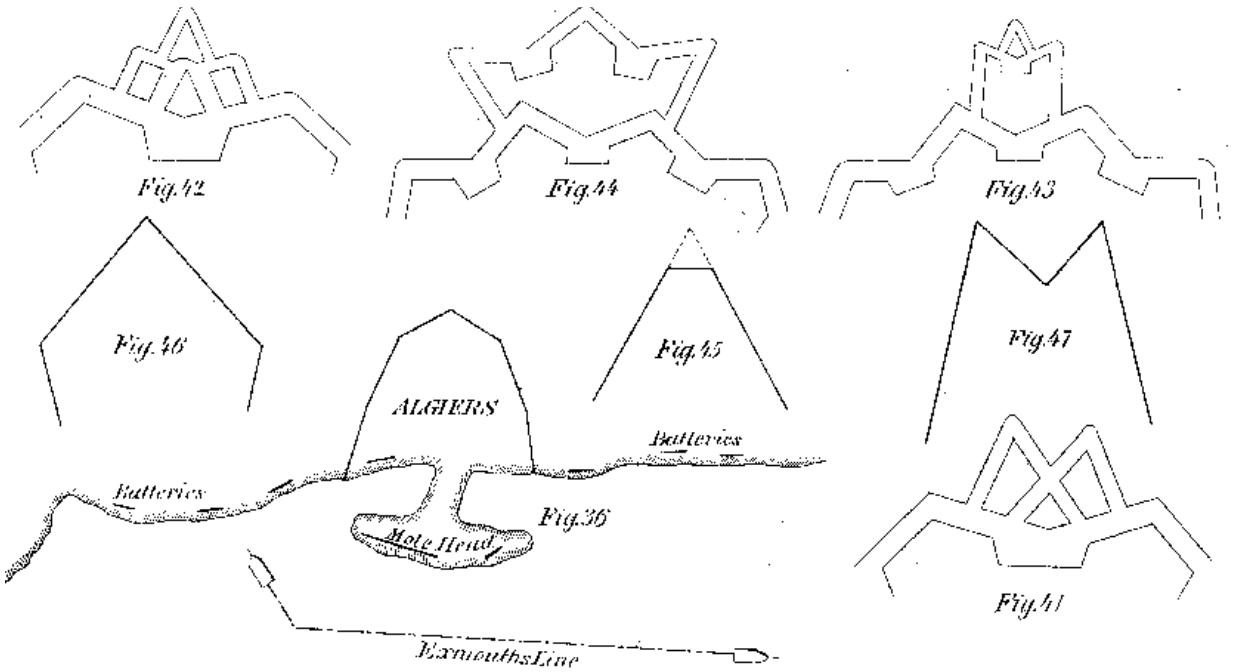
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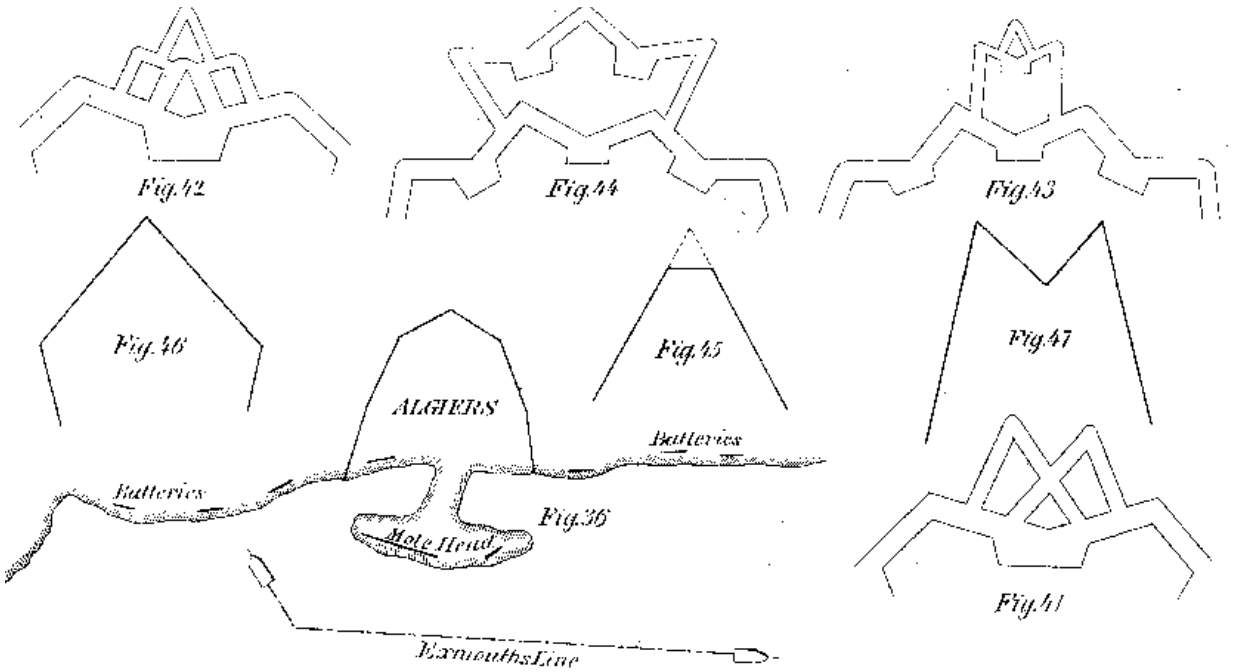
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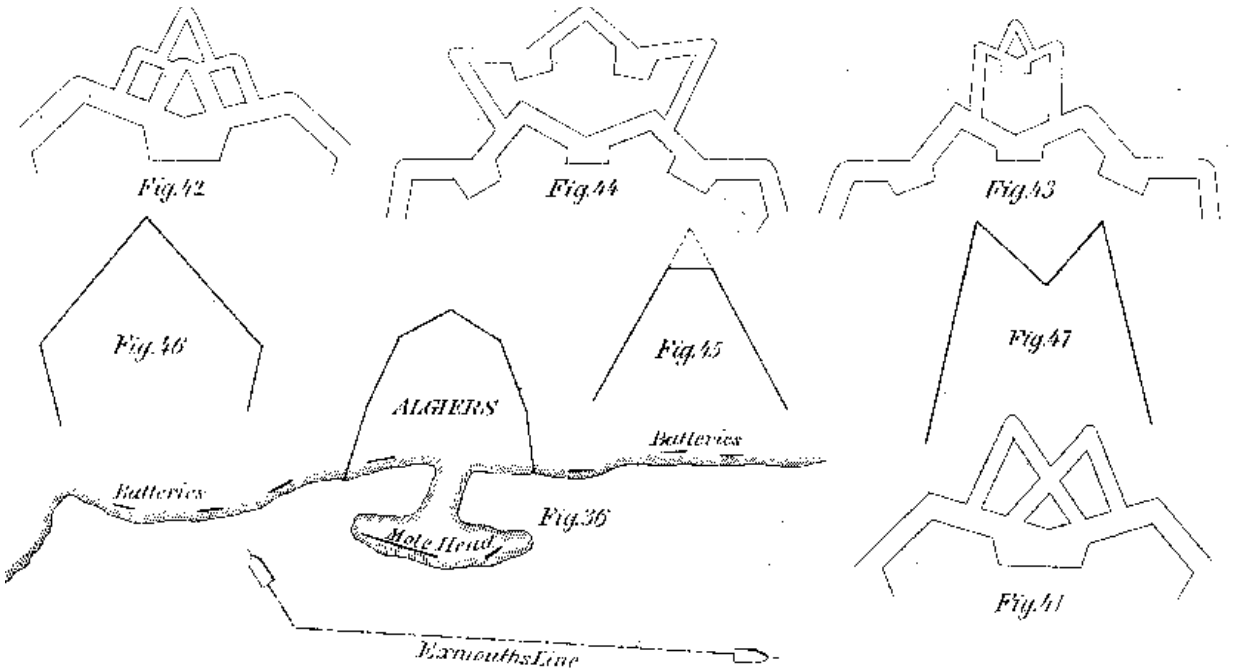
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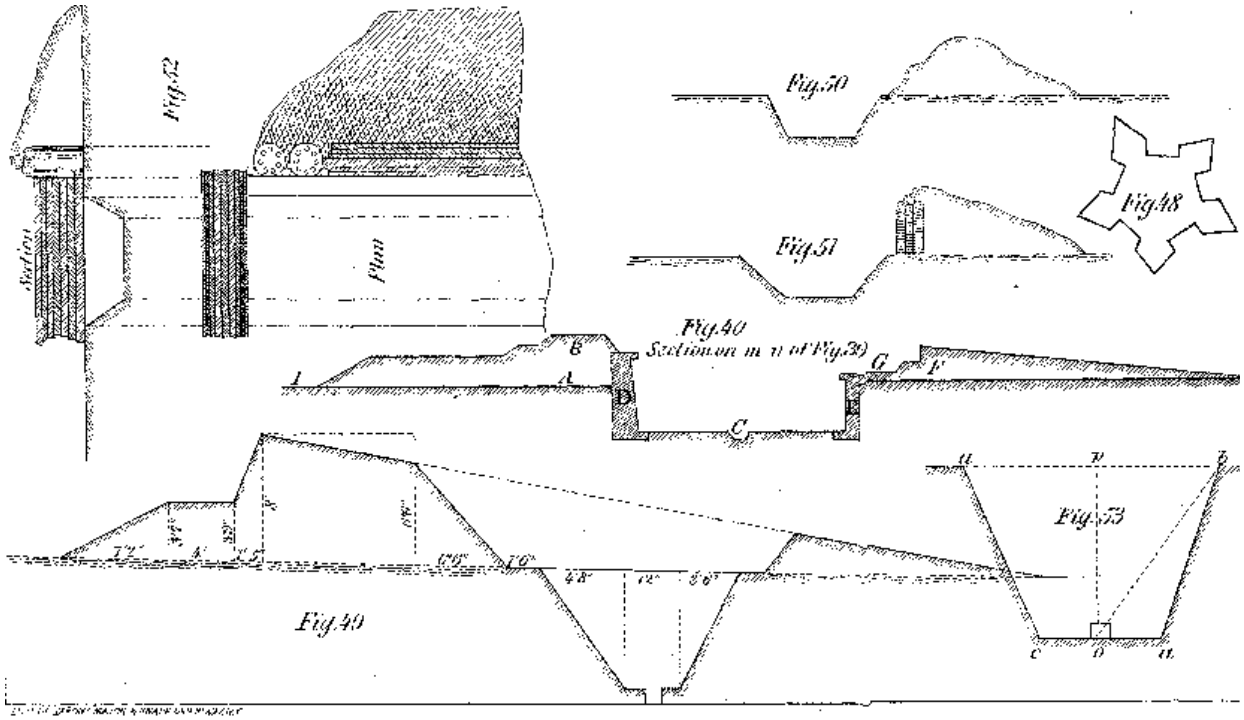
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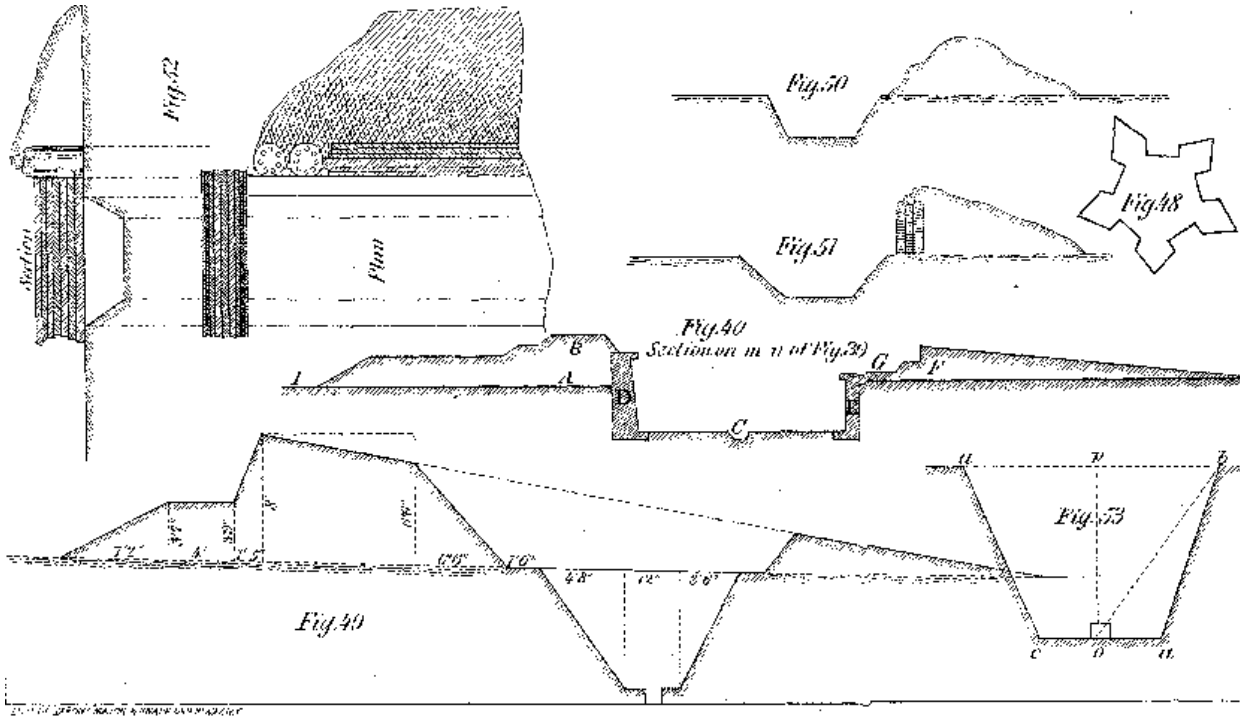
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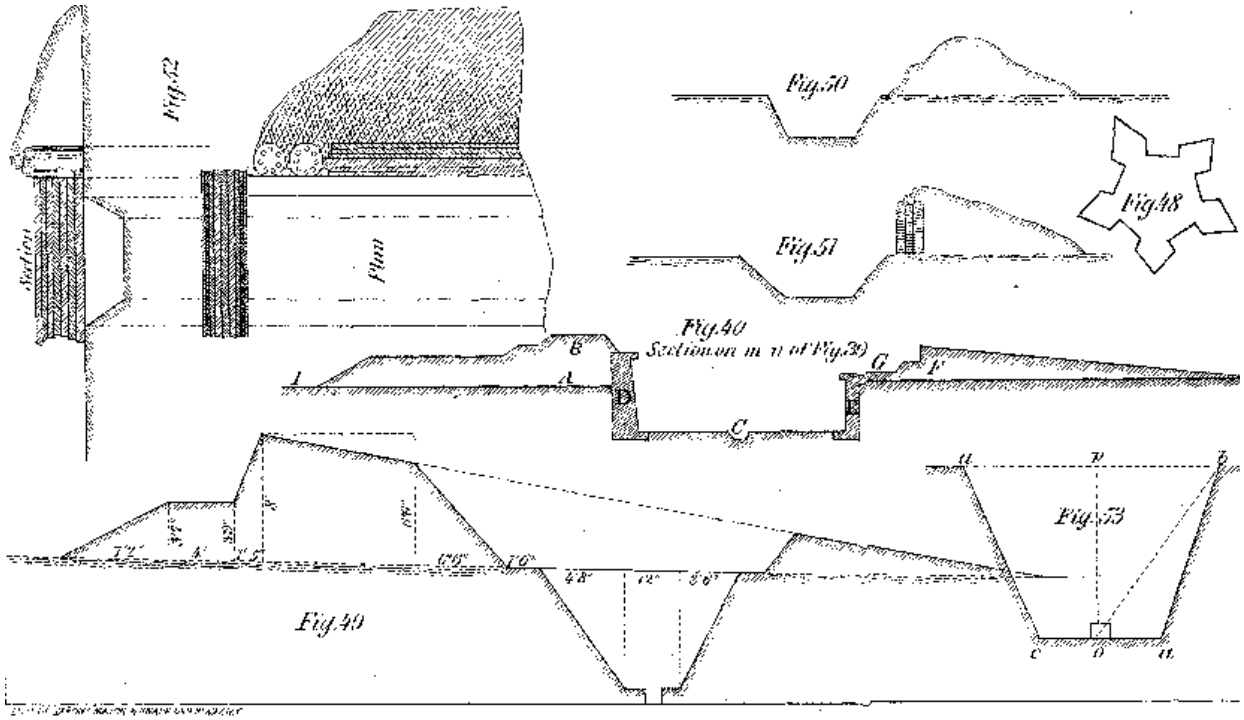
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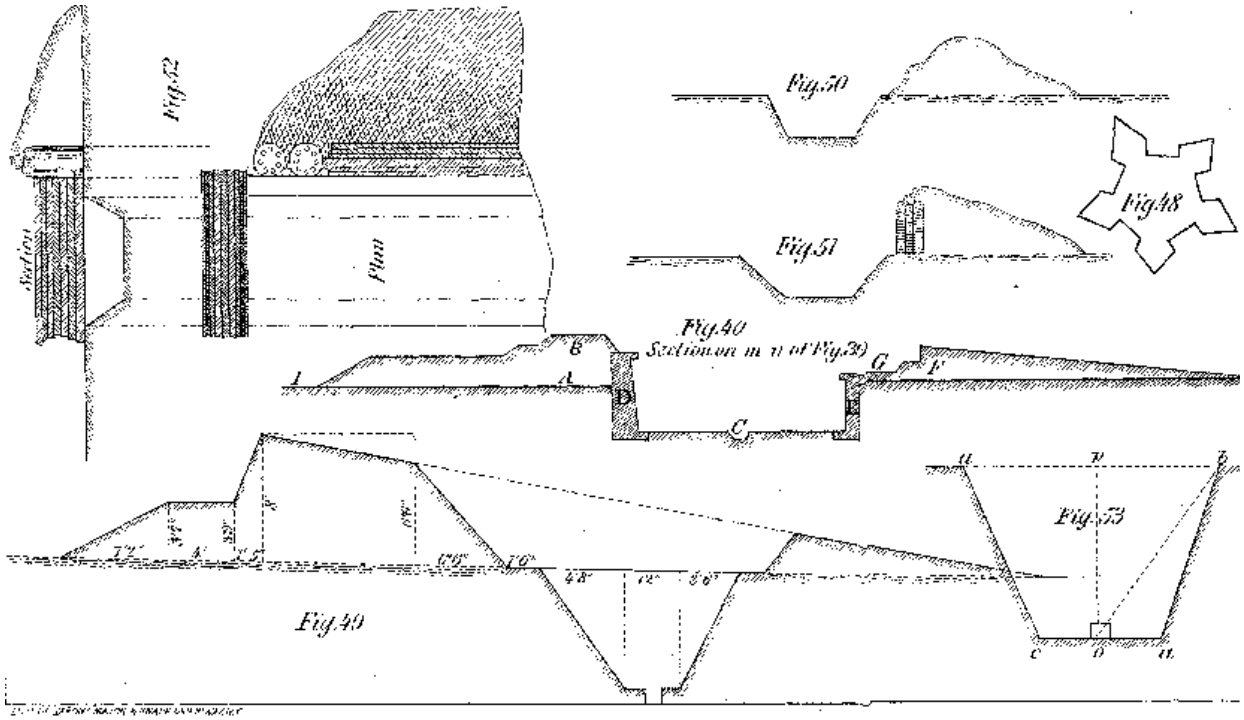
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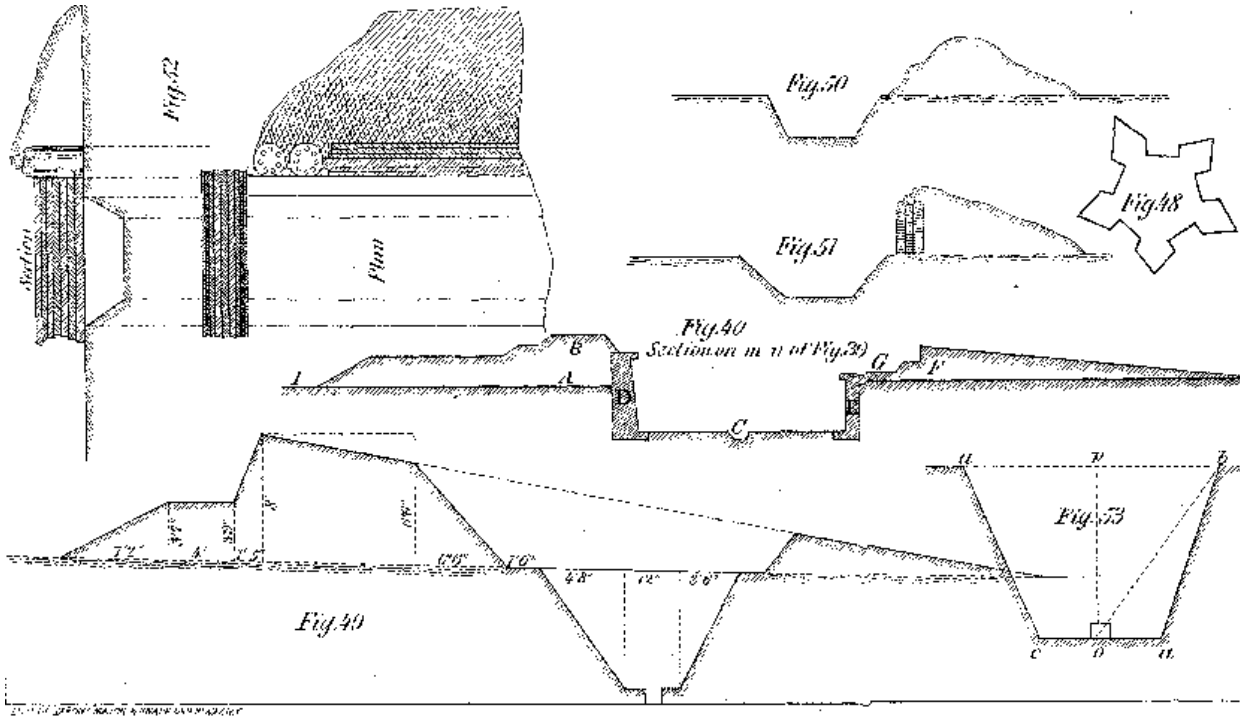
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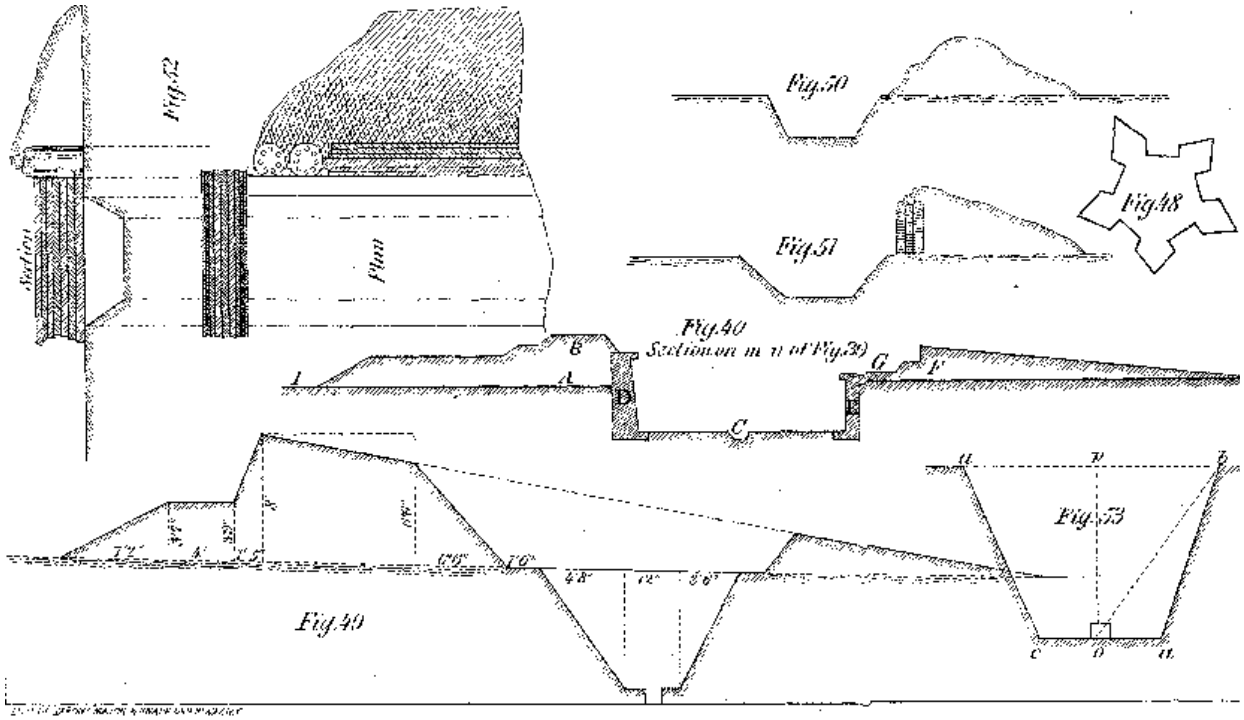
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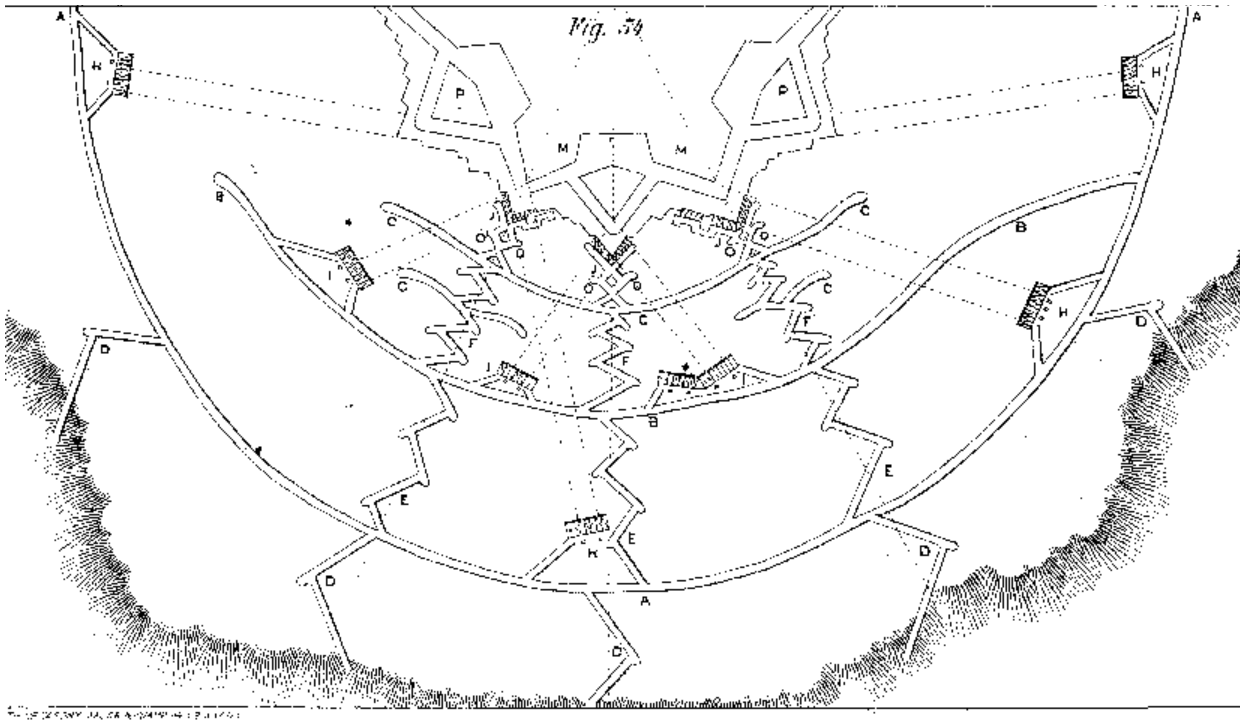

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