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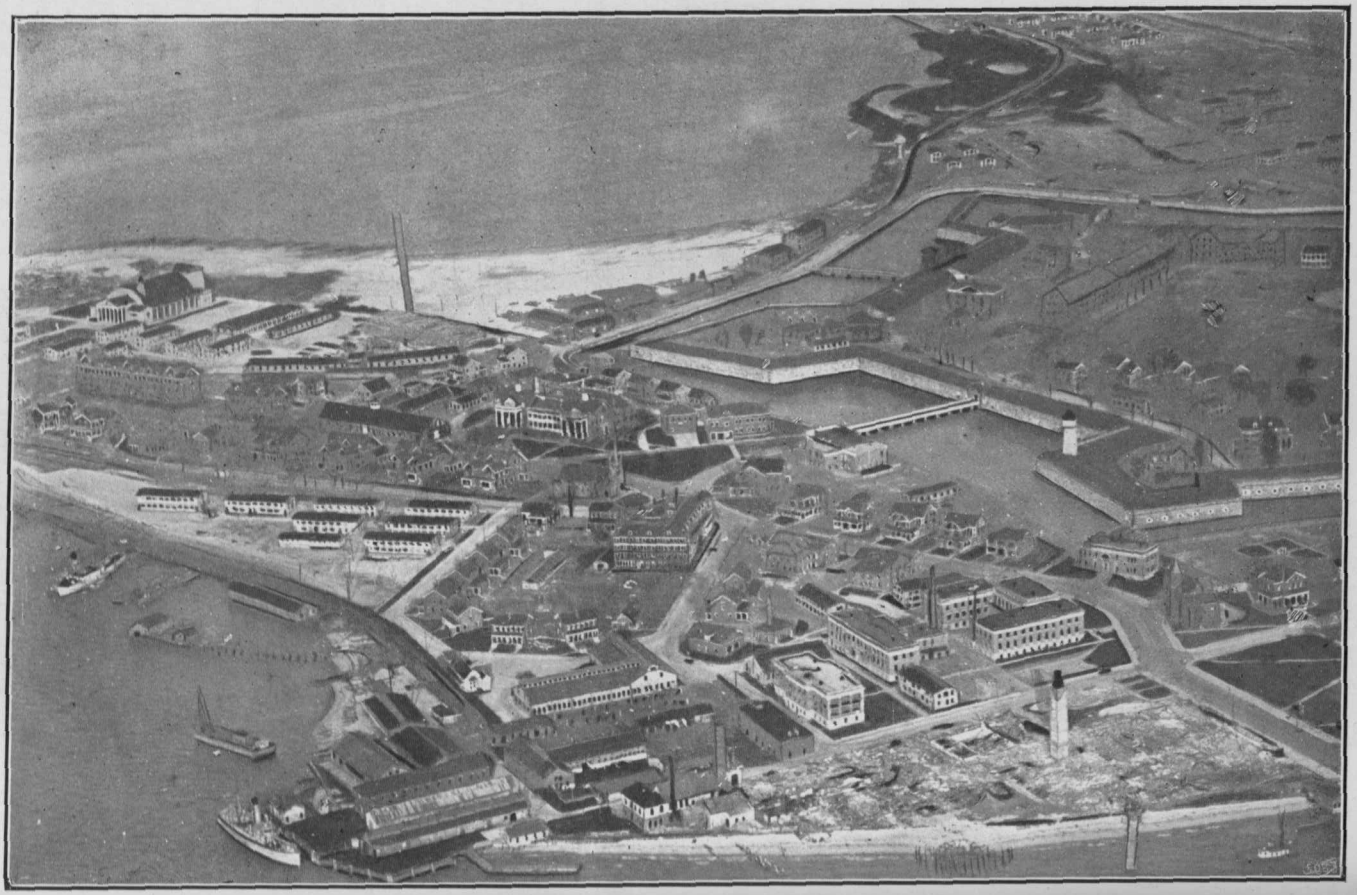


BIRDS EYE VIEW OF FORT MONROE

The Coast Artillery Journal

Vol. 58 No. 2 FEBRUARY, 1923 Whole No. 198

Railways and Their Relations to National Defense

By Colonel Frederic A. Delano, late Transportation Corps, A. E. F.

Editor's Note: The JOURNAL and its readers are much indebted to Colonel Delano for this paper, written especially for the COAST ARTILLERY JOURNAL at the editor's request. There is no branch of the service in a more likely position to appreciate the importance of the subject than the Coast Artillery Corps, and no one better qualified to discuss it than Colonel Delano, who has been intimately connected with railroading for thirty years. Formerly President of the Wabash Railroad, he has been a member of the Federal Reserve Board, and during the war served as Deputy Director General of Transportation, being the American representative in the French Ministry of Public Works.

THE importance of railways to National defense is more and more appreciated. It was tested in the rapid mobilization of troops on the Mexican Border in 1916; it was wonderfully demonstrated in the gathering of troops at concentration camps in 1917 and 1918, and in the splendid dispatch with which those troops were moved to the ports of embarkation. The handicap which Russia suffered from in the lack of adequate railway facilities across Siberia was evident to any student of the Russo-Japanese War; and the enormous use which Germany made of her railways in the Great War is fresh in everyone's mind.

In a country of immense distances and with a long coast line, the railway plays the most important part as a line of communication. That in no way belittles the importance of coastwise navigation, of internal waterways, or of highways suitable for motor-driven vehicles. Each plays its important part, but to the railway belongs the duty of the long distance, rapid, cross-country movements in large volume.

To visualize quickly the functions which the railways must be prepared to perform, we may roughly classify them as follows:

I. *Troop Movements:*
   a. Gathering to concentration camps;
   b. Entraining in large units for dispatch as needed;
   c. Reverse movements of equipment.

II. *Supplies:*
   a. For troops,—food, equipment and ammunition;
   b. Material and supplies for construction work;
   c. Movements to store points and out of store points;
   d. Reverse movement of equipment.

III. *Artillery and special appliance units mounted on trains:*
   a. Movements to mobilizing centres;
   b. Special movements of units as ordered.

There is a saying as old as history that "an army moves on its stomach." This certainly was an axiom appreciated by such military leaders as Alexander, Hannibal, Napoleon and Sherman; and yet none of them, even the most recent mentioned, could dream of the extent of the requirements of a modern army;—for while the capacity of the human stomach remains unchanged, the requirements of the modern civilized man far exceed even those of a generation ago. And when to those requirements are added the needs of a modern army in the field, we get a per capita total far beyond anything we have known heretofore. Furthermore, this total is constantly growing.

In the Great War our Transportation Corps Officers in France estimated the movement from ports of debarkation to supply bases or to the front as between fifty and fifty-five pounds per man per day (i.e. counting every man in France) and allocating in the total distributed, quartermaster supplies, munitions, equipment, engineer supplies, etc. That meant at the height of the movement in France something like 50,000 tons per day, or not less than 2,000 loaded cars of the total cars at our disposal in France. But even this total movement did not include material transferred and rehandled, nor return movements of either loads or empties, and excluded all troop movements. If we assume that we can do little if anything to resist the tendency to increase per capita requirements, an allowance must be made for a steady but certain increment in this item.

There again this last Great War developed as never before the possibilities of moving large pieces of artillery mounted to move by rail. The success with the 14-inch navy guns mounted on railway trucks (designed by Mr. S. M. Vauclain of the Baldwin Locomotive Works) was not only impressive, but indicated the immense importance of this method of mounting large cannon and mortars for coast defense. The possibilities of moving heavy coast defense artillery or special defense

units by rail indicate a demand for railway service not heretofore fully appreciated, for not only must strategic points in the interior be connected with seaboard and frontier points—and this is perhaps adequately accomplished by existing railways—but we must have parallel to our shore lines and boundaries, railways for the prompt movement of heavy defense guns or other units. A reasonable supply of such equipment would be far cheaper than adequately protecting (as, for example, with Fixed Artillery) all our ports and boundaries.

However, because Americans know that considering the area of their country and the population, there is no nation, save Canada, equally supplied with railways, they are apt to forget that the railways are located to meet the demands of commerce, and without reference to military necessities. The extent to which they fully meet the requirements of military strategy is not for me to say, but I venture to assert that no one can determine that question until the railway map of this country is drawn, as I presume it never has been, to show in a readily distinguishable manner the character of the railways properly classified or graded. Thus, railways of Class I, Roads of Double Track or better, capable of handling the maximum traffic and the heaviest wheel loads;—and so on down to the inconsequential branch line equipped for only the lightest traffic. Such a map must show the nature of the physical connections between railways and the opportunities at junction points for the interchange of business. It must show clearances, yard facilities, division points, shop facilities, etc. Supplied with such a map the strategist could determine first how best to avail himself of existing facilitites and second what added facilities the Army and Navy should have.

It is conceivable, and indeed possible, that some lines of slight importance commercially are of considerable importance from a military standpoint, and should therefore be strengthened or better equipped with trackage facilities of various kinds. In the same way, it is possible that the Government should build or aid in building or extending lines where none now exist, or in making physical connections between lines that now cross each other but where no connections between them exist.

All these suggestions would be truisms in any European nation, but are hardly considered with us. Indeed, if the expense of carrying out these suggestions were large, it is doubtful if the work could be accomplished in a time of profound peace, even though that is the time when it should be done; but a detailed and comprehensive study of the situation after the preparation of a map, which is clearly a prerequisite, will probably show that the total cost to be borne by the Government for what might be called "Military Extensions and Connections" would be trivial when compared to the safety secured.

The necessity of a map such as is described is illustrated by an experience in 1903 when President Roosevelt toured the country on his

famous speech-making tour. His trip of some 14,000 miles had been planned with much care as to the sections of the country to be traversed, but without knowledge of the character of railway traversed. The fact that a line was shown by black lines in the Railway Guide was considered enough. Some of the resulting experiences were fraught with danger, but fortunately everything passed off well. However, what actually happened was that a heavy locomotive with seven Pullman cars was scheduled over many branch lines which had never seen a Pullman car or a high-powered passenger engine. Connections between lines were required where none existed. Fortunately for everyone, the railways concerned bent their energies to making the needed "Y" connections, and strengthening track and bridges too soft for such wheel loads or speeds; but it is safe to say that many a railway manager breathed easier when the trip was finished.

Some added emphasis might properly be layed on the importance of a complete yet comprehensive study of existing facilities. The initiative for this work must come from the Army or the War Department, and when so initiated will find a cordial response from the railway managements. This I say without hesitation, even though I hold no brief for any such management, and speak with assurance only because I know how glad they will be to cooperate in every proper way in carrying out a comprehensive scheme of National Defense.

As an illustration for the need for cooperation, we might suggest that the movement of unorganized groups of officers and men, the gathering of these groups to concentrating points, and finally to important centres, is a matter requiring joint study by qualified army officers and equally qualified railway transportation men;—for the selection of suitable entraining points, camps and the like requires an intimate knowledge of many factors not least of which are the railway side track and yard facilities.

TO LOSE A FRIEND
IS TO DIE A LITTLE

Coast Forts of Colonial Massachusetts

By Major Robert Arthur, C. A. C.

THE story of the coastal forts of Colonial Massachusetts is brief and easily told. For a space of years Plymouth held the stage but early gave way to the quickly growing and more important city of Boston. This latter metropolis became the capital of the Province and consequently the center of settlement. Protection for Boston meant protection for the Colony, and it is therefore in the coast defenses of Boston that we find the major portion of our story.

I. CUTTYHUNK

The opening scene is, however, laid, not in Boston Bay, but at Cuttyhunk, where Bartholomew Gosnold built a fort (or more properly speaking, a trading house) in 1602. The New Engand coast had, of course, been known for years; and many fishing and trading expeditions had been sent across the Atlantic to the rugged shores of Maine and to the more hospitable littoral to the southward. Profit lay in the Indian trade and European speculators were not slow to take advantage of it. In fact, colonization grew largely from an appreciation of the trade possibilities which would be opened up with representatives on the ground in the form of permanent communities.

In 1602, Henry Wriothesley, Earl of Southampton, organized a trading expedition under the command of Gosnold, who, with a party of thirty-two men in the *Concord*, made the precarious voyage to the American shores. Sighting the coast of Maine, he turned southward, passing and naming Cape Cod. Arriving at length at an island which he named Martha's Vineyard, he turned in toward shore. On June 4th he anchored off an island which, in honor of the Queen, he called Elizabeth's Isle (Cuttyhunk). This island contained a fresh-water lake with a shore-line of about two miles, and separated from the sea by a strip of beach about a hundred feet wide. In the lake was a "rocky islet" on which Gosnold built a fort and from which he traded with the natives.

At the end of twenty-four days he found his supplies running low and, with a light load of sassafras, cedar, and furs, he started on his homeward voyage, abandoning his fort to the ravages of the Indians.

This trip of Gosnold's is stated by many writers of varying degrees of authenticity to be an attempt on the part of the sturdy skipper to establish a colony in the New World, and even Archer, the chronicler of the voyage, relates a tale to the effect that Gosnold and eleven others

desired to remain on Elizabeth's Isle. Gosnold, himself, in his official report of the expedition makes no statement concerning any such intention.

When the *Concord* reached England the provisions were entirely exhausted. This fact in itself is sufficient to make it appear highly improbable that the voyage was an attempt at colonization, for no experienced mariner, such as Gosnold was, would have undertaken such an endeavor with less than nineteen weeks' supply for his crew and for the would-be colonists. It is, of course, possible that Gosnold, after reaching America, expressed a desire to remain but the difficulty of dividing his scanty supplies forced an abandonment of the project.

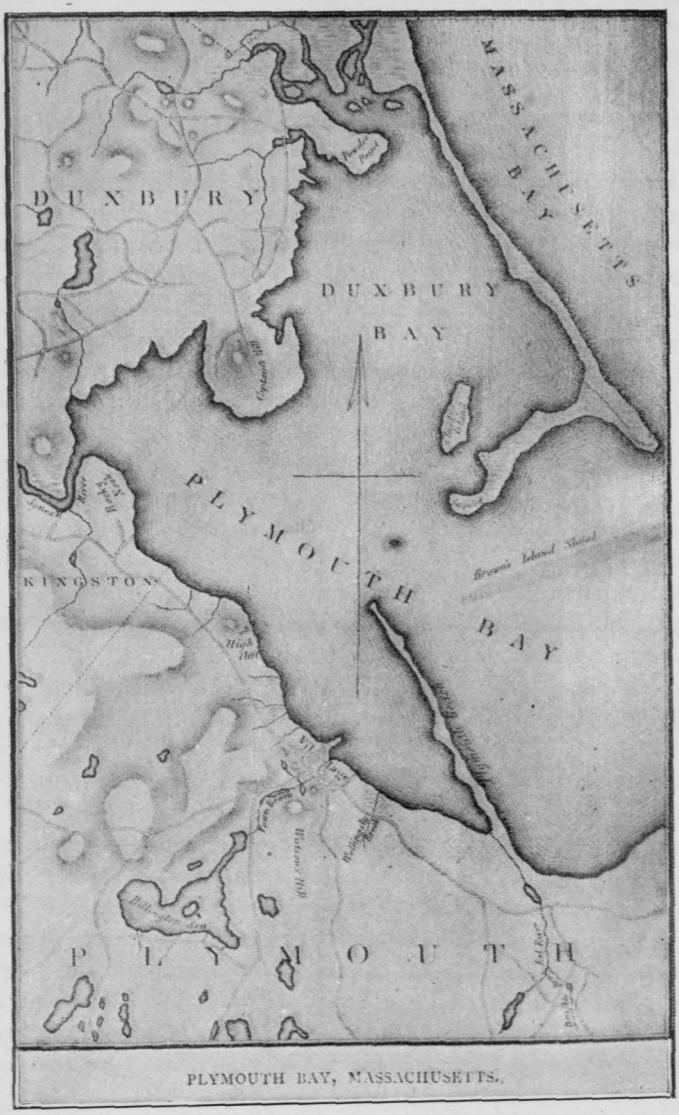
II. PLYMOUTH

Early in the seventeenth century, a group of religious fanatics, known as Separatists, much oppressed and much maligned by the Puritans, felt themselves forced to migrate from England to Holland. Here they remained a number of years on peaceful terms with the Dutch, but they found it particularly difficult to earn more than a bare living, they foresaw the approaching conflict between Holland and Spain and feared for the effect upon themselves, and above all they saw in their children an ever-increasing affection for Holland and a tendency toward absorption into Dutch national life which foreshadowed their own extinction as a Separatist community. As a result, many of them were induced to leave Europe for the New World, where they could become masters of their own destiny.

Starting with the intention of settling in the Hudson River valley, they ended a rough and stormy passage of sixty-seven days from Plymouth (ninety-nine days from Southampton) when Captain Jones of the *Mayflower* brought them into Cape Cod Bay. Wearied of the sea, fatigued by the long and close confinement aboard the small vessel, and fearful of the approaching winter, the hardy hundred and two pioneers of civilization in Massachusetts decided to make their new home in the vicinity of Cape Cod.

The men of the party, usually under the active leadership of Miles Standish, made a number of trips of exploration along the shores of Boston Harbor and at last, on the 19th of December, 1620, they "returned again a ship boord, with resolution the next morning to setle on some of those places. So in the morning, after we had called on God for direction, we came to this resolution, to goe presently ashore againe, and to take a better view of two places, which wee thought most fitting for vs, for we could not now take time for further search or consideration, our victuals being much spent, especially, our Beere, and it being the 19. of *December*. After our landing and viewing of the places, so well as we could, we came to a conclusion, by most voyces, to set on the maine Land, on the first place, on an high ground, where there is

a great deale of Land cleared, and hath beene planted with Corne three or four yeares agoe, and there is a very sweet brooke runnes vnder the hill side, and many delicate springs of as good water as can be drunke,



From Avery's "Story of the Pilgrim Fathers."

FIG. 1.

and in this brooke much good fish in their seasons: on the further side of the river also much Corne ground cleared; in one field is a great hill, on which wee poynt to make a plat-forme, and plant our Ordinance, which will command all round about; from thence we may see into the

Bay, and farre into the Sea, and we may see thence *Cape Cod:* our greatest labour will be fetching of our wood, which is halfe a quarter of an English myle, but there is enough so farre off."

Massachusetts was, at this time, ripe for colonization. The Indians were neither numerous nor particularly inimical. Most of the tribes had been decimated by the plague of 1616-7-8 and not only were they not to be feared by the whites but they could scarcely be refused as allies of the whites. Put more properly, they welcomed the Pilgrims as allies against the more distant tribes.

Nothing is known of the history of the New England Indians prior to the seventeenth century but, at the time of the Pilgrims, the native inhabitants of the seaboard territory from the Saco to the Connecticut were grouped into five Confederacies, embracing many small tribes. In Maine were a number of fierce warlike tribes; central Massachusetts contained the Nipmucks and one or two kindred tribes; and on the lower Connecticut and westward were many small detached tribes. Western Massachusetts, Vermont, and northern New Hampshire were largely inhabited.

Of the five Confederacies, the Pequod nation, comprising twenty-six tribes in eastern Connecticut under the grand-sachem Sassacus, was the strongest. To this nation belonged the Mohegans under that famous sachem, Uncas.

Bitter enemies of the Pequods were the Narragansets in Rhode Island under the grand-sachem Canonicus. The Narragansets and the Pequods were both ferocious and aggressive, but the bitter feud between them tended to save their more eastern and northern neighbors from subjugation, for neither could afford to take the chance of detaching a large body of warriors to the northern areas. Each of these nations had from four to five thousand fighting men and neither had suffered materially from the plague of a few years before.

Furthest to the north was the Pawtucket confederacy, in northern Massachusetts and southern New Hampshire and Maine, under the grand-sachem Passaconaway. The principal tribes were the Wamesits, Naumkeags, Agawams, Penacooks, Piscatawats, and the Accomintas. War with the Tarrantines of Maine, civil wars, and the plague had ruined the nation, and the Pawtuckets were on the verge of extinction.

Adjoining the Pawtuckets on the south, and friendly toward them, was the Massachusetts confederacy, including the Massachusetts, the Nashuas, the Nashebas, the Nonantums, the Punkapoags, the Neponsets, and some of the Nipmucks. Depredations by the Tarrantines, the Narragansetts, and the Mohawks, followed by the plague, had reduced this nation to about a hundred warriors,—a number so small that the nation had joined nominally the Pokanokets.

This latter confederacy, under the grand-sachem Massasoit, came between the Massachusetts and the Narragansetts, and included the

Wampanoags, the Pocassets, the Saconets, the Namaskets, the Agawayams, the Manomets, the Sakatuckets, the Mattakees, the Nebsquassets, the Monamoys, the Nausets, and the Patuxets. Except for the Namsakets and the Cape Indians, this nation had also suffered horribly from the plague. Therefore, Massasoit, controlling the territory south and west from Boston Harbor not only did not resent the appearance of the white man but even welcomed him as an ally and hastened to make an offensive and defensive alliance with the Pilgrims. More than this, the site chosen by the Pilgrims for their home was that formerly occupied by the Patuxets, a tribe which had been completely wiped out by the plague, for "about foure yeares agoe, all the Inhabitants dyed of an extraordinary plague, and there is neither man, woman, nor childe remaining, as indeed we haue found none, so as there is none to hinder our possession, or to lay claim vnto it."

Thus auspiciously was Plymouth founded on December 21, 1620.

On Thursday, the 28th (O. S.), the passengers were landed from the *Mayflower*, and at once "so many as could went to worke on the hill, where we purposed to build our platforme for our Ordinance, and which doth command all the plaine, and the *Bay*, and from whence we may see farre into the sea, and might be impayled, hauing two rowes of houses and a faire street."

In a few weeks "the first house, for common vse to receiue them and their goods," was completed, the fortifications well under way, and Leyden Street laid out. In February, signs of Indians in the vicinity alarmed the Pilgrims, and they effected a military organization with Miles Standish as Captain and Commandant.

He at once set about completing the fort and, early in March, had Captain Jones and some of his seamen assist in mounting five guns in the fort. "Wednesday the 21. of February, the master came on shore with many of his Saylers, and brought with him one of the great Peeces, called a *Minion*[1], and helped to draw it vp the hill, with another Peece[2] that lay on shore, and mounted them, and a saller[3] and two bases.[4]

In 1622, the Pilgrims learned of the Indian massacre in Virginia at a time when Massasoit was markedly cool toward the white settlers, whereupon they hastened to commence a new fort upon Burial Hill. Bradford says, "This somer they builte a fort with good timber, both strong & comly, which was of good defence, made with a flate roof & battlments, on which their ordinance were mounted, and wher they kepte constante watch, especially in time of danger."

The fort is not further described, but Isaak de Rasieres, Secretary

[1]Minion,—about a thousand-pound gun firing a ball of from three to four pounds.

[2]Probably a Minion.

[3]Saker,—about an eighteen-hundred-pound gun with a bore of about four inches and firing a ball of abour four pounds.

[4]Base,—a small piece firing a ball of about half a pound.

of the West India Company and emissary from the Manhattan Dutch to Plymouth in 1627, wrote that "Upon the hill they have a large square house with a flat roof, made of thick sawn planks stayed with oak beams, upon the top of which they have six cannon, which shoot iron balls of four and five pounds and command the surrounding country. The lower part they use for their church, where they preach on Sundays and the usual holidays." "Thus did these pious people offer their devout aspirations to God with the sword in one hand and the Bible in the other."

In 1632, "Whereas our ancient work of fortification, by continuance of time is decayed, and christian wisdom teacheth us to depend upon God in the use of all good means for our safety," it was agreed to rebuild the fort. Each man was supposed to participate in the labor or to forfeit ten shillings for each day defaulted and to pay for the work he should have done. Some of the men must have defaulted in both labor and money or else the energy of the company flagged, for in 1635 the Pilgrim fathers engaged Thomas Boreman ("to be paid in beaver, at ten shillings a-piece, or other commodities of valuable price") to complete a work in the form of a palisade. The specifications provided that "all the posts, ten inches square, and not to stand above ten feet asunder; to be done with three rails between every post, the post and rails to be sawed boards; to be nine feet high, and to be cut sharp at the top."

Existence in Plymouth continued peaceably and peacefully, and the Pilgrim fathers deemed it unnecessary to devote a great deal of time to their fortifications. They did, in 1642, repair or reconstruct the fort, but the years succeeded one another with no other extensive alteration in the colony's defenses until the outbreak of King Philip's War. In February, 1675, Nathaniel Southworth was engaged to erect a fort on Fort Hill, formerly Burial Hill. This new work was a hundred feet square, with a strong palisade ten and a half feet high. A watch tower was erected within the palisade, and in it was mounted the ordnance, consisting of three pieces of miscellaneous calibers.

At the conclusion of the war, the fort was demolished and the material sold to William Harlow, who used it to erect a residence on Sandwich Street. The cannon were removed to Cole's Hill, where they remained to protect the town during the Revolutionary War. Later they were sold as salvage, and were melted down in a forge at Bridgewater, bringing to a close Pilgrim efforts toward self-defense against foreign attack.

III. BOSTON AND VICINITY

The ten years following the settlement of Plymouth saw the Colony of Massachusetts Bay organized, the area of Boston settled by the Puritans, and the town of Boston incorporated. More fortunately

situated than Plymouth and backed by greater wealth, Boston's rise to importance was almost unduly rapid, and early in the history of the Colony, the General Court found it necessary to devote considerable attention to defensive works on the seaward side.

It is said that in January of 1632, Governor Winthrop and four of his Assistants, three ministers, and other worthies of the city, numbering in all about twenty-six, went to Natascott (Hull) with a view to selecting a possible site for a fort. Arriving towards evening, they were forced by a storm to spend the night in a delapidated shanty with no covering other than straw. By morning their enthusiasm appears to have evaporated, for "upon a view of the place it was agreed that to build a fort there would be of too great charge and of little use."

"A South East View of ye Great Town of Boston," by William Price, 1743

From Avery's "History of the United States," Vol. III.

FIG. 2.

Other sites were, however, chosen and in May was begun the construction of a fort on Corn Hill (later Fort Field, and eventually Fort Hill). Labor was furnished by details from the towns of Boston, Charlestown, Roxbury, and Dorchester, each town providing the detail for one day at a time, followed by the other towns by roster. Funds for material were provided by Salem, Aggawam, and Saugus. The Bostonians broke the ground on May 24th, followed by a detail from Charleston on the 25th, and then by the others in turn.

This co-operative method of fort-building, used in the public works of the Colony for years, was never altogether successful. Dissensions delayed the work and funds were hard to collect. As a result, the General Court found it necessary, in May, 1633, to order that its "ffort att Boston shalbe finished with what conuenient speede may be, att the publique charge." Even so, it was not until July, 1634, that the fort was reported completed. John Samford was appointed "canoneere" on the fort in 1632, and apparently remained on duty there for a number of years.

In discussing the defensive plans of the Colony, the worthy fathers at Boston considered "the vsefullness of a moveing ffort to be builte, 40 ffoote longe & 21 ffoote wide, for defence of this colony," but the scheme seems to have come to naught despite the "ffree offer of some gentlem[en] lately come ouer to vs of some large somes of money, to be imployed that way." Mr. Stevens probably did not receive his ten pounds "for his care & expedicon in this worke to be p[ai]d when the worke is finished."

As early as 1633 Castle Island seemed to offer defensive possibilities and decision was soon reached to fortify at that place. In May, 1634, the General Court appointed a committee consisting of Thomas Beecher (from whom was descended Henry Ward Beecher), Mr. Peirce, and Robert Moulton, to "bargaine" with Mr. Stevens and Mr. Mayhews for the building of a "seaffort." In July, Governor Dudley and the Council visited the island on a tour of inspection, and gave approval to the project.

Returning to Boston, the Governor recommended to the General Court the erection of defensive works on Castle Island, and that legislative body ordered the construction of a platform on the north-eastern side of "Castle Ileland" and a small fort on the top of the hill "to defend the said plateforme."

At the same meeting, the General Court also ordered defensive works built at Charlestown and at Dorchester. Deputy Governor Ludlow was detailed to supervise the work at Castle Island; Israel Stoughton that at Dorchester; and Thomas Beecher that at Charlestown. Captains Underhill, Patrick, Mason, Traske, and Turner, and Lieutenants Feakes and Morris were constituted a committee to select the several sites and to lay out the works.

The manner of building these forts was similar to that employed in constructing the fort at Boston. Salem, however, was to have all payments of money refunded if the inhabitants "shall so fortifie themselues as to satisfie the Court within theis 12 monethes." The sum of six hundred pounds was raised for the purpose of building these works and for completing the structure on Fort Hill. The platform at Castle Island was in the nature of a bateau with guns mounted upon it, while the fort is described as being a "castle with mud walls." The works at Dorchester and Charlestown were scarcely more than breastworks.

As was the case with all the early forts, work progressed slowly. At the March, 1635, meeting of the General Court, it was ordered that the fort on Castle Island, "nowe begun," should be completed before any other defensive work was carried on, but this proved still to be ineffectual and in September Captain Mason was authorized to impress men from any community which was in arrears in its alloted share of labor. At Boston, Captain Underhill received a similar authorization, and work at these two places advanced somewhat more rapidly.

As soon as completed, the "castle with mud walls" insisted upon all the etiquette of a larger establishment and "demanded as respectful notice as if it had been the tower of London." This the British sea-captains found decidedly irksome, but they complied in every detail, for the captain of the fort was instructed by the General Court to insist upon the prescribed regulations. If any vessel failed to drop anchor off the fort, he was to give warning by firing a shot across the bows of the offending ship. If this failed to suffice, a shot was to be fired across the ship and through its rigging. A third shot, if found necessary, was not to be wasted. To add insult to injury, the ship captain was required to pay liberally the cost of the first shot, about double the cost of the second shot, and about quadruple the cost of the third and subsequent shots. The rules of etiquette were strictly observed.

In March, 1636, the General Court loaned the inhabitants of Boston six pieces of ordnance to be mounted on a platform at the foot of Fort Hill, and appropriated thirty pounds to be used in building the platform and in completing the fort on the hill. At the same time, twenty pounds were appropriated for a platform and a breastwork at Charlestown "for three pieces of ordinance, att the hill foote there." No additional appropriation was made for the fort on Castle Island, but that place was given priority in impressing labor for construction, and Lieut. Morris was appointed to command, succeeding Mr. Gibbons.

Before long, Captain Patrick relieved Lieut. Morris, and on May 17, 1637, the garrison consisted of:—

Capt. Patrick, Commanding.
Lieut. Howe, Assistant,
Lieut. Damfort, Ordnance Officer,
Sergt. Tomlins, Cannoneer,
Will. Fulen, Gunsmith, and
Mr. Starr, Surgeon.

The peaceful conditions which accompanied the colonization of Massachusetts continued to exist, and a pacifistic element naturally developed in the General Court and among the public. A considerable portion of the Colony, however, continued to believe in military preparedness and desired to keep at full strength all the military elements of the Colony. Under the familiar plea of economy, the question of reducing the armament by abandoning the coast forts came up for discussion in the General Court, but the worthy Puritans of the legislature, astute politicians that they were, failed to come out solidly for disarmament. They compromised and, under date of May 2, 1638, they recorded for our benefit this ingenious and happy solution of a difficult political problem:—"Whereas the major part of this Court hath expr[e]ssed themselues vuwillingly to charge the country further w[i]th the finishing & maintaining of the fort at Castle Iland, & yet

notwithstanding that there are many in the country all willing & desiros that the said fort should bee yet vpheld & manned, it is therefore ordered, that if the aforesaid p[ar]ties that are so willing & desiros that the said fort should bee vpheld, shall satisfie the counsell w[i]thin 8 dayes that they wilbe at such charges for the manning & maintaining of the said fort till the next Generall Court as shalbee disbursed therevpon, & as the counsell shall see cause to appoint, that then the said fort shalbee so disposed of. And if the next Generall Court shall see cause to maintaine & vphold the said fort longer, then this charges & w[hi]ch shalbee after shallbee borne by the publicke. But if perticular men will not vndertake the defraying of the charges of the said fort, vpon the consideracon before exp[re]ssed, then the order of the last Court for the fetching away ordinances, &c, shall imediately be executed by Mr Staughton, Capt Cooke, Ensigne Palmer, John Johnson, & Mr Glover."

Has our own Congress ever hit upon so delightful a method of testing the patriotism of the "perticuler men" demanding legislative action and appropriation and at the same time successfully passing the buck to a succeeding Congress? It is too bad that we are not informed whether the "perticuler men" got their money back or not. However, it is to be doubted.

The ammunition had been ordered removed in January, but popular support assured at least temporary maintenance of the fort, and the order was suspended. Yielding to pressure, as legislative bodies often do, the Court, in June, 1638, voted a hundred pounds a year for the fort, and in June, 1639, it voted 250 pounds for a "house" and for repairs to the fort. Captain Sedgwick was appointed to the command of Castle Island in 1641.

In May, 1643, the arms, ammunition, and ordnance were again ordered removed from Castle Island and sold, but before the order could be executed, the serio-comedy dispute between La Tour and d'Aulnay over the proprietorship of New France and eastern Maine led the former to seek the assistance of the Bostonians. The entry into the harbor of an armed vessel flying the French flag greatly alarmed the people until they learned that his mission was a friendly one. Still, the alarm served to impress upon the public a realization of the fact that a hostile warship could have carried off the guns of the now delapidated and useless fort and could, with no difficulty, have sacked the town.

The Governor thereupon called a special meeting of the Court, which, after "much debate," voted one hundred pounds for the maintenance of the fort and a garrison of twenty men,—with the old joker attached—"to be paid when" the towns in the Bay had erected a new fort. The towns were also to be permitted to name the Commander of the fort.

The fort was therefore rebuilt, in 1644, of pine trees, stone, and earth, fifty feet square, in the interior, and with walls ten feet thick. It remained, however, the property of the Colony. Richard Davenport was appointed to the command, in which position he remained until his tragic death in 1664.

As was usual in the co-operative method of construction, the work made slow progress. The Court, having first permitted the towns to construct the fort, proceeded, paternalistically, to penalize them for not completing it. We find on October 18, 1645, that the "Cort being much troubled y^{t} ye Castle is, & hath bene so long neglected," ordered Boston, Dorchester, Roxbury, Charlestown, and Cambridge, each to complete its assigned work within two weeks or to be fined twenty pounds penalty plus five pounds for each additional day of delay. What then happened, we know not in detail, but a year later there still remained work to be done, and a draft of labor was again authorized. Ministers and magistrates were exempted from the draft.

With the passing of years, the fort again deteriorated. By 1652 it had become sadly decayed, and a committee consisting of Captains John Leverett, Francis Norton and Thomas Clark, and Mr. John Johnson, Surveyor General, was appointed to examine and report upon "the great battery on the Castle Iland." The committee unanimously recommended extensive repairs, so on June 2, 1653, "the whole Court, being mett together, entring into debate about ffortiffications in reference to the Castle," voted two hundred pounds "for the building or reparying of the great battery at Castle Iland" and referred the work to the committee which had made the original investigation. This committee was "impowred to impresse meete pe[r]sons and what else they shall judge necessary for the speedjest accomplishment thereof." The draft of business and of capital is thus not the new question that many of us are led by present-day discussion to believe.

On August 30th, the action of the Court was modified so as to provide for the erection of a small fort at a cost not to exceed three hundred pounds. Shortage of funds in 1654 threatened to force discontinuance of the work, but in the lexicon of our forefathers there was certainly no such word as "fail" when they had their minds made up. The Court, fully as ingenious as its predecessors, found a way out of the difficulty.

"Forasmuch as the countrye is in debt, no stocke in the treasury, no meanes at present to raise any, so that workemen cannot be precured to finish the Castle, w[hi]ch yett is necessary forthw[i]th to be donne, itt is therefore ordered, that the military companjes of the twelve next tounes, viz., Hull, Hingham, Weimouth, Braintree, Dedham, Dorchester, Rocksbury, Charles Toune, Cambridge, Water Toune, Maulden, and Woodbourne shall, in lejw of theire forwe next trayning dajes, allow three dajes at the Castle, this somer, * * * and that all

the rest of the companjes in this jurisdiccon shall allowe for euery souldjer in theire respective companjes fower shillings and sixepence to be jmployed & improooved about or vpon the sajd Castle, for w[hi]ch they shallbe exempted from theire fower next trayning dajes, (Boston only to be excepted)."

Thus was the fort built, and a reduction of the garrison to a Captain and four men reduced the maintenance cost to a not overly burdensome sum.

This fort lasted nine years before extensive repairs again became necessary. In 1663, the fort was repaired and enlarged by the addition of a small three-story "castle" with brick walls. The first floor was used as a dwelling room, the second as a lodging room, and the third as a gun room in which were mounted "six very good saker guns." The roof provided space for three smaller guns.

On July 15th, Richard Davenport, the commanding officer, was sitting in a room adjoining the powder magazine which contained a large quantity of gun-powder. There he was killed by a bolt of lightning which entered through an open window during a storm, but which did not pierce the thin partition of the magazine. Shortly afterward Roger Clapp was appointed to the command of the fort, where he remained for twenty-one years.

News of the war between Great Britain and Holland reached Boston in the late spring of 1665, and caused at once a resumption of activity along military lines. The Court ordered that "the batterjes at Boston be forthwith compleated." Castle Island was at that time in fair condition but the mainland works adjacent to Boston had practically disappeared, so the North and the South Batteries appear in the records.

The Sconce or Water Battery (South Battery) may have been the successor to the battery at the foot of Fort Hill, but the name is not applied until 1666, at about which time a new battery seems to have been built by John Leverett. A committee from the General Court reported, on May 13, 1666: "Wee entred a well contriued fort, called Boston Sconce; the artillery therein is of good force & well mounted, the gunner attending the same; the forme thereof suiteable to the place, so as to scower the harbour, to the full length of their shott, euery way; it is spacious w[i]thin; that the trauerse of one gunne will not hinder the other course, and for defence the foundation is of stone, & well banked w[i]th earth for dulling the shott & hindering execution, ffinally, we app[re]hend it to be the compleatest work of that kind which hitherto hath been erected in this country. * * * Boston Sconce hath nine gunns mounted, & fower more intended." The Sconce was augmented or rebuilt in 1672 when the Dutch again threatened. In 1676 it appears to have been "a small brick fort, with two tiers of six guns each, without officers or men." It mounted thirty-five guns in 1743, at which time the works on the top of the hill had disappeared. The

British occupied it while in possession of Boston. In 1779 the guns were removed and sent to the Army operating against Clinton in New York.

The North Battery is first mentioned in 1644, when it was the intention of the Court to erect a fort "att Walter Merry's Point." The work was not built at that time, but in 1666 it appears practically complete. It was a work of considerable importance, in that it commanded the mouth of Charles River and the entrance to Town Cove. "The foundation is defended from the violence of the sea w[i]th spyles & plancks; the wall is of considerable thickness, yet lesse safe than the other [South Battery], by reason of the sharpe edges next the cannon, & widenes of the ports w[i]thin, which being faced w[i]th strong timbers, as is intended, willbe much better." Seven guns were mounted here at this time. A thousand pounds were appropriated in 1706 for the improvement of this battery. During the British occupancy of Boston in the Revolutionary War, North Battery contained seven 12-pounders, two 9-pounders, and four 6-pounders.

In March, 1673, the fort on Castle Island, built chiefly of wood, was accidently destroyed by fire. But "the Court, hauing considered the awfull hand of God in the destruction of the Castle by ſjer," did not consider it contrary to their Christian scruples to insist on having a fort on the island notwithstanding their apparent assumption of a Heavenly origin of the catastrophe, and ordered "a small regular peece erected where the old Castle stood."

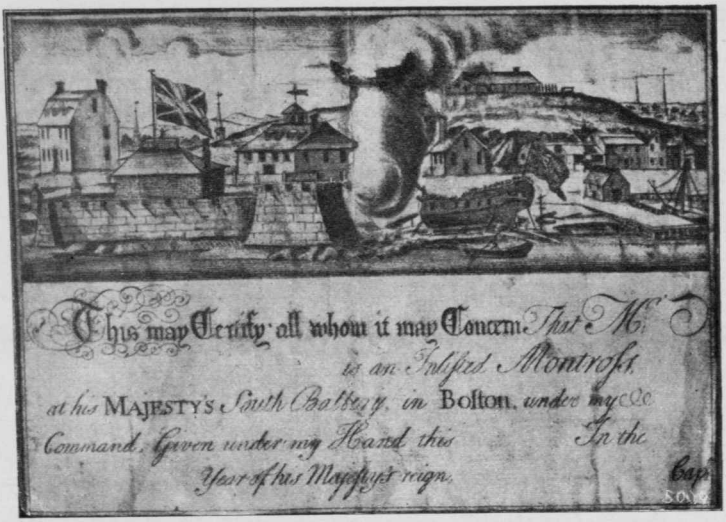
A year later they had an imposing work of stone on the island. With an interior about sixty feet square and with four bastions, the new fort mounted thirty-six guns and sixteen culverins. A water battery mounting six guns completed the defenses. The whole Court visited the "newly finished" Castle on October 8, 1674, and pronounced itself satisfied.

In 1687, Governor Andros erected a "palisade fort" of four bastions on Fort Hill, in such a position as to command the harbor. In September, he wrote to the Secretary of the Admiralty: "I have made a Battery and am now fortifying a place at the south end of the towne, called Fort Hill, very proper and absolutely necessary for his Maties Service, under which is a good Channell, close to the shore, where convenient Ware houses may be made, and as am advised, a Dry dock if Occasion [arise]. The same commanding the Avenues to the Town by Land or Sea."

Two years later, Andros found it necessary to flee from his own people. When the news of the successful invasion of England by William of Orange reached Boston in the spring of 1689, the Bostonians became very much excited, and the Governor found it advisable to seek safety at Castle Island. Hoping for a return of the old Charter, the whole town was ready to support the new Administraton, by force

of arms if necessary. Messrs. Oliver and Eyres were sent to Castle Island to demand the surrender of the fort. Andros temporized but within twenty-four hours he surrendered and was held at Boston, while the people took possession of the fort. John Fairweather was placed in command, vice Captain John Ripon, who was relieved.

Time smoothed out this difficulty, as it has a way of doing, and the fortifications around Boston were again left to the ravages of time. The end of the century approached and found Massachusetts, in common with most of the other Colonies, with no coast defenses. However, a new era was about to dawn, and Boston was soon to have a fort of which she might well be proud.



From Avery's "History of the United States," Vol. V.

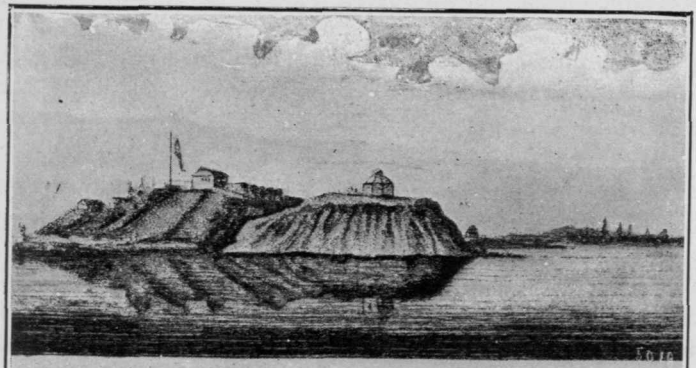
FIG. 3. AN ENLISTMENT BLANK, WITH ENGRAVED VIEW OF FORT HILL, BOSTON

With the opening of the new century, Colonel William W. Romer makes his appearance in the annals of the Colony. This officer was a famous Provincial Engineer who had a hand in the design and construction of all the important forts on the New England coast during the early years of the eighteenth century. Under the administration of Sir William Phipps, appointed Governor by King William, he was sent to Boston in 1701 to rebuild the fort on Castle Island.

The Crown having donated a large sum of money, Colonel Romer demolished the old works on the island and built a regular and substantial fort of brick, using mortar made with lime obtained from burnt oyster shells. Upon its completion, the new fort was named Castle William in honor of the late king, William the Third, and the royalistic leanings of the Colony were illustrated by the names given the several bastions,—Crown, Rose, Royal, and Elizabeth. The ordnance given to

Castle William consisted of twenty-four 9-pounders, twelve 24-pounders, eighteen 32-pounders, and eighteen 48-pounders.

The threat of a French invasion, which had been largely instrumental in causing the erection of Castle William, passed with no untoward event, and the years succeeded each other peacefully until 1716. The Castle had always been Colonial property and the appointment of the Commander had always been a Colonial prerogative. In this year, however, the Crown appointed the Lieutenant Governor, William Dummer, to command. The colonists, feeling that this constituted an infringement upon their rights, were inclined to protest the appointment, and the General Court expressed considerable ill-will toward Governor Dummer.



Castle William

From Avery's "History of the United States," Vol. V.

FIG. 4.

By 1732, Castle William had deteriorated to a considerable extent, so it was repaired and augmented. In the summer of 1734, we find that "a new addition is now making for the entertainment of twenty large cannon, and then Castle William (so it is called) will be capable of mounting 120 guns."

Lack of foreign complications during the next few years led to the neglect of the fort and its equipment, and by 1739 it was "in a poor defenceless condition & wanting of powder & all other warlike stores." War with France again threatened and, in 1740, the Castle was repaired. A new bastion large enough to accomodate twenty guns was added to the fort and named Shirley Bastion. At the same time the pay of the men stationed at Castle William was raised and twenty men were added to the garrison.

The fort was not at this time equipped to capacity with ordnance, there being but one hundred guns mounted, with twenty of these in the water battery—"on a platform level with the water." The main ship channel passed so close to the island that all vessels had to pass

within musket-shot of the castle. Additional ordnance was presented to the fort by the king in 1744; another magazine was built in 1747; and a third was added during the administration of Governor Shirley.

In June, 1746, a French fleet was sent out under D'Anville to ravage the New England coast and to destroy the fort at Boston. When word to this effect reached that town, excitement prevailed, fortifications were repaired, coast lookout stations were established, and troops were raised. It is said that, during a ceremony at Old South Church on a fast-day, a storm arose and moved Thomas Price to pray that the elements might bring confusion to the enemy. At any rate, that is just what happened. Contrary winds delayed the voyage and a gale scattered the fleet, and it was not until September that the vanguard of the crippled fleet limped into Chebucto (Halifax). Shortly afterwards D'Anville died suddenly under somewhat suspicious circumstances; D'Estournelle, who succeeded him, committed suicide after his plans had been over-ridden by a council of war; small-pox broke out among the men; and the expedition was abandoned.

In 1747, there occurred in Boston a riot which caused the Governor to flee for safety to Castle William, where he remained a short time until he received assurances that his authority would be sustained.

Nothing further of consequence in the story of the Castle occurs until ten years later, when Governor Pownall arrived to assume the reins of government. Sir William Pepperell was then in command of the island, a post which he had received (along with his title) in recognition of his lucky but none-the-less highly acclaimed exploit at Louisburg a decade before. Following the custom of like occasions, Pepperell offered the key of Castle William to the new Governor, remarking: "Sir, I hand you the key to the Province." Governor Pownal, not to be outdone, responded in his stately manner: "Sir, the interests of the Province are in your heart. I shall always be glad, therefore, to see the key of the Province in your hands." Thus the famous old fighter was retained in his command until his death two years later.

In 1759, death closed fifty years of continuous service on the island for Captain Lieutenant John Larrabee. In 1764, the Castle was used as an inoculation station during the epidemic of small-pox which raged around Boston that year.

At about this time Boston became the center of much of the pre-Revolutionary activities which make no small part of our early history, and in which Castle William played its part. In 1765, stamps by which Great Britain expected to raise revenue in the Colony were brought to Boston and stored at the fort. Here they were not to remain, for the vigorous opposition of the colonists caused the act which called for the use of these stamps to be repealed, and they were soon returned to England.

In 1770, England, sensing the approaching storm, again infringed on

Colonial rights in regard to the fort. Under the Charter of the Colony, the Governor was Commander-in-Chief of the Colonial militia and was authorized to build or to demolish forts. He was also authorized "to comit from time to time the government and custody of the same to such person or persons as to him shall seem mete."

Notwithstanding all this, Lieutenant Governor Hutchinson, in September, received an order from England designating Boston Harbor as the rendezvous of all British ships stationed in American waters and directing the transfer of Castle William "to such officer as Gage should appoint, to be garrisoned by regular troops and put into a respectable state of defence."

Such an order would, of course, have created a furore in Boston, so the transfer was effected with a minimum of publicity. Colonel Dalrymple, who had been stationed with his regiment on the island for some months, was designated by Gage as the new commander of the fort. So "on ye 10th of Sept. with great secresy Col^{o} Dalrymple * * took possession of ye Castle by virtue of an order from ye Lt Govr to Capt Phillips, who had no previous intimation of it whatever, & who imediately surrendered ye Castle with all its appurtenances to Col^{o} Dalrymple."

It is only fair to Governor Hutchinson to state that he hesitated before issuing the order, but he apparently felt that he was bound to obey instructions from higher authority and that he could not consider the probable effect upon the people. His first duty appeared to be to the powers which appointed him. Consequently, regular troops replaced the militia, and Castle William continued to be manned by a large force of British soldiers until it was returned to the Americans in 1776.

In 1772, Captain Sir Thomas Adams died on board his frigate, the *Romney*, and was buried on Castle Island. Thirty years later, while earth was being removed for the construction of Fort Independence, a number of coffins were dug out and removed to the common burying ground at the south end of the island. That of Captain Adams, a highly ornamented double coffin, had no legible inscription and was not then identified. Consequently his grave became indistinguishable from those around it.

One of these others, however, did possess a readily legible inscription, to the following effect: "Here lies the body of John, aged fifty years, a fatihful soldier and a Desperate Good Gardner." Is this sarcasm or naivety?

When the stirring events of the early days of the Revolution burst upon the world, there were a large number of soldiers stationed on Castle Island. It does not appear that this force participated in the early bloodshed, although a body of men was sent out on two occasions for minor operations. In February, 1776, a small detachment was sent

from the fort to seize gun-powder and other stores located at Salem, but the Americans were informed of the movement and were able to remove everything of military value before the arrival of the enemy. Later, five hundred men were sent to make a feint attack upon Dorchester in order to draw the American forces from around Roxbury. The effort was unavailing and damage was limited to the burning of half a dozen houses in Dorchester.

During the season of 1775-1776, Washington was able to concentrate a body of troops, formidable in number but lacking in training and discipline, around Boston. Following the Battle of Bunker Hill, the British remained in inactivity, giving Washington the opportunity he required to raise, equip, train, and discipline the rapidly changing personnel of his army. In the course of several months, the Americans had seized and fortified all the hills commanding Boston, so General Howe, who had succeeded General Gage, deemed it expedient to remove his forces from the vicinity. On March 17, 1776, he embarked his troops on transports and, ten days later, dropped down the harbor.

Prior to their departure from Boston, the British blew up or otherwise rendered unserviceable all the batteries and forts they had occupied. On Castle Island they threw the projectiles in to the water, broke the trunnions off the guns, destroyed the military stores, and blew up the fort. In such fashion was Castle William returned, a mass of ruins, to the control of the American colonists.

Following the evacuation by the British, General Washington sent Colonel John Turnbull to take possession of Castle Island. With him, or following shortly afterward, was Lieutenent Colonel Paul Revere, who was stationed on the island until 1779.

Among the ruins of the fort was subsequently found a slate stone, about, twenty-five inches square, bearing the following inscription:

ANNO DECIMO TERTIO REGNI WILHELMI
TERTII MAG: BRIT: FR: & HIB: REGIS
INVICTISSIMI. HOC MUNIMENTUM
(:EX EJUS NOMINE WILHELMI CASTELLUM
NUNCUPATUM:) FUIT INCEPTUM,
ANNO SECUNDO REGNI ANNAE
MAG: BRIT: FR: & HIB: REGINAE
DOMINI MDCCIII.
A Tribuno Wolfgango Wilhelmo
Romero Regiarum Majestatum
in Septentrionali America Architec-
=to militari primario constructum

This may be translated about as follows: "In the thirteenth year of the reign of William the Third, Most Invincible King of Great Britain, France, and Ireland, this fortification (called Castle William, from his

name) was undertaken; and was finished in the second year of the reign of Anne, Queen of Great Britain, France, and Ireland, in the year of Our Lord, 1703. Built by Colonel William Wolfgang Romer, Chief Military Engineer to their Royal Majesties in North America."

The Americans, while besieging Boston, had not neglected the lower harbor. A number of defensive works had been built, and, in January, 1777, a Committee of Fortification was appointed by the General Court of the "State of Massachusetts-Bay" to report on the condition of all the defensive works in and near Boston Harbor and to recommend the action required, according to their judgment, to put the harbor in an immediate state of defense. The committee was also to include an estimate of the number of men and guns required at each place and to prepare a general plan of defense. The report stated:—

"Hull — That at Hull, is a Pentagonal Fort, well constructed, & nearly finished: within the Fort is a very good Well; a good Ditch on the outside, friezed on the Berme, but the Glacis not finished; in the Fort is wanted a Blind, a Magazine, a Guard-House & two Barracks; on the outside is wanted a Bridge, Covered-Way & Place of Arms; & the Fort has 16 Embrasures. There are also two Batteries will constructed, open to the Fort, but well defended against the Channel; one of these has 5 Embrasures, but wants another to be added, to rake Stony-Beach; the other has 8 Embrasures. * * * *

"Long-Island — That at Long-Island there is a Fort laid out, but far from being finished; designed for 30 Guns; to have 2 Ravelins, & one Battery, for outworks— * * * * *

"Point Shirley — That a small work at Point-Shirley is already erected, at which place are old buildings enough for 100, or 150 men: 5 or 6 Ps of Cannon, with 2 or 3 Field Ps; will be Sufficient for this Post.

"Castle-Island — That at Castle-Island, much is done towards putting it into a good State of Defence, & much more is still necessary; when the Plan is finished, there will be about [42] Embrasures; & 16 are already opened; there are 4 Barracks finished, & 4 more will be needed.

"Governor's Island — That at Governor's Island, there is a Block-house with a Breast-work; & Barrackage for about 100 Men; & 1 Embrasure in the Breast-work; and the work is all finished.

"Dorchester-Point — That at Dorchester-Point is a well finished Fort, of the Star-kind, with 13 Embrasures; a Guard-House within, & Barracks enough near at hand, on the outside.

Dorchester-Heights and Hill	At Dorchester-Heights are two Small Forts, with 11 Embrasures in one of 'em, and 9 in the other; These want one or two Ravelins. And at a Hill between [the] Heights & Point, there ought to be a Redoubt &c. There are Barracks enough for all.
"Battery	A Small Battery is already at Fox-Hill; and another ought to be between that & the Fort at the Point.
"Noddles-Island[5]	That at Noddles-Island, is a Quadrangular Fort, well finished, & Barracks enough for about 400 Men on the outside; This fort has 19 Embrasures. This wants one or two Ravelins to make it more defensible.
"Boston	That at Boston is a Quadrangular Fort, well finished; but the Com^{tee} are of opinion, that if the Stockading was taken up, & the Berme Friezed, it would be much better. In this Fort are 19 Embrasures.
"Charles-town	And that at Charlestown point is an irregular Fort, with 9 Embrasures. At Bunkers Hill is an irregular work with 7 Embrasures. And Barrackage enough for about 300 men."

The fort at Hull was located on Telegraph Hill, and the two batteries were on Cushing Hill. Nantasket Head was fortified shortly after the British left Boston, and, at this time, a fort called Fort Independence is reported as "well constructed and nearly finished." It would seem that Boston Harbor was sufficiently well provided with defenses, but more was to be done.

In August, 1778, Count d'Estaing put into the harbor for the purpose of repairing and refitting his fleet. Anchoring in Nantasket Roads, he took over, for the protection of his station, the sites of Hull, George's Island, Lovell's Island, Gallup's Island, Long Island, and Peddock's Island and manned the existing works or built new batteries. To provide the necessary armament, he took his frigates *Aimable*, *Alcmene*, and *Engageante*, twenty-six to thirty guns each, into Hull Bay, and dismantled them. Within the month he had thirty 18- or 24-pounders mounted at Hull and one battery of eleven 24-pounders, one of eight 18- and 24-pounders, and one of six mortars on George's Island. Detachments under the command of Bougainville garrisoned the peninsula at Hull, the Count de Broves commanded on Gallup's Island, and the Marquis de Charet was in charge of Peddock's Island. Captain Duchatelet had charge of the mortars on George's Island, while de Rions with some marines manned the guns. Lovell's Island appears to have had no troops assigned to it.

Having satisfactorily provided for his safety during the time his

[5]In 1630, Mr. Maverick was living on Noodle's Island and had built himself a small fort in which four cannon were mounted.

fleet would be in a defenseless condition, d'Estaing repaired and refitted his fleet during the months of September and October, and quitted the harbor on November 4th. With his departure, coast defense activity in Massachusetts came to an end until the Federal authorities, a number of years later, undertook the first coast defense project of the United States.

At the conclusion of the Revolution, an act passed by the legislative body of the state required that all convicted criminals should be confined on Castle Island. The number was never great, the maximum at any one time being about ninety, but they were a constant source of trouble to the garrison and taxed the vigilance of their keepers. In several mutinies and attempts to escape from the island, a number were killed and a few wounded.

In the hundred and sixty years following the first settlement in Massachusetts, a great deal of money had been expended upon coast forts and batteries, but, in common with the other colonies, Massachusetts found itself too much occupied with internal affairs to pay any attention to possible foreign relations and the probable necessity for defense against foreign invasion in the years following the Revolutionary War. Even had the governing authorities had the time to build forts, the burden of debt and the greatly depreciated currency, combined with a lack of credit, would have prevented the construction of any extensive works. Consequently, the next step taken along defensive lines was delayed until the central government had been organized and had begun to work smoothly. By that time Massachusetts had been organized and had begun to work smoothly. By that time Massachusetts had no coast forts and no military stores of value which could be turned over to the new administration. Like Virginia and Maine, Massachusetts had no coast forts.

Bibliography

Anon. Boston Illustrated. (Boston, 1872.)

Arber, Edward. The Story of the Pilgrim Fathers. (London, 1897.)

Avery, Elroy M. A History of the United States and Its People, Vols. III, IV, and V. (Cleveland, 1907-8.)

Barry, John S. The History of Massachusetts. 3 volumes. (Boston, 1855.)

Bostonian Society, The. Publications, Vols. II and X. (Boston, 1905-13.)

Bradford, William. History of Plymouth Plantation. (Boston, 1856.)

Cheever, George D. The Journal of the Pilgrims at Plymouth, in New England, in 1620. (Boston, 1848.)

Cushman, Robert. A Relation or Iournall of the Beginning and Proceedings of the English Plantation Setled at Plimoth in New England (London, 1622), reprinted in Cheever's *Journal of the Pilgrims at Plymouth.*

Davis, William T. History of the Town of Plymouth. (Philadelphia, 1885.)

Dexter, Henry M. Mourt's Relation or Journal of the Plantation at Plymouth. (Boston, 1865.)

Drake, Samuel A. Old Landmarks and Historic Personages of Boston. (Boston, 1873.)

Dyer, Julia K. THE ISLANDS IN BOSTON HARBOR, published in the *Boston Society Publications, Vol. II.*

Goodwin, John A. THE PILGRIM REPUBLIC. (Boston, 1888.)

Hutchinson, Peter O. THE DIARY AND LETTERS OF HIS EXCELLENCY THOMAS HUTCHINSON, ESQ. 2 volumes. (Boston, 1884-6.)

Hutchinson, Thomas. THE HISTORY OF THE COLONY OF MASSACHUSETTS BAY. 3 volumes. (Boston, 1765, and London, 1767-1828.)

Massachusetts Historical Society. COLLECTIONS OF, SECOND SERIES, VOLS. V, VI, and VII. (Boston, 1814-26; Vols. V and VI reprinted 1846-8.)

Massachusetts Historical Society. COLLECTIONS OF, THIRD SERIES, VOL. VII. (Boston, 1838.)

Massachusetts Historical Society. COLLECTIONS OF, FIFTH SERIES, VOL. V. (Boston, 1878.)

Massachusetts Historical Society. COLLECTIONS OF, SIXTH SERIES, VOLS. VI, VII, and IX. (Boston, 1893-7.)

Massachusetts Historical Society. PROCEEDINGS OF, VOLS. V, XII, XV, and XVII, (Boston, 1862-1880.)

Minot, George M. CONTINUATION OF THE HISTORY OF THE PROVINCE OF MASSACHUSETTS BAY. 2 volumes. (Boston, 1798-1803.)

Mourt, G. A RELATION, OR IOURNAL, OF THE BEGINNING AND PROCEEDINGS OF THE ENGLISH PLANTATION SETTLED AT PLIMOTH, IN NEW ENGLAND. (London, 1624, reprinted in Arber and in Dexter.)

Jones, Augustine. THE LIFE AND WORK OF THOMAS DUDLEY. (Cambridge, 1899.)

Shurtleff, Nathaniel B. RECORDS OF THE GOVERNOR AND COMPANY OF THE MASSACHUSETTS BAY IN NEW ENGLAND. 5 volumes. (Boston, 1853-4.)

Smith, Fitz-Henry, Jr. THE FRENCH AT BOSTON DURING THE REVOLUTION, published in the *Bostonian Society Publications, Vol. 10.*

Stark, James H. ANTIQVE VIEWS OF YE TOWNE OF BOSTON. (Boston, 1882.)

Thacher, James. HISTORY OF THE TOWN OF PLYMOUTH. (Boston, 1832.)

Thornton, John W. THE LANDING AT CAPE ANNE. (Boston, 1854.)

Winslow, Edward. GOOD NEWS FROM NEW ENGLAND. (London, 1624, reprinted in Arber.)

Winsor, Justin. THE MEMORIAL HISTORY OF BOSTON. 4 volumes. (Boston, 1882.)

Hammond, John M. QUAINT AND HISTORIC FORTS OF NORTH AMERICA. (Philadelphia, 1915.)

IT IS NO CREDIT TO THE CHIP THAT IT IS OFF THE OLD BLOCK

G.P.F's Use Indirect Fire at Naval Targets

Extracts from the Report of Special Target Practice at Moving Targets with Indirect Fire—155-mm. (Filloux) Guns, Battery A, 51st Artillery,

By Captain Robert N. Mackin, Jr., C. A. C., Commanding.

I. The following is a report of the special target practice with 155-mm (Filloux) guns held by Battery "A" 51st Artillery at Fort Eustis, Va., on December 23, 1922.

II. *Statement of Problem:* The object of the practice was to determine the adaptability of the 155-mm (Filloux) gun for firing effectively at moving water targets as a rapid fire battery using indirect fire.

III. *Special Methods of Training*: So far as was known with the information available a similar practice had not been held before by the United States Army. It is not incorrect to state that the entire training was special. The emplacement of the guns, the training of the gun crews in loading and firing the piece and the entire system of fire control and direction were unique and had to be learned basically by the entire battery personnel with the exception of one or two men in the gun crews. This special training in detail was as follows:

The drill of the piece for tractor artillery was modified to conform to the necessities of the practice. A gun pointer, a deflection setter and an elevation setter were used to set the sight for deflection and elevation, point and lay the piece and to give the command for firing.

The gun pointer's duties were confined to keeping the vertical wire of the sight on the aiming point at all times and giving the command fire when No. 1 had reported ready.

The deflection setter was equipped with a C.A.T. headset and was in direct communication with the deflection transmitter in the plotting room. His duties were to keep the sight set constantly at the deflections received by him and to set by means of the azimuth micrometer scale the corrections ordered by the battery commander as a result of observation of fire.

The elevation setter also was equipped with a similar headset and connected directly with the elevation transmitter. He received elevations every ten seconds. These elevations he set on the elevation scale and kept the elevation level bubble centered at all times by means of the elevating hand wheel. He also glanced at the cross level bubble

every ten seconds and when necessary centered it by means of the leveling worm. Traversing, and elevating or depressing the piece were not stopped during loading.

No. 1 opened and closed the breech and fired the piece from the left side of the gun (American block) at the command of the gun pointer. When the piece had been fired No. 1 only partially rotated the firing mechanism block, then opened the breech and completed rotation and removal of the firing mechanism block after the breechblock had been

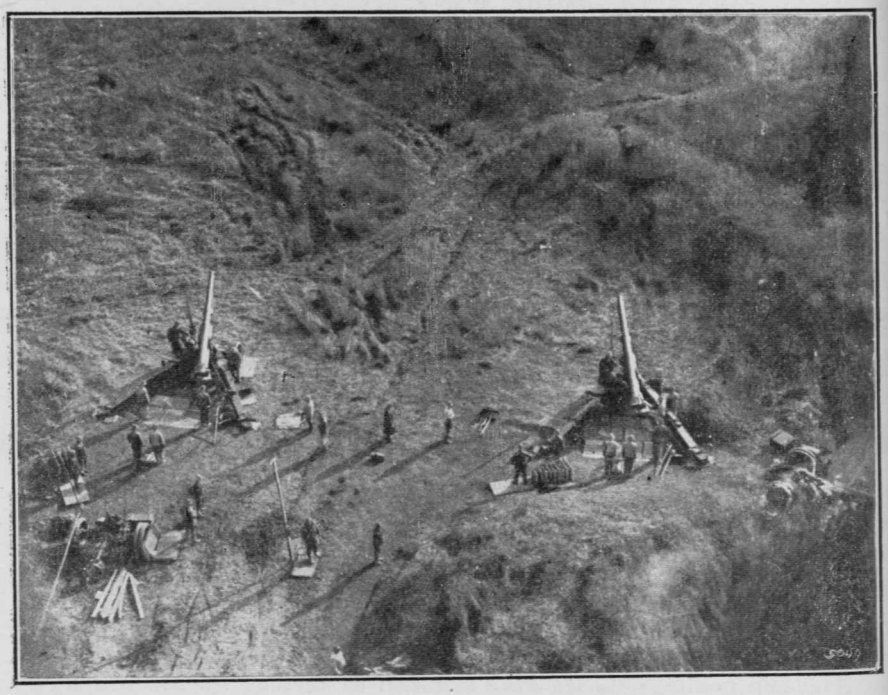


FIG. 1.

THIS PHOTOGRAPH SHOWS THE DISPOSITION OF THE MATERIEL AND PERSONNEL OF THE FIRING BATTERY. THE EXECUTIVE OFFICER IS IN THE CENTER OF THE PHOTOGRAPH; IN THE FOREGROUND BESIDE THE TELEPHONE POLE IS THE OPERATOR WITH HEADSET, ON THE BATTERY COMMANDER'S LINE. THE GUN CREWS, DEFLECTION SETTER'S PLATFORM, THE PROJECTILE BOARDS AND LOADING TRAYS ARE CLEARLY SHOWN. THERE IS A HIGH MOUND DIRECTLY IN REAR OF NUMBER 1 GUN.

caught and held open by the back latch catch. He then handed the firing mechanism block containing the fired primer to No. 4. The breechblock was closed with the firing mechanism block partially rotated and rotation was completed when the breechblock was fully closed.

No. 2 assisted No. 3 in ramming and inserted the powder charge.

No. 3 rammed the projectile and sponged the powder chamber after each shot.

No. 4 measured the setting of the replenisher piston after every other shot, calling the setting to the gun commander. He also received

the firing mechanism block from No. 1, and handed him a clean firing mechanism block with a fresh primer in place.

No. 5 acted as a powder runner between the powder pit and No. 2.

Nos. 6 and 7 carried the loading tray and inserted it in the breech. After the sehell had been pushed off the tray No. 7 stepped back and took his post. No. 6 removed the tray and returned it to its stand.

No. 8 inserted the fused projectile in the loading tray.

No. 9 handed the powder charge to No. 5.

A single powder magazine was used for both guns in preference to the usual custom of using a magazine for each gun. This change saved the services of two men for other duties.

An entire fire control section was trained. To do this properly within the time allowed, without sub-calibre practice and with continued bad weather which prevented tracking any kind of a target presented a rather difficult problem. The road to the secondary station was in very bad condition and almost impassable for an automobile. The observing stations were 110 feet above the ground. With the temperature at freezing and often a considerable wind these stations were anything but conducive to good work.

An entire day in these stations waiting for the field of fire to clear militated against good morale. To offset this except on the obviously clear days the readers' lines to the armsetters were run out from the plotting room to a point nearby and within hearing of a T.I. bell. Several hypothetical courses were run in this manner which helped splendidly in the training of readers, armsetters and the entire section.

For several days the haze lifted sufficiently to permit the two observers to track on different but not on the same target. This was taken advantage of as an aid in training observers, readers and armsetters and very materially reduced the second differences of the observers.

The fire control section consisted of a plotter, assistant plotter, two armsetters, a range board operator, deflection board operator, deflection transmitter, elevation computer, elevation transmitter and one telephone operator.

The duties of the men of this section together with a further description of the duties of the sighting details will be gone into and described fully in paragraph VI to avoid repetition.

The personnel of the battery was very much the same as during the direct fire practice on Nov. 1, 1922, except that ten additional men were used. Unfortunately only the first sergeant and two sergeants of the battery had had previous training with the horizontal base system. This will give an idea of the amount of instruction and training required to produce even fair work in the time allowed.

The entire problem to be solved was explained to the battery. The most excellent condition of morale permitted the battery commander

to demand the highest standard of workmanship and the response to the demand was all that could be desired.

Believing that the maximum rate of fire with the matériel had not been attained at the previous practice a flat rate of fire of four rounds per gun per minute was set as an objective for the gun crews whose composition was changed slightly from that during the firing of November first.

IV. *Preparations made for Firing, including Measures taken to Insure Uniformity in Functioning of Matériel and to Determine the Deviations During Firing:*

The problem was given to the battery commander on Nov. 15, 1922. Several days were spent in reconnaissance of possible firing points, base lines, etc., and in selection of a reasonably warm, dry place to install a plotting section. Had the season been spring, summer or fall a truck would have been fitted up as a plotting truck. Search for a possible shack or lean-to developed an abandoned house in fair condition in the vicinity of what was to be the primary station. This house was selected, windows and holes boarded up, the interior cleaned out, a fireplace bricked up and a small stove installed in one room. All was now ready for the selection of gun positions, orientation and the development of a system of fire control which would fit the problem.

It would be an exceedingly simple matter, given a horizontal base line, to fire the guns accurately with Case III at a rate of one salvo every thirty seconds. This, in the opinion of the battery commander would absolutely waste 50 per cent of the efficiency of the guns and take them out of the class of rapid fire weapons.

Again, with the speed of the target and the course known, it would be possible to train for the practice alone and use a system for the practice which would not stand up when firing at a fast target in battle.

Finally it was decided that a system of fire control for 155-mm guns with indirect fire to be successful must be able to send accurate and continuous firing data against a target the size of a modern destroyer moving with a speed of 30 miles per hour in any direction on the field of fire. The maximum angular travel in 30 seconds at 15,000 yards would be 29 mils and at 10,000 yards, 44 mils.

After considerable study the system as given in detail in paragraph VI was decided upon, the necessary devices were constructed and the telephone system installed.

Because of the success obtained in the last practice with spotting from an elevated point near the battery position the same system of observation of fire was selected for this practice. This system permitted the battery commander to receive observations within one or two seconds of the splash. It was thought an increase in range of two or three thousand yards would not interfere with successful observation especially since a higher-powered telescope was to be used.

The telephone system was made as simple as possible and was as follows: lines were laid from the observing stations to the plotting room, from the observing tower to the plotting room, from the elevation transmitter paired to both guns, from the deflection transmitter paired to both guns, from the plotting room to a point between the two guns, and to the fort system for meteorological data. No switchboard was used, all lines being direct and all available for use at one time.

The only plotting board available was a Whistler and Hearn board which had been in service at Fort Dupont, Delaware, the azimuth circles of which were numbered for a base line at that post. It was necessary to place a paper strip over the azimuth circles and insert the azimuth corresponding to the proper setting of the primary and secondary arms after the board had been oriented. In order to orient the gun arm it was necessary to know the exact location of the directing gun. The azimuth and length of the base line were known. An oriented line was established in rear of the selected gun positions and the exact point over which the center of each gun was to rest was accurately determined. No. 1 gun was selected as the directing gun and its displacement from the base line computed. With this data at hand it was possible to orient the gun arm of the plotting board. In Case III when using the Whistler and Hearn plotting board the gun azimuth at any particular time is obtained from the gun arm azimuth circle. These gun azimuths cannot be set on the 155-mm gun but must be converted into figures of deflection to be set on the sight and the sight set on an aiming point. This conversion can be performed readily by anyone using a conversion chart but it was decided to save this operation by having a deflection scale on the perimeter of the board by means of which the uncorrected deflection could be determined at the instant the plotter read the range.

In order to make this scale it was necessary to emplace the guns in the selected positions, orient them, erect aiming points and obtain a deflection which gave a pointing of the guns at a known azimuth. The azimuth of the center line of the field of fire of the guns was determined and the deflection for No. 1 gun which when set on the sight and the sight set on the aiming point would cause the gun to be pointed at the azimuth of the center line of the field of fire. Separate aiming posts were used for each gun and were painted different colors. In order to have the same firing deflection be correct for both guns No. 2 aiming post was moved 2 mils so as to cause the fire of both guns to converge at a range of 10,000 yards, the guns being exactly 20 yards apart.

Having this base deflection for the center line of the field of fire it was possible to go to the plotting board, place the gun arm at the correct azimuth of the center line of fire and mark on the deflection scale, which had been drawn but not numbered, the correct base deflection.

It was a simple matter then by converting degrees and hundredths of degrees into mils to use the gun arm as a ruler in marking the deflection scale in both directions to the limits of fire of the guns which was obtained by traversing the right gun to its extreme right traverse and the left gun to its extreme left traverse. The scale of the board was changed to 500 yards to the inch to permit tracking of a target up to 13,000 yards.

The guns were now emplaced and oriented, a base line had been selected and the observers connected to the plotting room, the plotting board had been oriented and it was possible to track targets and obtain uncorrected ranges and uncorrected deflections every 30 seconds.

Correction and Transmission of Ranges:

It was decided to plot the set forward point on the board for travel of the target for 30 seconds plus the time of flight. This necessitated the construction of four set forward rulers for the different ranges.

Carrying out the endeavor to fire as accurately as possible it was decided to use the Pratt range board to correct for the wind, muzzle velocity, tide and atmosphere. The Coast Artillery Board was requested to make and made a chart for the board for the base charge, 155-mm gun using H.E. shell. To eliminate the time which normally was consumed from the receipt of the actual range to its issue in the form of corrected range from the range board operator, the last range minus the correction applied was used in obtaining the correction for the next range and the correction for the range in yards (using a reference number) was placed on the range correction scale at the rear end of the gun arm every 30 seconds between the plotting of the target and the next bell.

It will be seen now that the plotter read every 30 seconds the corrected range to the set forward point at the next bell.

It was necessary to convert these ranges to mils of elevation to be set on the gun, so a range conversion ruler was constructed. The elevation scale of this ruler was made movable to allow for changes in elevation by the battery commander at any time during the firing.

A stop watch was provided for the elevation transmitter.

Correction and Transmission of Deflections:

A deflection board which corrected the base deflection for wind and drift was constructed and with this device an abridged range table showing wind and drift was furnished the operator. The deflection scale on the regular wind component indicator was changed so as to show the component right and left to be used with the abridged range table.

In order to send the deflection to the guns continously, what may be called a deflection synchronizer was constructed. This is merely a movable deflection scale with a reading window.

This completed the fire control installation. The personnel for the

various positions as well as the six men used on the two gun sights were selected from the entire battery irrespective as to whether or not they were members of a gun crew. The men were instructed in their various duties and training of the fire control section commenced. Attention could now be paid to the gun crews and the guns.

A small platform to the left and under each sight was constructed for the deflection setter. The gun crews were organized and training commenced. Two 37-mm guns were requisitioned, to be strapped on the breech-reinforce of each gun in order that some subcalibre practice might be held to train the personnel and allow the battery commander to eliminate possible causes of error in the new system. These guns have not arrived.

The following brief diary may serve to show the amount of training the battery was able to have before the practice.

The period between Nov. 16, 1922, and Nov. 24, 1922, was spent in reconnaissance, orientation, study of the problem, construction of devices and emplacement of the guns and other matériel. The period between Nov. 27, 1922, and Dec. 7, 1922, was of practically no value because of the holidays and because of the fact that Battery B of this regiment was engaged in firing on the range with a problem in high burst ranging.

Friday, Dec. 8, 1922: Organization of details in morning, battery on guard in the afternoon.

Monday, Dec. 11: Fire control section drilled on hypothetical track because of haze. Guns bore sighted.

Tuesday, Dec. 12: Fire control section and gun pointers drilled on hypothetical track because of haze.

Wednesday, Dec. 13: Fire control section drilled only, using hypothetical track. Haze.

Thursday, Dec. 14: Full battery drill morning only, using hypothetical track. Haze.

Friday, Dec. 15: Fire control section drilled all day, tracked for a few minutes but haze set in. The most of the day a hypothetical target was used.

Saturday, Dec. 16: Full battery drill, tracking on passing shipping.

Monday, Dec. 18: Drill using a real target for the first time. Gun sections drilled in the morning.

Tuesday, Dec. 19: Full battery drill tracking target. Ammunition brought to the battery.

Wednesday, Dec. 20: Full battery drill. Battery fired 4 shots to check orientation.

Thursday, Dec. 21: No drill. Preparation of ammunition.

Friday, Dec. 22: Regular practice commenced but firing ceased because of haze. When the field of fire cleared again it was found that

the target was so weak in construction that it collapsed when towing was commenced.

Saturday, Dec. 23: Battery practice completed 9:45 a.m.

Checking of Orientation:

The orientation of the gun positions and the plotting board involved a great deal of computation and the including of an error in this work obviously would have affected the pointing of the gun so, for reasons of safety, it was decided to fire four or six shots to check the entire orientation. When the field of fire was perfectly clear a point was selected at 10,000 yards range and plotted on the board. The observers were advised of the azimuth of this point from their stations and advised when the shots would be fired. They were to bisect each splash and send in the readings to the plotting room.

The guns were laid at the corrected deflection and elevation and the four shots fired.

Shots Nos. 1, 2 and 4 were observed by both stations and plotted but the third shot was lost from B′.

The errors of shots 1, 2 and 4 were as follows:

Shot No.	Gun No.	Mil error from hyp. point
1	1	R-2
2	2	L-5
4	1	R-3

These results established the accuracy of the orientation and firing was ceased to save ammunition.

It was very desirable that the guns be again calibrated with the lot of powder that was to be used but the necessity of conserving the sand-filled shells made this impossible.

The following measures were taken to insure proper functioning of matériel and increase rapidity, accuracy and safety of firing.

If one of the two guns misfired it was arranged that three minutes would elapse before a fresh firing mechanism block and primer were inserted. In the meantime the other gun was to finish its share of the series and if this was completed before the first gun got into action the second gun would fire the remainder of the other's allotted number of rounds. This was all under the supervision of the executive officer, the battery commander only giving the initial commands for firing. Elevation scales were tested against a quadrant at an elevation corresponding to 10,000 yards and the correction for each gun applied on the site correction scale. Recoil and recuperator cylinders were filled to the proper amount, care being taken that no air remained in the cylinders. The normal setting of the replenisher piston is 150-mm. However to avoid draining oil during firing and thereby possibly cause a delay the recoil cylinders were filled to a setting of the replenisher piston of

180-mm, thereby allowing for the expansion of the oil during firing. Bleeding was ordered when a setting of 120-mm should be reached. The gun may be fired safely at settings of the piston between 100 and 200-mm. A drain plug was left in the drain hole of each recoil cylinder with the end of the plug unscrewed ¼-inch away from the outside of the valve and the battery mechanic provided with a drain plug wrench stationed at the guns to bleed either gun at an instant's notice from the gun commanders.

Similar precautions with regard to breech blocks, firing mechanisms and primers were taken to those reported for the firing of November 1, 1922.

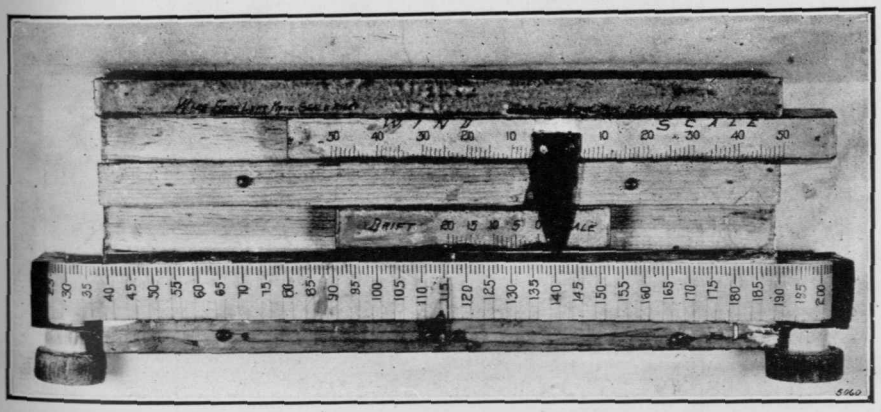


FIG. 2.

Measures taken to determine the deviations during firing:

An officer and two range rake operators were placed on the vessel towing the target to observe and record the longitudinal deviation of each shot. Two lateral observers were placed at the battery to observe the lateral deviation of each shot.

An experienced timekeeper was placed directly in rear of the guns to take the time each shot was fired and to time interruptions, if any.

Special Mechanical Devices:

The following is a descriptive list of the devices used in the practice which are not a part of standard equipment:

(1) Deflection Board:

A photograph of this board is shown by Figure 2. The board contains a movable deflection scale, rolling between two drums, on which are printed all the deflections within the limits of fire. Two movable sliding scales add algebraically the correction for wind and drift.

By means of the operating knobs the uncorrected deflection is brought to the fixed index A. The proper correction on the drift scale is brought opposite the fixed index A. The proper correction on the wind scale is

brought opposite the pointer on the drift scale. The corrected deflection is read on the deflection scale opposite the long pointer on the wind scale. When the wind and drift corrections remain unchanged the corrected deflection is obtained by moving the uncorrected deflection to index A and reading the corrected deflection opposite wind scale pointer.

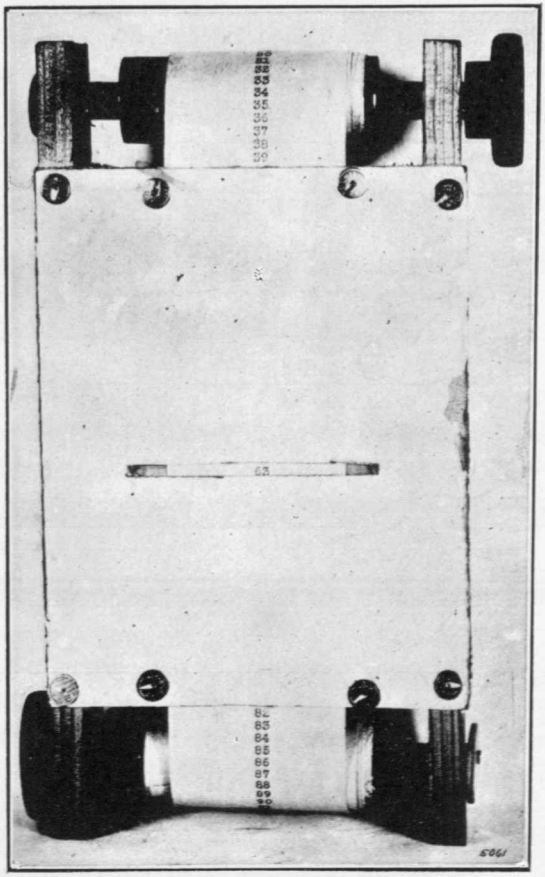


FIG. 3.

(2) Deflection Synchronizer:

A photograph of this device is shown by Figure 3. This device consists of two opposite spools each with operating wheels. A long strip of paper upon which a deflection scale has been printed runs between the spools and may be moved in both directions. The scale is covered except for a reading window which enabled only one deflection to be seen at a time. The spools of the device were fitted with a slight drag which caused the scale to be tight when drawn over the surface of the platen.

Two successive corrected deflections having been received, the operator who had a headset and was connected to the deflection setters on each gun moved the corrected deflection for the next bell to the reading window and on the bell called this deflection to the guns. He had received the angular travel for 30 seconds from the assistant plotter, and, after sending this first deflection then moved the spool in the proper direction (increasing or decreasing) at a rate which caused the deflection for the second bell to appear at the reading window at that bell. One minute after he had commenced moving the scale was usually sufficient for him to attain the proper rate of movement and from then on his error rarely exceeded one mil. If the rate of angular travel was increasing or decreasing such as would be caused by an oblique course or by a change of speed by the target it was possible for him to allow for the change and increase or decrease his rate of transmission accordingly.

This device was operated in conjunction with the deflection board exactly on the bell. Each 30 seconds on the bell the deflection board operator called the corrected deflection for that instant. The synchronizer operator either called the same deflection at the same instant or was one or two mils slow or fast. If in error he jumped his device to the deflection following the one called by the deflection board operator and continues transmission. If he was slow he increased the rate of transmission to cause the readings at the next bell to coincide, if fast he increased the rate of transmission accordingly.

It is of interest to note that one hour's training in the operation of this device produced excellent results with persons of average mental ability. Experience has shown that training rather than any peculiar mental quality is all that is necessary to produce good results.

The device is necessarily crude and although perfectly satisfactory for the practice can easily be improved mechanically so as to reduce greatly the personal equation as to the time interval element. The spools should be geared together. A device of the speedometer type could be used to indicate the rate of speed. The battalion commander after seeing the device in operation was enthusiastically for it and suggested the possible use of a metronome. Going a little further, it would be quite possible to install a rheostatic governor on a small electric motor. Before the next practice an attempt of some such sort will be made to improve the device. However the battery commander feels that an analysis of the deflections transmitted in the practice proves the present device, even in its crude state, to be satisfactory. Simplicity of design and operation militate for it. Experience has shown that sending one deflection per second and less by the operator permits clear articulation and the hearing by him of the repetition of the deflection by the deflection setters. The maximum speed of transmission necessary would be 45 deflections per 30 seconds. This would mean a target

traveling on an arc from the battery at 10,000 yards range moving at a speed of over 30 miles per hour or at 15,000 yards range at a speed of 45 miles per hour. The range of the gun is 17,650 yards. Traveling in this manner at 10,000 yards a destroyer would present a target 8 mils wide. A target coming straight toward the battery or approaching it at an acute angle would present no difficulty in the transmission of deflection. Conditions under which the speed of the target may be disadvantageous to rapid transmission of deflections are compensated for by their making of an error of one or two mils in pointing of no consequence. It is believed this principle is sound.

The deflection strip may be made with two scales running side by side. One scale showing every deflection for average speed targets, the other scale showing every second deflection for very fast targets.

The deflection transmitter was also the medium through which the arbitrary deflection corrections by the battery commander as a result of observation of fire were sent to the deflection setters. The operator transmitted the corrections without ceasing to operate the device. The interruption of data transmission meant nothing since the guns could not be fired while a deflection correction was being set on the sight. The instant the corrections were sent and repeated, data transmission recommenced. The sending of these corrections usually consumed from one to three seconds.

2. Deflection Scale on Plotting Board:

This has already been explained in Paragraph IV.

(4) Deflection Scale on Wind Component Indicator:

A photograph of this scale is shown by Figure 4. It was pasted over the regular deflection scale of the indicator. When the pointer was to the right of the vertical axis of the indicator the wind was right and vice versa. One-tenth of the component multiplied by the range table correction for a 10 mile cross wind gave the correction in mils right or left to be used on the wind scale of the deflection board. Otherwise the wind component indicator was operated in the usual manner.

(5) Deflection Setter's Platform:

In order that three men may work on the gun sight at the same time without the slightest confusion a platform of this sort was necessary. It was constructed in a few minutes from waste 7 8-inch lumber.

(6) Range Conversion Board:

A photograph of this board is shown by Figure 5. A range scale (A) showing every 20 yards of range is fixed on the left side of the board. In the center of the board is a movable pointer (C), on the right side of the board is a movable elevation scale (B), the elevations on which, when the scale is at normal, correspond to the ranges on the fixed range scale, the movable pointer serving as a cross ruler. When arbitrary elevation changes are ordered by the battery commander the operator moves the elevation scale up or down the proper amount. Every ele-

vation thereafter called includes the correction until a fresh correction is received and so on.

The plotter having called the corrected range, with the board set at normal, the operator runs the pointer to the range, glances opposite

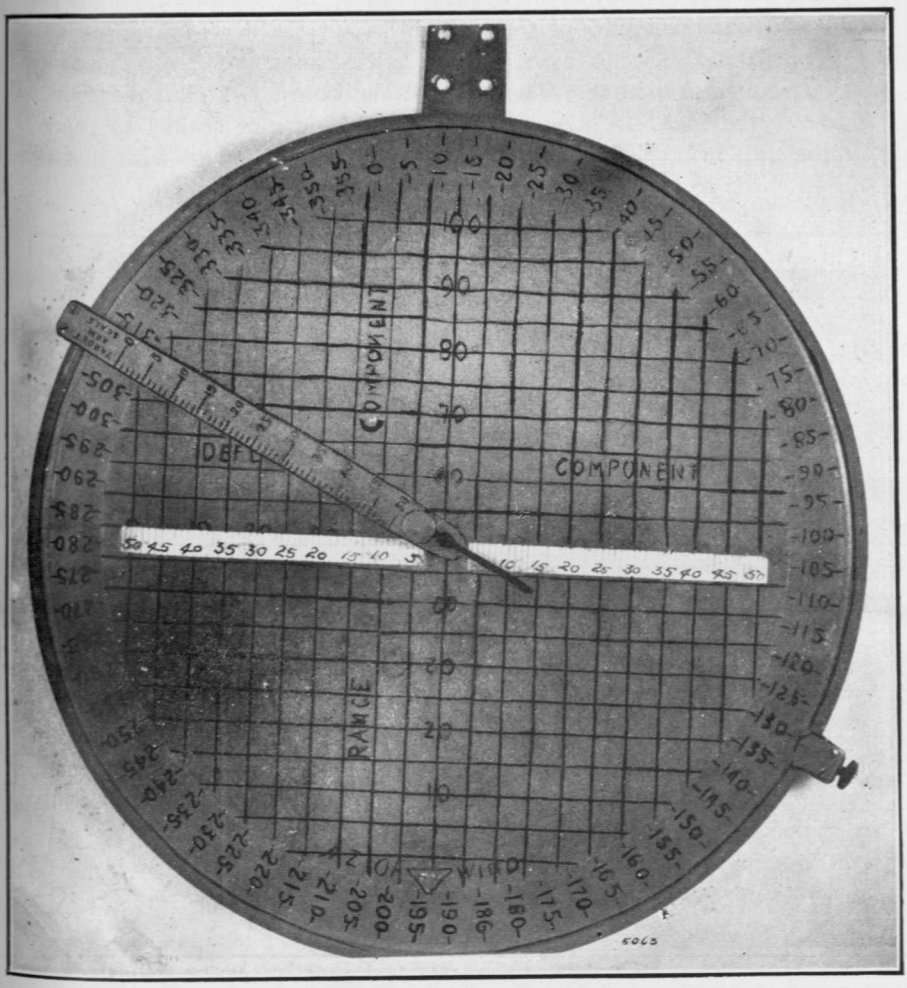


FIG. 4.

and calls out the corresponding elevation. Arbitrary elevation corrections are made as described above.

(7) Range Correction Scale on Pratt Range Board:

This is merely a scale which is pasted over the upper scale of the range board to enable the full correction to be obtained as a reference number to be applied as a correction on the range correction scale on the gun arm.

(8) Abridged Range Table:

This table is appended to the end of this report and is obtained from the 155-mm range table, Charge 1.

(9) Plotting Board:

The plotting board was not a special device, but the following changes were necessary to enable it to be used.

The azimuth circles were covered with paper and renumbered to conform to the base line. The scale of the board was changed to 500 yards to the inch. A new range scale for this new scale was pasted on the gun arm. The range correction scale was made with a scale of 500 yards to the inch to conform to the scale of the board.

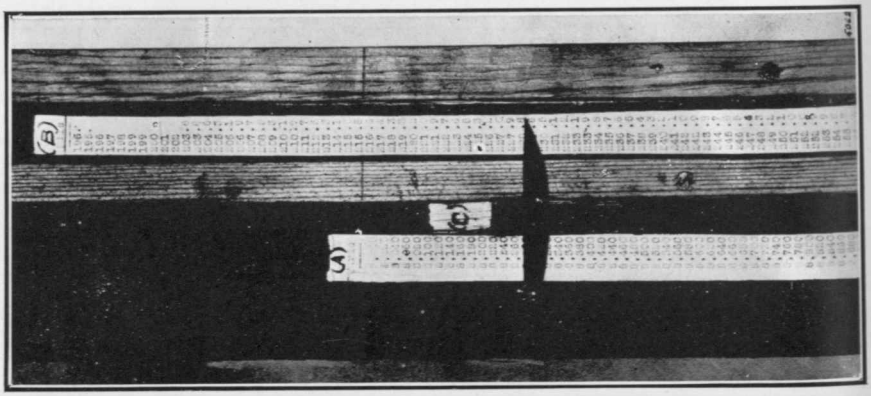


FIG. 5.

Three orienting points were established to permit daily orientation of the board. Four set forward rulers were made with which to plot the set forward point. A new coupler of the proper length was made for the B″ and auxiliary arms. A deflection scale was made as already described.

Changing this board to conform to the needs of the battery involved a great deal of work and study by the battery officers.

VI. *Sequence of Events in Firing the Battery:*

A Meteorological message was received shortly before the practice. The wind component indicator was set for the velocity and direction of the wind. The subpointers on the Pratt range board were set for the tide and atmosphere. From previous use of the powder and also from the temperature of the powder taken ten minutes before the practice the muzzle velocity subpointer was set by the battery commander. As soon as the target appeared upon the field of fire it was indicated to the observers and when identified by both stations the command to track was given. The command "prepare for action" was sent to the guns. The deflection and elevation setters checked communications and

awaited data. At the first bell the armsetters received the readings from the observers and set the primary and secondary arms, called "set" and recorded the settings. The plotter plotted the position of the target, brought up the gun arm, and called out the approximate range and the assistant plotter called out the approximate deflection.

Range:

The range converter called out the approximate elevation and recorded it. The elevation transmitter called the approximate elevation to the elevation setter at the guns, who set the elevation and elevated or depressed the gun until the elevation bubble was centered. The range board operator set the main ruler at the approximate range. He then obtained the azimuth of the target from the gun arm azimuth scale and set the azimuth on the wind component indicator. He worked out the range correction and set it on the range correction scale on the gun arm before the next range was ready by the plotter.

Direction:

The deflection board operator set his deflection scale at the approximate deflection, glanced at the abridged range table for the drift for the approximate range called and set the drift on the drift scale. He then glanced at the wind component indicator and noted the deflection component. He multiplied 1/10 of this figure by the wind component in the abridged range table opposite the approximate range and set the resultant mil correction for drift on the drift scale. He then waited for the second bell.

On the Second Bell:

The armsetters set the readings and called set. The plotter plotted the intersection of the arms and called "clear." He then plotted the position of the set forward point, brought up the gun arm and called the corrected range. The range converter called the elevation for the first corrected range and recorded it. The elevation transmitter sent this elevation to the guns on the third bell. After the first range correction was set on the range correction scale the range board operator set the correction after every other bell.

The deflection board operator called the first corrected deflection. The deflection transmitter brought the deflection to the reading widow. The assistant plotter called out the first uncorrected deflection. The deflection board operator worked out the corrected deflection and called it on the third bell. On the third bell the deflection transmitter sent the first corrected deflection to the guns.

After the Third Bell:

Range:

The plotter plotted the set forward point and called the second corrected range. The range converter called the elevation for the second corrected range and recorded it, predicting for ten seconds after the fourth bell from the difference in elevation between the second and third elevations. At the fourth bell the range transmitter commenced to send elevations every 10 seconds and continued this throughout the practice.

If necessay, ranges could have been transmitted every five seconds but a study of the matter indicated that this was not necessary.

Deflection:

The assistant plotter called out the second uncorrected deflection and the difference between it and the first uncorrected deflection. Given this difference the deflection transmitter became aware of the rate of transmittal of deflections necessary. The deflection board operator worked out the second corrected deflection and called it on the fourth bell. On the fourth bell the deflection transmitter commenced sending continuous deflections and continued this throughout the practice, correcting his work if necessary, every 30 seconds.

After the fourth bell the battery commander reported "ready to fire" to the battalion commander. When the word to commence firing was received the battery commander ordered one salvo. When the observation for the salvo was received the battery commander stepped to the deflection transmitter and gave the deflection correction for each gun as "number one, right four." He then faced the elevation converter and called the arbitrary elevation correction as "up 16." He personally saw that the corrections were transmitted, then gave the commands for three salvos and so on until the practice was completed. He received the observations of the separate shots of a series of salvos when the series was completed.

Note: When the change in elevation was ordered the elevation converter moved the elevation scale up or down and in that way included the correction in every succeeding elevation but the elevation transmitter also supplied the correction to the next elevation sent to the guns without waiting for the corrected elevation from the converter. This applied the correction just as quickly as the deflection correction was applied.

VII. *Method of Fire Adjustment Used with Reasons for Its Adoption in Preference to Other Methods:*

The method used was the bracketing method as specified in Coast Artillery Memorandum No. 4, 1921, for rapid fire batteries.

VIII. *Statement of Solution of Problem:*

Orders to "commence firing" when ready were received from the battalion commander at 9h, 30m, 4 sec. Firing was commenced at

9h, 30m, 30 sec. First salvo gave trial elevation. First improvement series was a burst of three salvos reported three range correct and three short. No change of elevation possible so a second burst of three battery salvos was fired, reported one range correct and five short.

With four overs and eight shorts a change of 1/6 fork was ordered and a burst of six salvos for effect fired, reported three range correct, five overs and four shorts. No change from observation possible and a final burst of six salvos for effect fired. This completed the problem as agreed before the practice. Practice fired on one course. 38 rounds fired. Total time for practice, 14 minutes, 20 seconds. Average time between salvos in a series of salvos, 16 seconds. Elapsed time between first and last shot of first three salvos was 36 seconds, for second three salvos, 35 seconds, for first six salvos, one minute, 21 seconds; for last six salvos, one minute, thirty-two seconds.

Observation: The observation arranged for the practice was as follows; an officer who had had considerable experience as an observer both on the ground and from the air and who had done excellent work as observer in the battery rapid fire practice on November 1, 1922 was selected as the observer by the regimental commander.

A first sergeant of the regiment of high calibre was selected as recorder for the observer.

A tower 110 feet high, 60 yards in rear of the guns was selected as the observing or spotting post. The observer wore a headset and was connected direct with the plotting room. The method of observation was axial. Overs and shorts only and rights and lefts in mils were desired. In a series of salvos only the average deflection error of each gun was called for.

The instrument used by the observer was the Azimuth instrument, Model 1920.

IX. *A General Resumé and Notes on the Practice:*

(a) The radio phone from shore to tug and vice versa worked excellently during the practice.

(b) The area covered by the guns of the battery was 60 degrees or 1067 mils.

(c) The battery installation was capable of handling four or six guns.

(d) It was not necessary to drain oil during the firing.

(e) The range changed 740 yards during the practice or in 14 minutes.

The range changed every 30 seconds at a rate varying from 60 to 100 yards.

X. *Officers on Duty with the Battery During Practice:*

Captain Robert N. Mackin, Jr., C. A. C.
1st Lieut. A. L. Bullard, C. A. C.

BATTERY "A" 51ST ARTILLERY
ABRIDGED RANGE TABLE 155-MM. GUN
DRIFT AND WIND

Range Yds.	*Drift Mils*	*Wind Component of 10 m.p.h. Mils*	*Range Yds.*	*Drift Mils*	*Wind Component of 10 m.p.h. Mils*
8000	4	3	10300	8	5
8050	4	3	10350	8	5
8100	4	4	10400	8	5
8150	4	4	10450	8	5
8200	4	4	10500	9	5
8250	4	4	10550	9	5
8300	4	4	10600	9	5
8350	4	4	10650	9	5
8400	5	4	10700	9	5
8450	5	4	10750	9	5
8500	5	4	10800	9	5
8550	5	4	10850	9	5
8600	5	4	10900	9	5
8650	5	4	10950	10	5
8700	5	4	11000	10	5
8750	5	4	11050	10	5
8800	5	4	11100	10	5.5
8850	5	4	11150	10	5.5
8900	5	4	11200	11	5.5
8950	5	4	11250	11	5.5
9000	5	4	11300	11	5.5
9050	5	4	11350	11	5.5
9100	6	4	11400	11	5.5
9150	6	4	11450	11	5.5
9200	6	4	11500	11	5.5
9250	6	4	11550	12	5.5
9300	6	4.5	11600	12	5.5
9350	6	4.5	11650	12	5.5
9400	6	4.5	11700	12	5.5
9450	6	4.5	11750	12	5.5
9500	6	4.5	11800	12	5.5
9550	6	4.5	11850	12	5.5
9600	7	4.5	11900	13	5.5
9650	7	4.5	11950	13	5.5
9700	7	4.5	12000	13	5.5
9750	7	4.5	12050	13	5.5
9800	7	4.5	12100	13	5.5
9850	7	4.5	12150	14	5.5
9900	7	4.5	12200	14	6
9950	7	4.5	12250	14	6
10000	7	4.5	12300	14	6
10050	8	4.5	12350	14	6
10100	8	4.5	12400	14	6
10150	8	4.5	12450	14	6
10200	8	5	12500	15	6
10250	8	5	12550	15	6

Barrage Balloons

Translated from "Ideas on Anti-Aircraft Defense" by G. Fontaine, Chef d'Escadron d'Artillerie, Chief of the Bureau of Anti-Aircraft Defense of the Army Air Service

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Editor's Note: This report from the Military Attache in France, is furnished through the courtesy of the Military Intelligence Division, War Department General Staff.

AIRPLANES in order to reach, during the night, an objective at a great distance, find in space a beaten path that is fixed by marks on the ground, and even navigation by compass does not entirely obviate orientation by marks along their route.

The routes followed by aircraft are, in general, well defined. Either airplanes follow a route parallel to general lines of the terrain, water courses, railroads, etc., or they orient themselves on characteristic points, junctions or rivers, woods, etc., in the same manner as navigators on the ocean search for signal lights. The location of these routes is made by the Service of Information of the Anti-aircraft Defense, which utilizes for this purpose all information received concerning the routes used by enemy airplanes which have penetrated their territory, such as reconnaissance and bombardment aircraft.

The knowledge of these routes is indispensable in order to prepare upon the ground a judicious distribution of the "Active Means" of anti-aircraft defense, cannons, machine guns, searchlights, etc. It is even more necessary for the location of the "Passive Means" of defense against aircraft, whose direct purpose is to obstruct these routes.

Numerous passive obstructions have been conceived: metallic cables raised and maintained in the air by kites; cables shot into the air from cannons (a project only;) cables dropped by airplanes and maintained in the air by parachutes; metallic cables supported by balloons, etc.

The English utilized for the defense of London aerial nets which were arranged in the following fashion (see Fig. 1.)

Each element of the net was composed of three balloons of 1000 cubic meters each, supporting between them metallic cables from which were suspended small cables maintained in a vertical position by sacks of sand attached to their lower extremities. These balloons were approximately 500 yards apart. The vertical cables had a length of 350 yards. In this manner a net of 1000 yards in length and 350 yards in height was maintained.

The raising of this net required about two hours and the maneuvering of it was extremely delicate.

The process which seemed, up to the present time, the most practical was that of the balloons of protection which did not offer any obstruction to aircraft except their own retaining cables. This system was used by the Italians in the defense of Venice and was very successful. It was adopted in France at the end of 1917.

These balloons of protection are small balloons of about 200 cubic meters whose maximum altitude is calculated at 8200 feet, carrying a cable of 3-mm in diameter with a resistance to rupture of about 1550 pounds (700 kgs.). An altitude of 11,500 feet can be obtained by

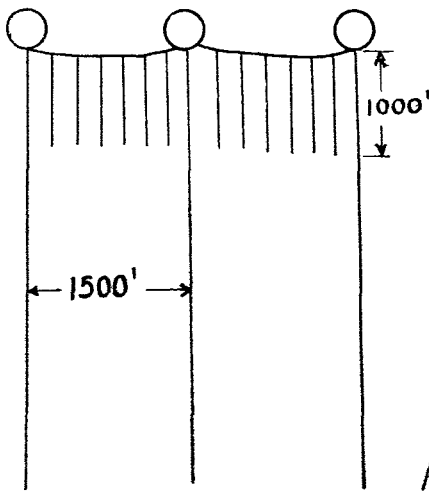

FIG. 1.

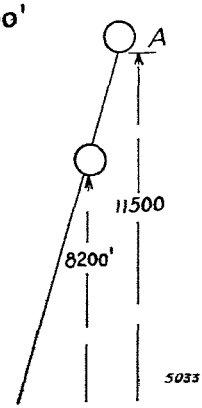

FIG. 2.

doubling two of these balloons in tandem (see Fig. 2.) When balloon A has obtained its maximum altitude, balloon B is attached to the end of its cable and arises in its turn allowing the first balloon to continue its ascension.

The material of these balloons is the same as that used in observation balloons and can resist a wind of forty-four miles per hour.

The balloons cannot be placed too close to each other because of the danger of entangling the cables. The interval for single balloons is from 200 to 300 yards and for tandem balloons from 400 to 500 yards.

Do these balloons of protection really constitute an obstacle?

The 3-mm cable seems at first glance to be too thin to be dangerous, but it has a strength of 1550 pounds. If encountered by an airplane in full flight it will communicate by its own inertia an appreciable shock and if touched by the propeller it will either wrap around it or break it. The calculation of the probability that an airplane 25 feet in width crossing a line of balloons 250 yards apart shows that there is one chance

in ten of running into a cable. It appears then that these balloons are a very serious obstacle.

Experience, however, is more conclusive than theory. We have seen from experience that in the region of Nancy from the time that certain points were defended by barrage balloons, German aviators did not descend a single time below the maximum altitude of these balloons.

The immediate effect of barrage balloons is to detour enemy aviators from their habitual routes and force them to seek altitude, thus contributing to diminish the frequency and precision of bombardments.

Barrage balloons to be effective should be employed exclusively at stations of small area. One can conceive that an objective surrounded entirely by balloons, mounted in tandem, could not be subjected to bombardments except from an altitude in excess of 11,500 feet, and, therefore, has nothing to fear due to the lack of precision of the bombardment and the dispersion of the points of impact except from very rare and unfortunate hits.

On the contrary, the utilization of barrage balloons for positions of large area and for large cities in particular is a complete error. In fact, a bomber would be indeed inexperienced and foolish to arrive over a large objective at an altitude less than 16,500 feet, if for example his objective was Paris. Moreover, the enemy could force the employment of barrage balloons in the proximity of defensive points. It will be necessary to experiment with the effect of surprise by placing unexpectedly barrage balloons across the route frequently traveled by enemy aircraft at points where no warning has been given of their presence and where the enemy are known to habitually fly at low altitudes. A squadron flying into a barrage of these balloons arranged in groups of five, for example, would almost certainly lose most of its aircraft. This mission of surprise should be confined to particularly mobile balloon elements.

The employment of barrage balloons such as we have just described, permits the realization of economy in the distribution of "Active Means" of anti-aircraft defense. This is their principal utilization.

The distribution should, therefore, be made as follows: to armies, nearly all of the anti-aircraft artillery mounted on automobiles, and automatic cannon for low flying aircraft. It is understood that the troops of the line provide their own defense with their own machine guns. For the defense of sensitive points the following organizations in order of importance: for objectives of small area, belt of barrage balloons, with small machine guns in case inclement weather prevents utilization of barrage balloons; for more important objectives, antiaircraft artillery in position and searchlights for night fire. In case of need, automatic cannon, especially when low altitude attacks are feared. And finally upon the aircraft routes far from sensitive points, strong organizations of night pursuit aircraft, and searchlights and barrage balloons.

Notes on Command

By Major Rodney H. Smith, C. A. C.

THE following article makes no claim to originality. It is rather a compilation of notes made from reading and experience in which endeavor has been made to put in compact, succinct form a few homely truths which every officer knows (or should know).

Much of the subject matter has been transcribed almost verbatim from Service School publications to which perhaps all readers of the JOURNAL have not had access.

As you read the qualifications of a commander or leader, it would possibly be interesting, not to say profitable, to subject yourself to a frank and searching examination. Note your deficiencies, then concentrate on eradicating them.

Command in the abstract signifies control, power, authority. In a military sense command is the control or authority a superior exercises over his subordinates. The exercise of this authority produces individual or collective action or non-action on the part of the subordinates regardless of their will. As a concomitant of this power or authority over the will of his subordinates, a commander is responsible for their actions to higher authority, just as he is responsible for his own actions. Power and responsibility must ever go hand in hand, His subordinates in turn are reciprocally responsible to him for their own actions and those of the men under them.

Thus is established the "chain of command" which makes it possible for the supreme commander to impose his will effectively on every individual member of his force without personal supervision, which is manifestly impossible.

The mechanical framework which enables the chain of command to function is termed organization. It is apparent therefore that command (with responsibility) and organization are inseparably inter-woven. Without organization command is helpless. Proper organization should then be based upon the necessities of command and responsibility. Command is the vital spark and organization the framework of conductors for the efficient transmission of that spark.

Let us further examine the relation between organization and command:

1. It is axiomatic that in every organization there must be a single will which controls it, which is alone responsible for what that organiza-

tion does or fails to do. This will is located in one person, the commander. The reasons are too obvious to need enumeration, yet history is full of instances where this fundamental axiom has been violated.

2. Experience has conclusively shown that the largest number of subordinates that a commander can successfully deal with *directly* and *personally* is, under the most favorable circumstances, nine. Under unfavorable conditions it is as low as four. As the brainwork of the commander increases and the functions of command multiply and broaden the number of subordinates should tend toward the minimum. This principle has repeatedly been violated with disastrous consequences to the commander and his command.

3. It follows then that when the number of individuals composing an organization exceeds the maximum (four to nine) which a commander can *personally* control, there must be a division into groups each under the control of a subordinate commander who deals directly with the commander above him. These divisions or groups are again subdivided in accordance with the above law until we reach at last the smallest subdivision of the organization which is again the maximum number of individuals over whom one man can successfully exercise direct *personal* control. In our army it is the squad of seven men commanded by a corporal. This successive subdividing into groups, each under a responsible commander is *organization*. The succession of commanders through whom the current of command flows and responsibility is fixed is the *chain of command* previously referred to. Note how inseparable are organization and command.

4. Just as the supreme commander is responsible for everything his command does or fails to do, so is the commander of each sub-division similarly responsible for his own subdivision. He must be sustained so long as he produces the desired results and lives within the law. Conversely, failing definitely, he must be eliminated. Many a higher commander has failed through being either too harsh or too lenient in handling his subordinate commanders.

5. In any organization each individual must know and know well his immediate commander, and likewise each commander must thoroughly know and understand the personal equation of every man under his immediate supervision. There must be mutual understanding. Every private should know his colonel, at least by sight, and have confidence in him, but he *must* thoroughly know and trust the corporal who is his immediate boss and realize that he is that corporal's *man*, "belongs" to him and is responsible to him.

6. No man can have more than one immediate commander to whom he is responsible and from whom he receives orders. Should another superior intervene and give him an order he must obey, but should report the circumstances to his own immediate commander at the first opportunity.

7. Each commander must have thorough understanding of his own job, its limitations and capacities, and the means, both men and material at his disposal for doing it. He must thoroughly realize the necessity for, and practice, effective co-operation with commanders of other units, who though having their own specific tasks to perform, are nevertheless working with him to the attainment of the common end in view.

8. In the grouping of units under one commander as the chain of command goes up, a point is reached where the commander finds the details of his job too much for one man to handle and at the same time, permit him to attend to his real job such as plans, policies, and personal contact with his troops, He therefore is given assistants, known as his staff, to relieve him of the burden of details. The commander is responsible for the actions of his staff and they in turn are responsible to him and act only in his name. They may best be considered a part of himself, furnished merely to amplify his physical and mental powers. They command nothing *per se*, and hence are not a part of the chain of command. The Commander and his staff constitute a "composite mind," but there is only one will—the will of the commander. In our army it has been determined by experience that the lowest unit whose commander should have a staff is the battalion of 1000 men.

Having enumerated these principles of command as related to organization, let us briefly consider their application:

As stated, the lowest subdivision in our army is the squad of seven men commanded by a corporal. The squad is a tactical unit, and the corporal, having no duties of an administrative nature, is given the maximum number of individuals that an average man should be able to handle personally with success under the conditions, i.e., seven. This squad is the corporal's command, his team, and he is responsible for its efficiency as a team and further responsible for every individual member of it *at all times*—in billet, on the march, and in action.

The next higher unit is the section of two or more squads commanded by a sergeant. Now here is a point often missed by non-commissioned officers and occasionally by officers,—that sergeant does not, or should not, exercise *direct personal* control over the sixteen or more men, but he commands two or more squads and only controls the men indirectly through their immediate commanders, the two or more corporals. He does exercise direct control over the corporals. He must know the personal equation of his corporals and see that they produce the desired results or take steps to get rid of them as corporals. In peace time, especially in garrison, the tendency is for the sergeant to attempt to command directly the sixteen or more men, corporals and privates alike. Very likely he can "get away with it" after a fashion under these conditions, but not so efficiently as a good corporal could supervise only seven men. But look at the vicious consequences—the corporals being granted no initiative, authority, or responsibility, cease to be corporals

except in name. In action the sergeant will have greater difficulty in handling sixteen or twenty four individuals than he would in handling two or three teams or squads each with a leader. Moreover if the sergeant be put out of action, there is no one to take his place, and the men without a competent leader soon get out of hand and more nearly approach a mob than a disciplined body of troops.

This example may equally well apply to any commander regardless of the unit. If the subordinate commanders are not given individual initiative, power, and responsibility they soon become figure-heads, unable to rise to the occasion and step efficiently into the next higher grade when needed. I have seen a reputedly efficient company commander so treat his lieutenants that they became well-nigh worthless. Just because he failed to understand the principle of the "chain of command" and was jealous of his authority, this captain badly overworked himself while his lieutenants were not allowed to do anything.

It is this type of officer from whom the protest comes that a company of two hundred and fifty men is too large for one man to handle. These captains are merely condemning themselves. Of course two hundred and fifty men are too many for one man to supervise *personally*. For that matter neither could he so handle one hundred men, Such a company commander is bound to fail. He cannot successfully run his company as a squad. It is basic that a captain must handle his command as so many platoons through his lieutenants.

In the foregoing discussion an attempt has been made to outline what might be termed the "mechanics" of command, i.e., the means by which command is exercised and responsibility is fixed. This is the *science* of command, a matter of rather exact knowledge, the result of centuries of experience, varying little in the armies of the civilized world, and changing only as new weapons and conditions are introduced into warfare. We come now to the other and more difficult phase, namely, a consideration of the qualities essential to the execution of command. What is it that supplies the vital spark which electrifies the frame-work down to the smallest part? What welds an organization together, breathes life into it and furnishes the monster with a mind, a will, a soul? It is the leadership of the commander. In the exercise of this leadership lies the *art* of command. "The soul of an army is the soul of its leader." *Esprit de Corps* filters from the top down in a military organization; never from the bottom up.

Authority to command is delegated by law and regulations. *Ability* to command depends primarily on the qualifications and personality or character of the commander and the extent to which he has impressed that personality or character on his troops.

Personal contact becomes increasingly difficult with the enormously augmented size of modern armies and fleets, but is none the less important. It is as vital to a division, corps, or army commander as it

is to the leader of a platoon in battle. The successful commander of any unit must be a true leader of it. Leadership is the soul of the command.

The qualities essential to the successful exercise of command may be divided under two general heads (1) personality or character and (2) professional knowledge and training. The necessity of (2) is obvious and we need only say that it must be the best. Let us examine into (1).

It is a *sine qua non* that a commander must possess courage of the highest order, not merely physical alone, but that vastly more difficult moral kind which will sustain him in the face of malicious or ignorant adverse report. He must be just, upright, and honest, but withal human. He must be frank yet tactful. He must be firm but unfailingly courteous. His dignity should be such as to forbid improper familiarity, yet he must be thoroughly approachable.

A commander should possess excellent health, a sound physique and a commanding presence. He must have personal magnetism and the quality of drawing out the real thoughts and confidences of his subordinates.

A man who is slovenly of attire, unkempt of person, un-polished in his manners, negligent of his obligations, obscene in his speech, in other words who is not a gentleman, cannot command the respect of his subordinates and is unfitted for command.

A successful leader knows and believes in himself and his ability and he knows and believes in his troops and their ability, and sees that his troops believe in him and themselves with sure foundation and sound reason. He lets them understand and realize what he expects of them. It is of interest to note that Foch's slogan to his division was, "IT SHALL BE DONE," and that his division invariably lived up to it. Having a well-based confidence in himself and in his troops, a true commander, by his acts and bearing, instils and inspires that confidence in those around him which spreads to and inspires the humblest private of his troops. Such is the essence of prestige. There is no more certain support of discipline, no better antidote for panic. No matter how badly things seem to be going every man will say to himself, "It's all right; the 'Old Man' is on the job," and hang grimly on to his own task. Such a commander has no need for pose or bluff which can never fool those under him for any length of time. A poseur is of necessity insincere, actuated by a trait which bars him from true leadership.

The real leader must possess the faculty of making decisions, and correct decisions, with speed and without hurry. To do this, he must be possessed of keen perception, reason, judgment, and that precious ability to perform under pressure without which he is nothing.

The ideal commander must be capable of tremendous, sustained, concentrated, and efficient mental effort in the face of personal danger and great physical discomfort; a stoic of iron nerve able to endure

pain in himself and in others; a man who welcomes the burden of responsibility that goes with power, allowing nothing to upset his efficient functioning—neither thrown off his balance by reverses nor by successes—a grim, relentless adversary who sticks to his task until the end is accomplished. He must not only incarnate "the will to win," but must radiate and inspire that will—that deathless determination throughout his command.

He must have the faculty of marshalling and bending to one end the energies and abilities of others. He must inspire in them zeal, and energy, and enthusiasm. This has been expressed in civil life by saying that the art of a good executive lies in getting others to work efficiently together for you. While treating all men fairly and justly the good commander is a student of human nature. He doesn't try to handle men as if all were run in the same mould. He leads whom he can and spurs and drives those whom he must.

The habit of command increases the efficiency of command and the power of leadership. The experienced commander often succeeds better than the inexperienced by reason of this habit alone, even though the latter may be a man of more innate ability. The former is used to command and gives an order as if it were the logical and natural thing to do, as if he had a right to, meant it, and expected to be obeyed. Without arrogance, conceit, or incivility he demands and gets obedience from those under him.

A commander must be an excellent judge of character and ability, and use that faculty in picking his subordinates. He must be firm in eliminating the unfit, but generous minded and quick to recognize and openly acknowledge and reward merit in those under him. Nothing so builds up *esprit de corps* and team-work. A commander must never "hog" the credit for good work done by a subordinate. Likewise he must manfully acknowledge his own mistakes and never allow a subordinate to bear the blame for the error of the commander. Far from damaging his prestige, such a course will work to his advantage, secure unhesitating and enthusiastic loyalty, and the respect and esteem of those under him.

Criticise when criticism is due, but let it be tactful, constructive criticism, not petty fault finding nor carping. Do nothing to injure the self respect of those under you. Inconsiderate and harsh treatment inspires resentment which is death to morale, and makes a perfunctory, indifferent, and perhaps disloyal subordinate.

In order to be thoroughly approachable, a commander must plainly show that he welcomes opinions from those under him. This does not mean that he should hold a "council of war," before making his decisions, but no one is so omniscient as to warrant refusal to listen to his subordinates. Some mistaken men have made themselves inaccessible on the ground that the other course weakened their authority and prestige.

This is a fallacy if the leader be the right kind of a man, if he is not, he will be found out anyway. The commander who encourages his subordinates to express their opinions freely but *respectfully*, who never ridicules them nor reprimands them for faulty opinion, but quietly and tactfully corrects them, binds those subordinates to him with unbreakable ties, and even more important he gets all the information there is to be obtained, so vital to him in making his decisions. Such a commander will inspire the best of morale and co-operation.

In discussing discipline and morale we hear much of the loyalty that must be instilled in those who are commanded. This is vital, but not less vital is the loyalty that the commander must show to his subordinates. All true loyalty is *reciprocal.* Otherwise the loyalty of those commanded will not be a warm, willing, personal devotion so essential to the success of the leader, but rather only a cold, duty-compelled, mechanical respect for the office and not the officer. The former sentiment stimulates and intensifies that greater and grander loyalty to the Cause and Country; the latter only exists at all because loyalty to Cause and Country requires it.

The leader worthy of the name must be ready to fight for his men and do it; a guardian of their rights, vitally concerned in their successes and happiness, and sympathetic of their misfortunes. And in doing all this he must nevertheless exact from every man the full performance of his duty, playing no favorites, being absolutely square, and "boning" no popularity. He must punish sparingly, but punish when punishment is due, making the offender realize that it is the Law which is punishing, not the commander personally.

Possessing the character and ability indicated above, coupled with the finest of professional knowledge and training, then and then only, may the aspiring officer hope at some time to rival the great leaders of the past in the practice of that difficult *art of command*, which consists in picking and training excellent subordinates, allowing them full power, initiative, and responsibility in handling their own jobs, inspiring enthusiastic and effective team-work among them, and leading the team with prompt, sound, unfaltering decision, and swift, resolute, persistent action to the efficient accomplishment of the end in view.

Night Firing Problems for an Anti-aircraft Artillery Battallion

By Major Oliver L. Spiller, C. A. C., Commanding 61st Artillery Battalion, Anti-Aircraft

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Editor's Note: At the JOURNAL'S request, Major Spiller has prepared this description of an interesting and valuable method of training which was developed in the 61st Artillery Battalion, Anti-aircraft, and which has been successfully employed for more than a year.

Preliminary.—The guns and machine guns are placed in firing positions so that the guns, when pointing toward the center of the field of fire will fire directly over the machine guns—in other words, the azimuth of the vertical plane of fire of the machine guns is the same as that of the guns when both are firing into the center of the field. The distance from guns to machine guns should be from 300 to 500 yards. Note: The term *gun* as used herein applies to the artillery weapon, 75-mm or 3-inch, as distinguished from the machine gun.

The four lights of a platoon are placed in normal position, viz: At the vertices of a quadrilateral 2500 to 3000 yards on a side. A departure from the tactical rule is made in locating the pilot light. It is placed about 200 yards to the rear and flank of the gun positions. This will facilitate the co-operation of the lights with other elements for the reason that the Searchlight Battery Commander, whose station is at the pilot light is near enough to observe the operation of the guns and machine guns.

All communications are laid from Battalion P. C. to each organization, and each battery lays its own interior lines.

Fire is conducted from the Battalion Commander's station.

Careful preparation should be made for the accurate orientation of all the elements, particularly the searchlights; the plotting, and locating of the bursts at both short and long range; and the training of Battalion and Battery telephone details in the transmission of the "type" messages which are used. Note:—The bursts can be plotted by taking from the trajectory chart the co-ordinates (altitude and horizontal distance) of the points at which bursts will be produced with certain fuse settings, the gun being laid at specified elevations. With this data applied to the map on which the gun and light positions are plotted, the points of burst can be so plotted that the azimuth and elevation to be set on any one of the lights to illuminate any particular point of burst can be determined.

The firings are of two general classes: *1st.*—Long range firing. The searchlights and the guns only are in operation, the range being too long for the machine guns. *2nd.*—Short range firing. Searchlights, guns and machine guns all operate.

LONG RANGE FIRING

1st Phase.—The Searchlight Battery Commander will cause two of his lights to place their beams so as to intersect at long range, altitude above 4000 feet. This intersection will be assigned to the Gun Battery Commander as a target About five rounds are fired. Firing is stopped and Searchlight Battery Commander is directed to find all bursts and follow them until cease tracking is given. He may use as many lights as necessary for this.

Type of messages given in order in which sent.

	From:	*To:*	*Message:*
1.	Bn.P.C.	S.L.	Long range target, data No. 3, Stand by.
2.	Bn.P.C.	Guns.	Stand by for fire at beam intersection, long range.
3.	S.L.	Bn.P.C.	Ready.
4.	Bn.P.C.	S.L.	Lights in action.
5.	Bn.P.C.	Guns.	Target. Beam intersection. Fire five shots. Commence firing.
6.	Guns.	Bn.P.C.	Five shots fired.
7.	Bn.P.C.	S.L.	Five bursts are up, search and follow.
8.	Bn.P.C.	S.L.	All lights out. Report when out.
9.	S.L.	Bn.P.C.	All lights out. Standing by.
10.	Bn.P.C.	S.L.	Same targets. Search and follow.
11.	Bn.P.C.	S.L.	Cease tracking.

2nd Phase. The 1st part is executed the same as the preliminary of preceding phase except only one shot is fired into the intersection. The smoke of this burst is followed by the two lights now on it and assigned to guns as target. After a few rounds, say six, fire is ceased and lights are put out. Then one light picks up one (any) burst out of the group that is in the air. This is assigned to guns as target, six rounds are fired, firing is stopped and light extinguished. Searchlight Battery Commander is directed to pick up and follow all bursts.

Type of messages used in this Phase, given in order in which sent.

	From:	*To:*	*Message:*
1.	Bn.P.C.	S.L.	Long range target, data No. 2. Stand by.
2.	Bn.P.C.	Guns.	Stand by for fire at beam intersection, long range.
3.	S.L.	Bn.P.C.	Ready.
4.	Bn.P.C.	S.L.	Lights in action.

	From:	*To:*	*Message:*
5.	Bn.P.C.	Guns.	Target. Beam intersection. Fire one shot. Commence firing.
6.	Bn.P.C.	S.L.	Follow same burst with two lights only.

Note: Message No. 7 is not sent until smoke has begun to move with the wind.

7.	Bn.P.C.	Guns.	Target. Burst in searchlight beam. Fire six shots. Commence firing.
8.	Bn.P.C.	S.L.	All lights out. Report when out.
9.	S.L.	Bn.P.C.	All lights out. Standing by.
10.	Bn.P.C.	S.L.	One light in action. Search and follow one burst.
11.	Bn.P.C.	Guns.	Target. Burst in beam of searchlight. Fire six shots. Commence firing.
12.	Bn.P.C.	S.L.	All lights out. Report when out.
13.	S.L.	Bn.P.C.	All lights out. Standing by.
14.	Bn.P.C.	S.L.	Six bursts are up. Search and follow.

15. ——Continue—— or Cease Tracking.

3rd Phase. This phase is a test for the Searchlight Battery. The Battery Commander uses his own judgment as to how many lights he puts into action and when. No more than four bursts are put up at one time. The fewer number of lights required to illuminate the four bursts, the more efficient the battery.

The two messages quoted below will show how the problem is started. Obviously the problem may be continued in various ways.

Type of message used in this Phase, given in order in which sent.

	From:	*To:*	*Message:*
1.	Bn.P.C.	S.L.	Stand by to pick up and follow bursts from Gun Battery.
2.	Bn.P.C.	Guns.	Fire at intervals of one minute. Four shots. Data No. 1. Commence Firing.

SHORT RANGE FIRING

1st Phase. Conducted in practically the same manner as the 1st Phase of the Long Range Firing, except that the bursts are assigned to the machine guns as targets. Considerable variety may result from manipulating the lights so as to shift from one target to another, thus requiring the machine gun to be constantly finding and opening fire upon a new target.

2nd Phase. Conducted in same manner as 2nd Phase of Long Range Firing, except that the machine guns also participate. Obviously there are several ways in which targets may be assigned to the machine guns.

3rd Phase. Conducted in same manner as 3rd Phase of Long Range

Firing, except that machine guns also participate. The guns are fired on data that will produce bursts within range of the machine guns.

Targets are assigned to the machine gun batteries as follows:

"Fire 25 rounds on each burst, as it is illuminated."

The operation of the lights may be varied from the procedure in the 3rd Phase of Long Range Firing in order to afford more targets for machine gun fire.

SPECIAL PHASE FOR SEARCHLIGHTS AND MACHINE GUNS

Tracking meteorological balloons liberated. This may be done with searchlights alone, or with lights and machine guns.

If for searchlights alone, the balloons may be released from any point; for firing by machine guns they must be released so the wind will carry them over the field of fire.

Discussion of the details of carrying out this phase is unnecessary.

IT IS TIME

TO START SCOUTING
CANDIDATES
FOR THIS YEAR'S

RIFLE TEAM

EDITORIAL

The Ku Klux Klan

THE recent revival of the Ku Klux Klan has called forth an increasing amount of public attention, which began with an attitude of tolerant amusement at the grotesque buffoonery of the ritual and appearance of gatherings of the order, and which has gradually given way to an appreciation of the possibility of menace in the pretensions of this rapidly swelling band of "galloping night gowns." The situation with regard to the Ku Klux Klan has reached a point where it is believed that some consideration of the purposes and performance of the society should be brought out in the open for frank discussion in the Coast Artillery and in all other branches of the military service. It is known that at least one attempt has been made to form a local organization of the Ku Klux Klan among soldiers and officers of the regular service, while similar efforts to proselyte among members of the National Guard have been given wide publicity in the press.

Consequently, it is high time that members of the military service became apprised of the significant features of Ku Klux organization and policy, and carefully decide whether these features warrant encouragement or condemnation, and consequently what the personal attitude of every United States soldier and officer ought to be. Stated concisely, the more outstanding features of Ku Klux activity are as follows:

First, as an organization the Klan proclaims itself the supporter of one hundred per cent Americanism, which it interprets to involve active opposition to the Hebrew race and religion, to the Roman Catholic Church and its followers, to negroes, and to the foreign born in this country, whether citizens or not. To be sure, the Klan also proclaims itself as pledged to the support of the Constitution, the officers of the law, the preservation of the Public School System and the protection of feminine chastity.

Second, the Klan assumes the responsibility for the scrutiny by its members of the private conduct and personal morals of all persons in the community, avowedly choosing the method of secret individual Klan espionage, in exercising this scrutiny and supervision.

Third, the Ku Klux Klan has adopted not only the secret ritual of the original Klan which was organized for a special purpose in the South in the early days of Reconstruction and voluntarily disbanded when this purpose was accomplished, but in addition has established its whole system of activity upon the basis of resort to action in mass, the individual members concealing their identity and thus side-stepping personal responsibility by the use of robes and masks calculated to inspire mystery and terror.

Fourth, the developments of recent months have shown repeatedly that not only is personal responsibility avoided by local organizations through their use of masks, but that in addition, the higher officers of the Klan also persistently avoid the acceptance of any responsibility by invariably disavowing the public activities of local organizations of the Klan when these activities become the subject of public investigation or disapprobation.

Fifth, it has already been apparant, noticeably in Texas and Oregon, that the Ku Klux Klan is determined to act cohesively in controlling political matters.

Sixth, on numerous occasions the Klan has assumed the rôle of custodian and arbiter of social and religious standards by its public demonstrations of nevertheless anonymous approval of certain clergymen and civil officials.

Seventh, by numerous examples in widely separated communities, it has become evident that the Klan does not hesitate to resort to extralegal use of violence which can be denominated as nothing less than lynching and mob action.

Eighth, the oath of allegiance, extracts of which are quoted below, from the hearings before the Committee on Rules, House of Representatives, 67th Congress, 1st Session, shows that members of the Klan yield an allegiance to the authority of the Klan which transcends the claims of allegiance to the constituted civil authorities, which harks back to medieval conditions in that the authority is not even subject to the majority control of the members of the society, and which even pledges its members to the possibility of becoming an accessory to any civil crime which does not amount to treason against the United States, rape and malicious murder.

"Section 3. *Obedience.*—You will say, 'I,' —— pronounce your full name, and repeat after me, —'In the presence of God and man, most solemnly pledge, promise, and swear, unconditionally, that I will faithfully obey the constitution and laws, and will willingly conform to all regulations, usages, and requirements of the —— which do now exist or which may be hereafter enacted, and will render at all times loyal respect and steadfast support to the imperial authority of same, and will heartily heed all official mandates, decrees, edicts, rulings, and instructions of the I——W—— thereof. I will yield prompt response to all summonses, I having knowledge of same, Providence alone preventing.'

"Section 4. *Obedience.*—'I swear that I will keep secure to myself a secret of a ——sman when same is committed to me in the sacred bond of ——sman-

ship, the crime of violating this solemn oath, treason against the United States of America, rape, and malicious murder alone excepted."

If, as is believed to be the case, the characteristic features of Ku Klux policy and methods have been fairly set forth, it is proper for officers and soldiers to examine the possibility of evil and injustice which they may contain. A careful examination seems to reveal that every one of these features contains seeds of distinct injustice and tyranny which subject the whole Ku Klux program to sweeping condemnation. It is, as it has always been, unquestionable that some of the most efficient and loyal officers and soldiers in the United States Army, as well as some of the most valuable citizens in the United States, are Jews and Roman Catholics. Instead of being in the interests of Americanism, this movement to stimulate animosity against Jews and Catholics is most decidedly un-American. The essence of Americanism lies in the harmonizing of all elements in American life, whereas the inevitable result of Ku Klux propaganda will be to stimulate division, friction and animosity. Even if there were the slightest justification in fact for the assertion of the Ku Klux Klan that the Catholics yield a higher allegiance to the Italian head of their Church than to the United States, or that the Catholics were united for the influencing of political ends, there can be no justification for resorting to secret and irresponsible conspiracy in combatting this form of activity which the Klan insists on ascribing to them. Furthermore, the attitude of the Ku Klux Klan presumes to coerce American life into allegiance to Protestant Christianity. This effort is as distinctly opposed to the established traditions of America as anything could well be. If any one of us chooses to abjure Christianity entirely, he is as entitled to do so as to accept Protestantism or Catholicism, and there is no one to say that he may not be as true and as loyal a citizen of the United States as any other.

In like fashion, we have in our midst the negro and the foreign born. While either one may have many mental and physical qualities which are distinct from those which the Klan chooses to approve, yet whether we will or no, there are here, and perforce, are a part of American life. The concern of Americanism then is not to thwart, to terrorize, to humiliate them, but rather with understanding and conciliation, to enable them to fit harmoniously into the communities of which they are a part.

An organization with the avowed purposes of the Ku Klux Klan must necessarily have a program of definite method whereby to accomplish its purposes. A consideration of the nature of its purposes will reveal the fact that the Klan has recourse to the only logical method by which it could possibly hope to forward its ends. This method is that of collective action by masked violence, which from its very nature, is intangible, secret and irresponsible. After spying upon the conduct of any individual, the Klan tries him without his knowledge and necessarily

without his presence and without giving him the inalienable Anglo-Saxon right of presenting his own defense, and then secretly punishes him for an offense against a criterion, the very existence of which he may be unaware. Here we have amidst the enlightenment of the 20th Century, a recrudescence of the most abominable and bigoted tyranny, a potential denial of all our long-established rights as free men and citizens, a sinister irresponsibility and an altogether intolerable invasion of civil sovereignty. Were there nothing more to condemn the Klan, this resort to the cowardly and crude code of the brigand would be enough to arouse every American soldier and officer to eternal hostility to the order. But this is not all. Every officer and soldier in the Army has sworn an undivided allegiance to the Constitution of the United States, to the President and to the officers appointed by law over him. So whatever any other American citizen may feel free to do with the less explicit obligation resting upon him to undivided loyalty to his country and its constituted authorities, certainly no member of the military service who faces the facts can consider with anything other than the utmost abhorrence, the suggestion that he prostitute his oath of military allegiance by the acceptance of an obligation which, like that of the Ku Klux Klan, not only specifically demands the division of his allegiance, but even potentially may require him secretly to violate the sacred oath which he has already freely accepted.

We may truly and rightly regret the disharmony, the injustice, the immorality, and even the venality which today are exhibited by individuals and communities in this country of ours, which we would love to see peopled by men and women pure and noble and devout; but we know that we can not look to the Ku Klux Klan for the genuine amelioration of any of our deplorable conditions and we should, yea must, firmly attempt as one coherent class to oppose by every proper means within our power the pretensions of so abhorrent and barbarous a thing as the Ku Klux Klan has revealed itself to be.

COAST ARTILLERY BOARD NOTES

Work of Board for Month of December, 1922

1. The following changes of the Board personnel are announced: Major R. R. Welshimer, C. A. C., and 1st Lt. J. F. Stiley, C. A. C., joined, and Major R. B. Colton, C. A. C., from attached to assigned.

2. Very little work was accomplished on Training Regulations during December. The "Battery Command" and "Meteorology" pamphlets were being put in final form ready to go to the printer.

3. New projects received during December.

a. The Cloke Plotting Board; Project No. 74.—This Plotting Board was designed by Colonel H. E. Cloke, C. A. C. It is constructed for general use, but is particularly adapted for use by Railway and Mobile Artillery units against moving targets. In general it is thought that this apparatus will be very satisfactory and meet the needs for which it was designed. The Artillery Board is considering its adoption, after minor defects have been corrected, as standard equipment for such mobile artillery units as may be employed tactically against moving targets.

The Whistler-Hearn board can be modified to be used as a Cloke Board with a moderate expenditure of funds. The Cloke Board seems to offer an acceptable solution of the problem of so equipping National Guard Units that their fire control matériel can be used equally well in armory drill and in target practice.

b. Fire control equipment to be supplied to 155-mm guns when these guns are used against moving targets. Project No. 75.—The action of the Artillery Board was based on the proceedings of a Board of officers convened in the 55th Artillery Regiment, Ft. Kamehameha, H. T. It appears that different fire control equipment is in use by the 51st, 55th, and 59th Regiments of Artillery. The Artillery Board favors consideration of methods employed by all three units and that tests be conducted at Fort Eustis embracing these various methods witha view toward the development of standard fire control equipment. Recent firings, both direct and indirect, at Fort Eustis by a two gun battery of 155-mm guns at a moving target at approximate range of 11,000 yards demonstrated conclusively the suitability of this type of mount for firing against moving targets.

A detailed description of the Fire Control Equipment used appears in this number of the COAST ARTILLERY JOURNAL. Satisfactory adjustment was attained, after which fire for effect was maintained at the rate of one salvo each 14 seconds. The Board has under consideration a project for recommending the assignment of one 155-mm gun together with standard fire control equipment, including the Cloke Plotting Board, to Coast Artillery National Guard units for armory training.

4. Projects previously submitted on which work has been accomplished:

a. Peyeru Anti-Aircraft Machine Gun Sights; Project No. 22.

(1) Four Peyeru sights were given an extensive test in comparison with four Trench or Forward Area sights. The test firings were conducted by the machine

gun company of the 61st Anti-Aircraft Battalion at Fort Monroe. Both type sights were mounted on .30 caliber Browning Machine Guns, Model 1917, mounted on anti-aircraft tripods, Model 1918.

(2) The tests were conducted with several distinct objects in view, viz—

(*a*) To determine the ability to rapidly and accurately adjust the sight preparatory to firing. It was found that the minimum time required to set up and adjust a machine gun fitted with the Peycru sight was five minutes and twenty seconds,—with the forward area sight—twenty seconds. In "march order" the Peycru sight must be removed from the gun, the forward area sight remains attached. Vertical adjustment of the Peycru sight is dependent on sighting at a point at known range. This is a disadvantage as fixed points at known ranges are not always possible to obtain.

(*b*) The second test was to determine the relative facility of opening accurate fire on a moving target at the instant it became visible. The targets used were 9-inch meteorological balloons. The gun using the forward area sight fired at six balloons and hit four; using the Peycru sight, six balloons were fired at with no hits. The Peycru sight is at a disadvantage in such a test because the gunner must use one hand to operate it, which necessitates elevating, traversing and operating the gun with the other hand. It was difficult for a gunner using the Peycru sight to keep on a target rapidly changing in elevation and azimuth. The Board is of theopinion, however, that the lack of a speed bead to accommodate such slow speeds as were obtained by the meteorological balloons was a decided handicap in this firing. The fact that the operating personnel was much more familiar with forward area than the Peycru sight also influenced results in favor of the former.

(*c*) The third test was to determine the relative ability of delivering sustained and accurate fire on a moving target. In this test a sleeve target towed by an airplane was used. Elevation 1500 feet, horizontal range about 1800 feet. The guns were mounted on the beach, the airplane ran a course parallel to the beach. Eight guns were used; four having the Peycru, four the forward area sights. The airplane ran its course six times. It was found that the Peycru sight gave best results under these conditions, viz., sight in proper adjustment and altitude, speed and direction of target remaining constant.

(3) Advantages and Disadvantages.—The following advantages in the use of the Peycru sight were noted:

(*a*) At the longer ranges it is considered more accurate than the Forward Area Sight.

(*b*) That feature in the construction of the front sight which automatically allows for the effect of high angle fire on the trajectory curve is an advantage and should be given further consideration.

The following disadvantages were noted:

(*c*) The sight is delicate in construction and will easily get out of adjustment.

(*d*) When out of adjustment it is comparatively difficult to adjust.

(*e*) It requires the gunner to manipulate the gun with only one hand, as he must use the other in operating the sight.

(4) It is considered highly desirable that a single type of anti-aircraft machine gun sight be developed for use with the .50 caliber and the .30 caliber machine guns; the sight to be suitable for use either in front or rear areas when properly graduated for the gun to which it is assigned.

The Peycru type sight is not suitable for use with the .50 caliber gun as now designed, since this sight requires that the gunner constantly use one hand in its manipulation.

(5) It is possible that some of the features of the Peycru sight may be used in the design of a sight to meet the needs of the anti-aircraft service. In order

to give the Peyeru sight further study, the Board recommended that the four Peyeru sights be retained by the 61st Artillery Battalion (Antiaircraft) for additional firings and tests with a view to determining and reporting specifically a design of an antiaircraft machine gun sight adaptable for both the .50 caliber and .30 caliber machine gun and suitable for use either in front or rear areas.

b. Application of Duplex Radio Telephony in Coast Defense—Project No. 28.

A radio transmitter has been installed in the Signal Station at Fort Monroe. A receiving station is located about 200 feet from the transmitter. These have been interconnected with the post telephone system. The present arrangement transmits very well from any post telephone but considerable difficulty is being experienced in getting the energy of the received signal into the post telephone system. There is practically no interference between the transmitter and receiver. The transmitter is at present being operated at 180 meters and the receiver at from 300 to 400 meters.

c. Range Correction Board, Model of 1921—Project No. 43.

(1) The Board is designed to serve the same purpose as the Pratt Range Correction Board. The need for a range correction board of more compact design has arisen with use of greater rangesinfiring. It is found that at long ranges, particularly for 16-inch guns and Howitzers, the curves on the range correction charts spread out and overlap to such an extent as to seriously handicap the operator of a Pratt Board in selecting the proper curve on which to set a pointer in determining the total correction to be applied. To overcome this difficulty, the new apparatus (Model 1921) has been designed where the charts for correcting range for wind, atmosphere, muzzle velocity and tide (h. s.) variations are entirely separate from each other, each chart being mounted on a pair of 3-inch drums except that the atmosphere and tide (h. s.) correction charts are on the same sheet of paper. Of each pair of rollers, one is behind the other. Each chart is wound up on one roller against spring tension on the other which keeps the chart taut at all times. As a chart rolls or unrolls, the curves for different ranges are exposed on the top of the drum. The drums are geared together in such a way that they wind and unwind uniformly to expose sections of the curves for the same range on each pair of rollers.

(2) The drums are also geared to a range tape which turns with them so that the range set on the tape can be made the same as that for which the charts are set. One of the defects of the apparatus is that as the range setting on the charts is changed, the range setting on the tape does not change at the same rate. The range readings on tape and charts must be made to correspond by a separate adjusting crank which turns the range tape only.

(3) A pointer actuated by a screw thread is made to travel back and forth over the face of each chart by turning a crank at the side of the apparatus. The pointers can be set at the required reference number on each chart. Any movement of any pointer is automatically transmitted to a total correction pointer. which indicates the corrected range on the range tape.

(4) The device was given a comprehensive test and was found to accomplish the purpose for which it was intended, viz., it affords a practical means for obtaining corrected ranges without over-lapping correction curves at the longer ranges. It has the further advantages of being quicker and easier of operation than the Pratt Range Board; arbitrary range corrections can be quickly and conveniently made by means of a sliding travel correction scale; it takes up no more space and is quite as portable as the Pratt Board; it can be fitted with the necessary zone correction curve charts.

(5) There were several defects noted in the design and construction of the apparatus submitted for test. These the Artillery Board commented on at length and recommended that a new experimental range correction board be constructed

embracing as far as practicable the changes in design suggested. If the recommendations of the Artillery Board are favorably acted on the project will be reopened when the new experimental device is available for further test.

d. Self-contained Range Finders, Anti-Aircraft—Project No. 47.

The test of anti-aircraft range finders was very actively engaged in during December and is nearing completion at this writing. The required number of range readings on stationary objects have been taken. Further tests will consist of taking readings on moving targets, both on sea and in the air, and comparing for accuracy the readings secured by the different instruments with range readings made by present artillery methods.

e. Day Mortar Elevation and Deflection Correction Board. Submitted by Captain J. B. Day, C. A. C.—Project No. 73.

(1) The Coast Artillery Board has completed the examination of the Mortar Deflection-Elevation Board recently submitted by Captain Day for examination and test.

(2) The Board is of the opinion that this device has been most ingeniously conceived and possesses considerable merit. It has been carefully compared by actual test with the mortar range board and mortar deflection board in use by the Coast Artillery at present. It was found that the Day board compares favorably with these instruments but that it does not possess sufficient advantages over present methods to warrant making the changes and incurring the expense that would be necessary if it were adopted. The Board has in mind also the possible superiority and ultimate adoption of fire control installation based on the Ford Target and Battery Computers.

(3) Based on the above considerations the Coast Artillery Board did not feel justified in recommending the adoption of the Day board.

f. Test of Spotting Boards.

(1) This extensive test has been completed and reported upon to Office Chief of Coast Artillery. A device designed by each of the following named officers was tested:—Colonel H. J. Hatch, C. A. C., Lt.-Colonel J. C. Ohnstad, C. A. C., Major Quinn Gray, C. A. C., Captain G. M. Wells, Ord. Dept., Capt. Louis J. Bowler, C. A. C., Capt. L. H. Thompson, C. A. C., 1st Lieutenant G. M. Taylor, C. A. C., and a joint proposal by Captain V. W. Hall, C. A. C., and 1st Lieutenant H. P. Ellis, C. A. C. Each board possesses considerable merit and is, within certain limitations, a workable solution of the spotting problem. When the tests were over, comparisons indicated that the Gray, Hatch and Taylor were the leading devices, and in the order named.

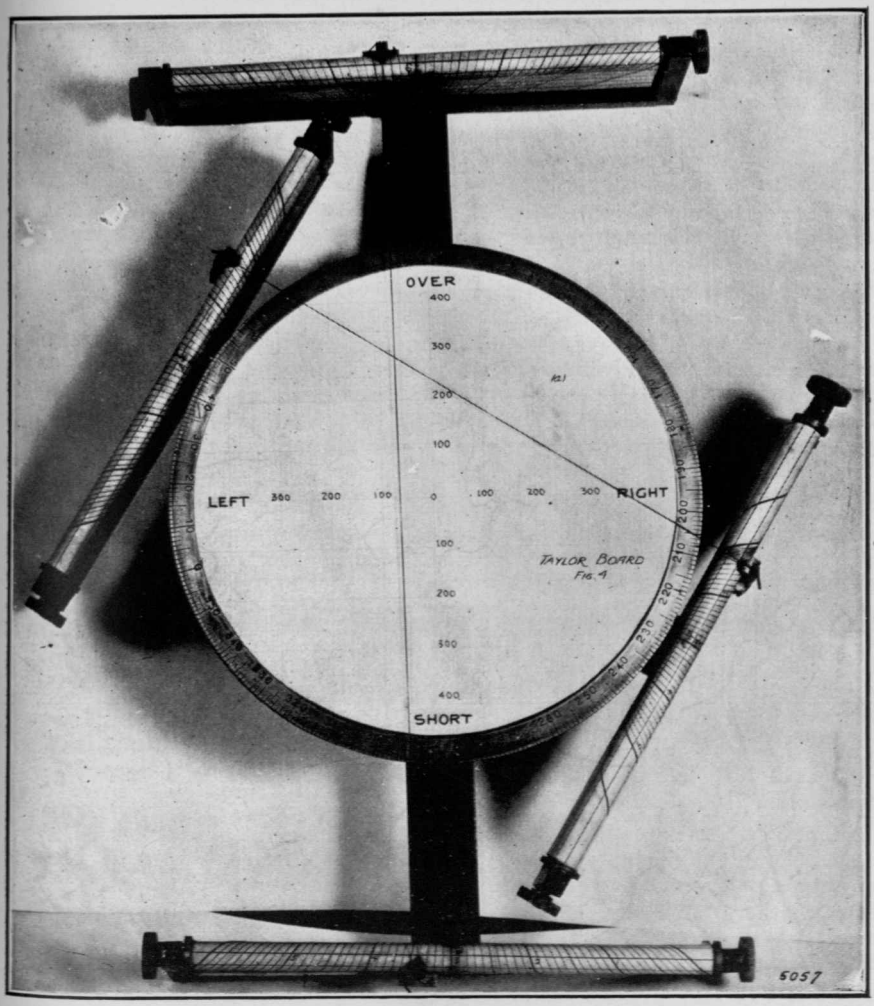
(2) The Gray Board is described in the May, 1921, issue of the JOURNAL OF THE U. S. ARTILLERY and in Part IV, Gunnery for Heavy Artillery.

(3) The Hatch Chart as constructed for this test, consists of a chart or series of charts for the desired field of fire upon which range circles and azimuth rays from the battery and the flank spotting station are drawn. It can be constructed as a bilateral plot of the field of fire, i.e., with azimuth rays drawn from each spotting station and the battery. Because of lack of space and the difficulty of good reproduction, an illustration of this chart is not reproduced here. It is well known to the service, but at an early date a detailed description with drawings will appear in the COAST ARTILLERY JOURNAL.

(*a*) The azimuth lines are drawn with a .20° subdivision and the range arcs at 100 yard intervals to a scale of 1″ equals 100 yards. Different colored lines are used to render the chart less confusing. A rectangular cardboard scale graduated in 10 yard units around the edges is used for measuring the deviations. A suitable table is made with rollers upon which the chart is rolled. The knobs on the ends of the rollers being turned to expose any desired section.

(*b*) As used in this test, upon the receipt of range and azimuth of the target,

the target pin was placed in the corresponding nearest intersection of rays from the battery and the spotting station. Upon receipt of the deviations the splash pin was placed at the intersection of the deviation lines. The scale was then placed lengthwise along the Gun-Target lines against the pins and the lateral and longitudinal deviations read directly from the scale.



THE TAYLOR DEVIATION COMPUTER

(4) The Wells chart is essentially the same as the Hatch chart, but is constructed to the scale of 1″ equals 200 yds. It combines a device for interpolating the deviation angles and reading true deviations with a modified Hatch chart.

(5) The Taylor Deviation Computer described below is very similar to the board in use by the Railway Artillery at Fort Eustis, and generally known as the Cole Board.

(*a*) "It consists of a circular platen whose center represents the target and across which rubber strings are moved to positions corresponding to the spotters'

lines of sight to the splash. The intersection of these strings thus shows the point of splash relative to the target, and the deviations are read easily on the cross-sectioned paper covering the platen."

(*b*) The board consists of five primary parts:—the target platen (a); the the orienting azimuth circle (b); the primary spotters' deviation setter (c); the secondary spotters' deviation setter (d) and the holding base.

(c) The target platen (a) is 9″ in diameter and covered with cross-section paper to a scale of 1″ equals 100 yards. About this platen is rotated a brass azimuth disc (b) graduated for 0-360°. The deviation setters (c and d) are rollers which are mounted on arms that may be rotated about the platen center. Tracing cloth scales graduated for ranges from 1000-20,000 yards and for deviations of +3°, are wound up on these rollers so that by turning them any desired range may be set off at the top of the rollers. Pointers sliding along opposite rollers and holding the line of sight strings may be slid to the observed deviation across the scale. The observing station-target range OT is set on both of the opposite scales and the displacement of the pointers for any given deviation will be such that the string will assume the position of a true radian and subtend the true tangent on the normal to the target. It is obvious that the tangent will be less for the roller toward the observer and greater for the distant roller. As constructed the inner deviation pointer will set the tangent for a range of OT—575 yards from the target to the scale of the board. The outer deviation scales are similarly made and give the tangents for a range of 925 yards more or less than that of the target. That is, the top element of these rollers is 9.25″ from the platen center."

(*d*) "To orient the board it is necessary to move the azimuth circle so that the GT line will read the set-forward azimuth. The line of sight strings are then moved by rotating their holding frames so that they will read the azimuth to the target from their respective observing stations. The ranges from these stations to the target are now also set by turning the rollers, and the string intersection is checked to see that it covers the target, when the four pointers are set at 0. At the instant of splash the deviation angles are observed and telephoned to the deviation setters. Each setter slides his two pointers to the designated deviation radian on the rollers and the splash is spotted on the graph paper at the string intersection."

(*e*) "As designed, the deviations are to be read at the B′ and B″ observing stations of the battery range finding system, and thus the required data for operation can be determined from the plotting board."

(6) The Bowler board is an ingenious combination of older devices with added features originated by Capt. Bowler. It is not only a spotting device for adjustment of fire on a set-forward point, but it can be used for relocating as a substitute for a difference chart. When used as a spotting device the board increases the scale of 1″=300 yds. (which is the scale of the board) to the scale of 1″=100 yds. at the target. The assumption that the triangles of a quadrilateral inclosing target (or set-forward point), rays from observing stations, and point of splash, will increase in direct proportion to the increase in scale rather than harmonically, appears to introduce an error in large deviations.

(7) The Hall-Ellis, and the Thompson resemble the Taylor board in general appearance. The material error noted in the Bowler board seems to be in the Thompson board also.

(8) A combination of the Taylor Board with the Ohnstad Board is being prepared for future test by an officer familiar with both devices.

(9) A summary of the advantages and disadvantages of the boards, as indicated by the tests, as follows:

Device	*Advantages*	*Disadvantages*
Hatch	Very accurate, simple and quick. Does not require relocated data. Requires only 1 operator.	Requires a large chart and a long board for a long field of fire and is not universal. Change of charts would be required for a change in flank spotting stations.
Wells	Requires only 1 operator and is quick. Does not require relocated data.	The scale is ½ that of the Hatch but the errors of operation are more than double. It is not universal.
Gray	It is quick and universal and requires no relocated data, and is reasonably small.	It requires 3 operators and is not as accurate as the Hatch and Taylor devices.
Taylor	It is small, reasonably quick, very accurate and is universal.	Requires relocated data, viz., range and azimuth from both spotting stations. This disadvantage is almost overcome when the base end stations are used.
Thompson	It is small and reasonably quick, accurate at short ranges, and is universal.	Requires relocated data. This disadvantage is almost overcome when the base end stations are used. Has large error at long range.
Hall-Ellis	It is small and quick and has average accuracy. Can be made universal by providing ready means for changing reference numbers.	Requires relocated azimuth for distant station and is graduated for a unit range—10,000 yds. and requires the use of a slide rule for the other ranges.
Ohnstad	It is small and accurate for Case II and can be made universal by equipping it with more station blocks. Requires no relocated data.	There are too many arms for accurate operation in Case III.
Bowler	It is quick and fairly small and requires no relocated data and is universal. Requires only 1 operator. The errors of operation were smaller than the average.	Is an expensive board to construct. Had a material error in the accuracy test. Has a large minimum range dead space, as constructed. This could be reduced materially. It could not be used for the 6800 yd. baseline without increasing minimum range dead space. It was therefore used for the Fort Wool baseline—length 2100 yds. It is believed the last defect can be reduced by a change in construction.

(10) With reference to the spotting board analysis sheet which appeared in last month's "Notes" the report of operations tests have been extended to include the last firings at Battery Anderson (12″ mortars) and Battery Montgomery (6″ rifles).

Longitudinal Mean Error in Operation in yards compared with Observers Angular Deviations.

Board	Calculated for Last 18 salvos Anderson Willoughby Base Line Case III	Calculated for Last 20 shots Montgomery Willoughby Base Line Case II
Hatch	9.4	4.7
Wells	20.8	33.4
Gray	28.7	10.3
Taylor	13.2	12.1
Thompson	30.1	4.4
Hall-Ellis	....	14.6
Ohnstad	....	....
Bowler	....	....

Case II.—Unilateral Deviation, Near Station Deviation taken as zero.
Case III.—Bilateral Deviations.

(11) When the device mentioned in paragraph 7 is completed, it is the intention of the Coast Artillery Board to conduct new tests which it is hoped will result in the adoption of a standard spotting board. Meantime letters have been written all officers concerned in the above tests advising them of the results insofar as same are applicable to their particular devices, and inviting their cooperation in the future comparative tests.

g. Range Tables.

(1) In the preparation of range tables at Aberdeen Proving Ground, the observed ranges are stripped not only for the variations due to wind and atmosphere (density), but also for the variations due to rotation of the earth, temperature (elasticity), as well as for variation in the weight of projectile.

In the preparation of range correction charts for a long range battery, the Chief of Coast Artillery has approved the recommendation of the Coast Artillery Board, to take care of the above mentioned variations by applying for them the range corrections as a flat correction, instead of incorporating them into sets of curves for use with the range correction board.

The reason for this decision will be evident from the following figures which indicate that for average conditions the range corrections are so small and their rates of change so slight as to preclude the necessity of incorporating them in sets of curves for use with the Pratt Range Board. Consequently the form of the present range correction chart of the Pratt Range Board will not be changed and the flat corrections arising from the variations mentioned, if of sufficient value to be considered, will be determined from the range table.

(*a*) The maximum range changes due to rotation of the earth, in latitude 13° are:—

For Range, Yds.	Range Change, Yds.
6000	±48
12000	±82
18000	±98
24000	±106
29000	±101

(*b*) The range corrections for the maximum variation in temperature expected, namely 40°F (59°F to 99°F) are—

For Range, Yds.	Range Change, Yds.
6000	+14
12000	+42
18000	+76
24000	+83
29000	0

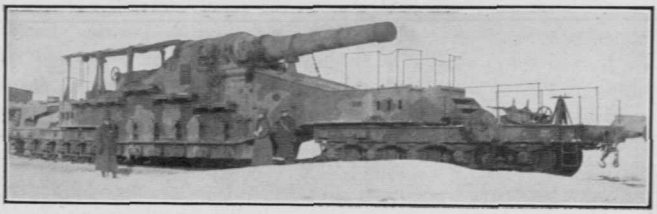
Note: The maximum change occurs at a range of about 21,000 yds. decreasing from then on to zero in the vicinity of the extreme range.

(*c*) The range changes due to an increase in the weight of the 900 lb. projectile of 2% are,—

For Range, Yds.	Range Change, Yds.
6000	−40
12000	−47
18000	−21
24000	+17
29000	+46

(2) While the above decision applies to a particular battery it is certain that the corrections for variations due to rotation, elasticity, and weight will not be incorporated in curves in any case where the Pratt Range Board is provided, and very probable that they will not be incorporated in any future type of range correction charts.

(3) The Chief of Coast Artillery has approved the recommendation of the Coast Artillery Board for the use of range correction charts for the 12-inch Batignolle Railway units, the tide (height of site) curves to be extended to the maximum limit of the chart subject to no over-lapping of the curves.



Employment of Heavy Artillery—Problem No. 7—A Solution

1st Requirement:

Upon the receipt of the orders Capt. B. goes to G4 3d Corps at MT. PLEASANT SH and obtains an order from him for 800 rounds of ammunition on the dump at LEFEVRE. He then proceeds to LEFEVRE and looks over the situation and decides that he will need 8 men to load each truck. As his trucks are all 3 ton capacity he can carry 20 projectiles in each, thus requiring 40 trucks for 800 projectiles. His powder can be carried on 4 trucks while 1 separate truck must carry his fuses. Captain B therefore decides upon his return to the echelon at 11.00 AM that he will need 45 trucks and a loading detail of 32 men making 4 reliefs. He accordingly decides to start his trucks out at 12.00 noon sending out 2 trucks each 15 minutes as he is forbidden to run trains in the day time. By thus sending out 8 trucks per hour and having each truck loaded upon arrival he will be ready to start back to the batteries by 7.30 PM. The distance back to the batteries is 6 miles and figuring a minimum of 2 miles per hour he would arrive at the battery about 10.30 PM. The trucks are unloaded directly in rear of the batteries where the battery personnel pile the projectiles immediately in rear of the gun to which it pertains, and scatter the powder in small lots in the woods as shown in solution to Problem 3. The fuses are kept in a small dugout in each gun emplacement.

2nd Requirement:

The dead. Major A makes a detail of an officer and 4 men from the battalion. The dead are buried temporarily, in shallow graves or trenches, and one of the identification tags is buried with the body. The other identification tag is attached to the grave marker. The battalion surgeon is required to examine each body before burial in order to determine definitely the fact of death. A written report to the Corps, through BHQ, is prepared by the personnel adjutant, stating names of dead, with rank, organization, serial number, exact manner of death (if from wounds, whether from shell, shrapnel, gas, or bullet,) and giving coordinates of each grave.

Sick and wounded. All sick and wounded are first brought or directed to the Battalion Aid Station for preliminary examination and treatment. Those cases

considered serious are evacuated to the Divisional Hospital Station at LITTLESTOWN in the battalion ambulance. The slightly wounded remain with the battalion, under treatment, and are returned to full duty status as soon as practicable. On account of the uncertainty as to the return of these men evacuated to the Divisional Hospital Station the individual clothing and equipment as well as personal effects accompany them. The individual records, properly completed, should accompany these men if time permits. Otherwise, these records follow the men as soon as practicable.

The conditions of this problem as to the evacuation of sick and wounded vary somewhat from those which ordinarily pertain to Infantry in the front line, as the sick and wounded of an Infantry Aid Station would be transported or marched by the litter bearer personnel of a sanitary company to a Collection Station, and from there transported by ambulance, if required, to the Divisional Hospital Station. As the 1st Bn 701st Artillery has an ambulance and is at some distance from the firing line, in rear of the nearest Collecting Station of the sector, the Battalion Surgeon evacuates his seriously wounded direct to the Divisional Hospital Station without calling on a sanitary company or ambulance company for assistance.

Replacements.—Request is made at once by telephone to Brigade Headquarters stating grades and numbers to be replaced. This is followed by a replacement requisition on proper form.

Employment of Heavy Artillery—Problem No. 8

References: Maps, Gettysburg 3-inch, New Oxford, Bonneauville, Gettysburg and Hunterstown Sheets, and 1-inch reduced from 12-inch War Game Map.

General Situation: In continuation of Problems 2, 4, and 6.

The hostile attack of 29 March resulted in the loss of a portion of the outpost zone of the 3d Corps. The attack was stopped by main line of resistance but our counter attacks failed to recover ground lost.

The line of contact along front of 3d Corps now runs (351.6 - 743.8)—(354.0 - 743.7)—(356.8 - 747.1)—HILL 571 - CR 588 - ROUND TOP SH.

Special Situation (Blue):

At 9:00 AM 11 April an order for an attack was received from CG 301st FA Brig with its annexes. Extracts from these which immediately concern Maj A read as follows:

* * * * * * * *

The 3d Corps attacks on D day at H hour with the object of restoring the WHITE RUN lines.

* * * * * * * *

Artillery fire prior to H - 2 hours will be reduced to the most urgent requirements.

* * * * * * * *

The 1st Bn 901st Art will fire concentrations on the hostile reserve trenches on reverse slope of WOLF HILL during the attack. During the preliminary bombardment and attack it will neutralize the enemy casemated batteries on reverse slope of WOLF HILL.

* * * * * * * *

ANNEX

* * * * * * * *

Unit	*No. Guns*	*Target No.*	*Objective*	*No. of Shots*	*Time*
1st Bn 901st Artillery	8	V	Casemated battery	132	H −2 to H
		VII	Casemated battery	132	H −2 to H
	4	V	Casemated battery	84	H to H +2
		VII	Casemated battery	84	H to H +2
	4	II	Reserve post	56	H to H +2
		IV	Reserve post	56	H to H +2
		VI	Reserve post	56	H to H +2

(See chart printed in December JOURNAL facing Page 556.)

* * * * * * * *

At 10:00 PM 16 April a secret message was received announcing D day as 17 April and H hour as 5:00 AM.

See note accompanying Problem No. 6, Page 556, December JOURNAL.

Required:

Maj. A's complete firing orders.

THE BULLETIN BOARD

History of the Batteries of the 62d Artillery

HEADQUARTERS BATTERY: Organized in 1847 as Battery "L", 1st Artillery, designated 9th Company, C. A. C., by General Orders No. 15, War Department, 1901, since which date its designation has been changed as follows: To 1st Company, Fort Warren, 1916, 7th Company, Coast Defenses of Boston, 1917, 11th Company, Coast Defenses of Long Island Sound, 1922, 9th Company, C. A. C., by General Orders No. 21, War Department, 1922, and Headquarters Battery, 62d Artillery by A.G.320.2 (8-2-22) (Misc.)

BATTLE PARTICIPATION: Shenandoah—August 7-November 28, 1864.

SERVICE BATTERY: Organized by Captain John R. Bell as part of the Light Artillery Regiment in 1814 and in 1816 was designated "K" Battery of that regiment. Assigned as Battery "A", 4th Regiment of Artillery in May, 1821, and designated 37th Company, C. A. C., by General Orders No. 15, War Department, 1901. Since that date its designation has been changed as follows: 3rd Company, Fort McKinley, 1916, 13th Company, Coast Defenses of Portland, 1917, disbanded by General Orders No. 12, Coast Defenses of Portland, 1919, reconstituted as the 37th Company, C. A. C., by General Orders No. 21, War Department, 1921, and assigned to 62d Artillery by A.G.320.2 (8-2-22) (Misc.)

BATTLE PARTICIPATION: Peninsular—March 17, August 3, 1862; Vera Cruz—March 9-29, 1847; Cerro Gordo—April 17, 1847.

2ND BAND, C. A. C. Organized as the band of the 2nd Artillery in 1821.

BATTLE PARTICIPATION: Mexican War.—See Rodersbough's "The Army of the United States," page 317, referring to the 2nd Artillery. "Even the band took part in the fighting. They were trained soldiers and served in the ranks with muskets in every battle, resuming their musical instruments in camp and garrison." Monterey—September 21, 1846; Vera Cruz—March 9-29, 1847; Cerro Gordo—April 17, 1847; Confreras—August 18-20, 1847; Churubusco—August 20, 1847; Molin del Rey—September 8, 1847; Chapultepec—September 13, 1847.

BATTERY "A": Organized by General Orders No. 50, War Department, 1899, as Battery "N", 7th Regiment of Artillery. Since that date its designation has been changed as follows: 82nd Company, C. A. C., in 1901, 1st Company, Fort Totten, 6th Company, Coast Defenses of Eastern New York, 1917, absorbed by 3rd Company, Coast Defenses of Eastern New York, September 30, 1919, reconstituted as 82nd Company, C. A. C., by General Orders, No. 21, 1922, as-

signed as Battery "A", 62nd Artillery Battalion and by A.G.320.2 (8-2-22) assigned to 62nd Artillery as Battery "A".

BATTLE PARTICIPATION: None.

BATTERY "B": Organized in 1776 by Captain Alexander Hamilton as a company of New York State Troops, transferred to Continental Service by resolution of the Provisional Congress of New York, March 17, 1777. Was the only organization retained in the service at the end of the Revolutionary War in 1784 when 25 men of the company were stationed at Fort Pitt with the remainder of the company, 55 men, at West Point. In 1787 it became one of the companies of the Artillery Battalion. In 1789 it was part of the Regiment of Artillerists and in 1812 it became a unit of the 1st Regiment of Artillery. In 1816 it was designated "E" battery, 2nd Battalion, Northern Division, and in 1821 it was assigned to the 2nd Regiment of Artillery as Battery "C". Since that date its designation has been as follows: 17th Company, C. A. C., in 1901, 4th Company, Fort Mills, P. I., in 1916, 4th Company, Coast Defenses of Manila Bay & Subic Bay, 1917, 17th Company, C. A. C., 1922, and Battery "B", 62nd Artillery in 1922.

BATTLE PARTICIPATION: Northwestern Indian Wars—Ohio, January 1790-August 1795; Florida Indian Wars—November 1817-October 31, 1818, December 28, 1835-August 14, 1842, December 15, 1855-May 1858; Peninsula—March 17-August 3, 1862; Fredericksburg—November 9-December 15, 1862; Chancellorsville—April 27-May 6, 1863; Gettysburg—June 29-July 3, 1863; Cold Harbor—May 22-June 3, 1864; Monterey—September 21, 1846; Vera Cruz—March 9-29, 1847; Cerro Gordo—April 17, 1847; Confreras—August 18-20, 1847; Churubusco—August 20, 1847; Molin del Rey—September 8, 1847; Chapultepec—September 13, 1847; Not specified—May, 1847; White Plains—October, 1776; Trenton—December 26, 1776; Princeton—January 3, 1777; Brandywine—September 11, 1777; Germantown—Octover 4, 1777; Monmouth—July 30-October 13, 1777; Yorktown—September 28-October 19, 1778.

BATTERY "C": Organized in 1812 by Captain John Goodall as one of the companies of the 2nd Regiment of Artillery. In 1815 it became Company "F" 2nd Battalion Southern Division and in 1821 Battery "G" 3rd Artillery. Since that date its designation has been changed as follows: To 29th Company, C. A. C., 1901, 9th Company, Fort Winfield Scott, 1916, 9th Company, Coast Defenses of San Francisco, 1917, 29th Company, C. A. C., 1922, Battery "C" 62nd Artillery, 1922.

BATTLE PARTICIPATION: Manila—February 4-March 17, 1899; Malolos—March 24-August 16, 1899; Laguna de Bay—April 8-17, 1899; Florida Indian Wars—November 20, 1817-October 31, 1818, December 28, 1835-August 14, 1842, December 15, 1855-May 1858; Peninsular—March 17-August 3, 1862; Antietam—September 3-17, 1862; Wilderness—May 4-7, 1864; Vera Cruz—March 9-29, 1847; Cerro Gordo—April 17, 1847; Confreras—August 18-20, 1847; Churubusco—August 20, 1847; Molino del Rey—September 8, 1847; Chapultepec—September 13, 1847.

BATTERY "D": Organized in 1847 as Battery "L", 3rd Artillery, designated 33rd Company, C. A. C., in 1901, 14th Company, Fort Mills, 1916, 14th Company, Coast Defenses of Manila & Subic Bays, 1917, 33rd Company, C. A. C., 1922 and Battery "D" 62nd Artillery, 1922.

BATTLE PARTICIPATION: Manila—February 4-March 17, 1899; Malolos—March 24-August 16, 1899; Peninsular—March 17-August 3, 1862; Antietam—September 3-17, 1862; Fredericksburg—November 9-December 15, 1862; Wilderness—May 4-7, 1864; Vera Cruz—March 9-29, 1847; Cerro Gordo—April 17, 1847.

BATTERY "E": Organized in 1813 by Captain A. N. Thornton as one of the companies of the Light Artillery Regiment. In 1816 it became Battery "F",

Light Artillery, in 1821 it was assigned to the 3rd Artillery as Battery "H". Later designations were as follows: 30th Company, C. A. C., 1901, 1st Company, Fort Worden, 1916, 1st Company, Puget Sound, 1917, 30th Company, C. A. C., 1922, Battery "E" 62nd Artillery, 1922.

BATTLE PARTICIPATION: Manila—February 4-March 17, 1899; Malolos—March 25-August 16, 1899; Florida Indian Wars—Same as Battery "C"; Vera Cruz—March 9-29, 1847; Cerro Gordo—April 17, 1847; Confreras—August 18-20, 1847; Churubusco—August 20, 1847; Molino del Rey—September 8, 1847; Chapultepec—September 13, 1847.

BATTERY "F": Organized in 1838 as Battery "K" 3rd Artillery. Became 32d Company, C. A. C., in 1901, 3rd Company Fort Baker, 1916, 12th Company, Coast Defenses of San Francisco, in 1917, Battery "A" 18th Artillery October 25, 1918 to December 2, 1918, 32nd Company, C. A. C., 1922, and Battery "F", 62nd Artillery, 1922.

BATTLE PARTICIPATION: Same as Battery "E" except that it did not take part in the Battle of Vera Cruz. Add the following Civil War Battles: Peninsular—March 17-August 3, 1862; Fredericksburg—November 9-December 15, 1862; Chancellorsville—April 27-May 6, 1863; Gettysburg—June 29-July 3, 1863; Wilderness—May 4-7, 1864; Petersburg—June 4-April 2, 1865; Shenandoah—August 7-November 28, 1864.

Recent Maneuver of the 55th Artillery, C. A. C.

The recent maneuver of the Fifty-fifth has been declared to have been one of the most complete and extensive movements of its kind ever attempted in the Hawaiian Department.

The organization performed day and night marches—precision and forced marches; established a camp which was a model of sanitation, alignment and discipline; emplaced its guns by day and by night; conducted extensive day firing and some night firing; built its own bridges and repaired its equipment which gave way under the strain of crossing Oahu's crests and gulches; utilized 60-inch searchlights, furnished by the Sixty-fourth Artillery, in its night work; developed and tried out an entirely new system of range finding and, with all this, found time to indulge in plenty of swimming, athletic exercise and general recreation for its men.

ROUTE OF MARCH

The Third Battalion left Fort Kamehameha on the night of October 18 at 8 p. m., and proceeded along the main highway to the Schofield Waipahu branch, here taking the Waipahu road to the back road to Schofield, where camp was made for the night. During the next day the battalion proceeded to Schofield Barracks where, after a slight rest, the battalion took the main highway to Haleiwa and thence to the camp.

The Second Battalion, which had the longest march, proceeded through Honolulu to the main Haleiwa-Schofield road, camping just this side of Kipapa Gulch on the first night.

The First Battalion left Fort Shafter at 8:30 p. m., proceeded along the main Schofield road to the Waialua road and encamped just opposite the North Schofield gate.

Battery C, commanded by Captain Roy T. Barrett, proceeded over the canefield roads east of Schofield and camped near the main Haleiwa road, just three miles south of the hotel.

The following night, at 8 o'clock, all organizations entered the main highway and proceeded to the camp site. Battery C, First Battalion, reached the posi-

tions first, then the Third Battalion entered the camp, followed by the First and Second in the order named. So well was the march timed that the column entered camp in an unbroken procession, some three miles long, with only the regular intervals between battalions and vehicles.

DISTANCES TRAVELED

During the two night marches, the First Battalion traveled 32 miles, the Second 41 and the Third 35 miles. In tribute to the mobility of the regiment it can be said that by 8 o'clock of the morning on which the battalion was due in camp, the Fifty-fifth was off the main highways and in the management park, guns, tractors and everything.

The first event of importance after camp was established was the appointment of a board of officers to devise and recommend a plan for firing the 155-mm guns at moving targets towed by a tug. This type of firing has never been done by this armament before this time. The guns had fired at drifting targets with good results, but firing at a towed target involved far more precise methods and more careful adjustment.

The firing was satisfactory in every way. Climatic conditions were not altogether favorable, but even this was ultimately overcome and all problems fired creditably.

A NEW USE FOR AIRPLANES

Great assistance was given the regiment during the maneuver by the air service at Luke Field and Schofield Barracks. As another innovation in handling a convoy, the regimental commander observed and controlled all day marches of the regiment from the air. It is obviously difficult for the commanding officer of a moving column to properly observe the movements of the front and back of the column at the same time from the ground. A solution for this apparent difficulty was found in aerial control using the "birdseye view." With the assistance of the air service the regimental commander made an ascent and remained in the air during the day marches, sending orders to the ground by wireless where the motorcycle couriers carried them from the receiving station to the parties concerned.

The air service also observed the firing of the battalion, furnishing data on the fall of the shots from which corrections were made.

THE RETURN MARCH

After the tactical missions of the maneuvers had been completed, the return march was started. Having tried a precision march on the trip to the camp, the regimental commander decided to make a forced march out of the return. The situation assumed was that the success of the regiment's effectiveness depended upon speed in reaching a certain point. The second battalion, which had to go through Honolulu, was not considered in this march for the reason that it probably would pass through the downtown traffic during the morning congestion. However, the first and third battalions were given 12 hours to get from the camp beyond Haleiwa to Fort Shafter and Kamehameha, respectively.

The first difficulty encountered on the return march was the fact that the bridge over the small drainage stream beyond Haleiwa was not strong enough to carry the heavy guns and tractors. At first it was thought that the engineers would have to be called, but later it was decided that such conditions must be met by the regiment in actual service and that the situation should be met and remedied within the organization.

The supply officer, Captain McBride, immediately dispatched a convoy of trucks for timbers, beams, joists and hardware, and within two hours had constructed a bridge capable of holding the weight of the entire column.

SPECIAL COMMENDATION

Major-General Charles P. Summerall, commanding the Hawaiian Department, made an official visit and inspection of the camp, accompanied by Brig. Gen. John D. Barrett, commanding the Hawaiian Coast Artillery district. In honor of the commanders the regimental commander staged a demonstration program which included a parade of all tractors of the regiment and an exhibition of moving target firing during the afternoon. The Second Battalion was assigned to the target practice demonstration and performed in a manner to draw favorable comment. The commanding general made a general inspection of the camp, kitchens and gun emplacements.

General Summerall stated that the camp was especially well laid out and evinced a generally pleased attitude with the things that he saw. General Barrette also offered words of praise on the maneuver generally.

Shortly afterwards the regimental commander received a complimentary note from the office of the commanding general. General Menoher, commanding the Schofield Sector, in whose tactical area the Fifty-fifth maneuver was held, sent the regimental commander a letter complimenting the regiment on its discipline during the period of maneuvers.

Anti-aircraft Firing at Target Towed by Airplane

The following is an extract from the report rendered by Captain A. Bradshaw, Jr., Coast Artillery Corps, commanding Battery B, 61st Artillery Battalion (Anti-aircraft), of the target practice held by that organization at Fort Monroe, Virginia, November 22, 1922.

This problem constituted a phase of the combined Coast Artillery-Air Service maneuvers. It was for two purposes:

(1) To determine if fire could be delivered with accuracy upon an aerial target towed by airplane.

(2) To determine whether or not fire could be conducted upon an aerial target without danger to the towing plane.

The target was a white sleeve 14 feet long, 3 feet in diameter, towed by seaplane with towline 2500 feet long. The target appeared on the course at 1:50 p. m. The course flown was over the water from Fort Wool to Back River light, about 1000 yards off shore. The sky was overcast with shifting clouds intermittently obscuring the target. The plane was on its second course before the battery personnel was able to see the target, and it was on its 4th course before the observers and gun pointers could be put on the target well enough to track it. Two 3-inch Mobile Antiaircraft Guns were used in the firing. The shots fired on the 4th and 5th courses of the target were more or less erratic for the reason that the gun pointer was directed to fire when he was reasonably certain that he was on the target, although not positively "on." The reason for this was that one of the principal objects of the firing was to determine whether or not it could be delivered with safety to the towing plane. Accordingly an officer was stationed at each gun, who personally verified that the line of fire was safe before the gun pointer fired. The results obtained are conclusive. Even when the gun pointers were not actually on the target, fire was delivered and the nearest burst to the plane was estimated by the pilot as from 3000 to 2500 feet. His estimation is confirmed by observers from the ground. As will be noticed from the record of the observer at the battery position, the firing on courses 6, 7, and 8 was fairly accurate. The observer's notation under "range" as to two shots being correct is an estimation, there being no reference points and the smoke of the bursts not being in such position as to show whether they were over or short. On course No. 7

there was a distinct bracket on the target, made by one shot from No. 1 Gun, clearly observed as an over, and one each from both guns, clearly observed as shorts; these were line shots and the smoke traveled respectively behind and in front of the target. A similar situation occurred on course No. 8 when a line shot from No. 1 Gun was a clearly observed over and a line shot from No. 2 Gun, fired almost simultaneously with it, was a clearly observed short. The rate of fire was very slow for the reason that the target was continually being obscured as above mentioned. On the first four courses the plane was at approximately 7000 feet. On making the turns at each end of the course, it gradually lost altitude, decreasing from 7000 to 5500 feet on the last two courses. A total of 22 shots were fired.

The pilot was Lieutenant W. K. Patterson, United States Navy, of the Naval Air Station, Hampton Roads. The work on the part of the pilot of the towing plane was excellent, especially as this was his first attempt at towing a target with line of this length and further that he was maneuvering a seaplane of rather low maneuvering ability. It may be assumed that the length of the towline could be reduced to 1500 feet with perfect safety.

The conclusions with reference to suitable targets are summarized as follows:

The target for artillery firings should be considerably larger than this. It will be noted that the range to the target varied from 2700 to 3700 yards, considerably shorter than the average would be in service firings. It is also believed that the color of the target should be black. Experience in training for this practice showed that the black balloons could be picked up more easily and followed longer than the white or red ones.

Rhode Island Names Armory Batteries

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
THE ADJUTANT GENERAL'S OFFICE,

PROVIDENCE, AUGUST 12, 1922.

GENERAL ORDERS, No. 23.

1. Upon the recommendation of the Commanding Officer, Coast Artillery Corps, Rhode Island National Guard, batteries in the various armories will be designated as follows, and officially referred to as such:

10″ Gun Battery in the Providence Armory, Cranston Street, will be named "Battery Crocker" in honor of 2nd Lieutenant Albert W. Crocker, C. A. C., who died at Limoges, France, October 8, 1918.

12″ Mortar Battery in the Providence Armory, Cranston Street, will be named "Battery Babcock" in honor of Captain Russell A. Babcock, C. A. C., who was killed at Camp Jackson, S. C., February 2, 1920.

6″ Gun Battery in the Westerly Armory will be named "Battery Merrill" in honor of 1st Lieutenant Harold W. Merrill, C. A. C., who was killed in action near Revigny, France, October 6, 1918.

The Battery in the Pawtucket Armory will be named "Battery Gatchell" in honor of Major Walter G. Gatchell, Cavalry, who died in Pawtucket, R. I., while serving with the Rhode Island State Guard, September 23, 1918.

The Battery in the East Greenwich Armory will be named "Battery Mosher" in honor of Sergeant Cyril B. Mosher, F. A., who was killed in action at Belleau Wood, France, June 18, 1918.

The Battery in the Woonsocket Armory will be named "Battery Flynn" in honor of 1st Lieutenant Harold F. Flynn, Infantry, who was killed north of Crepion, in the Meuse-Argonne, France, November 9, 1918.

II. Paragraph II, General Orders, No. 20, c. s., this office, is hereby amended to read as follows:

"Henry C. Card, formerly Captain, Company F, First Regiment of Infantry, Brigade Rhode Island Militia, is hereby placed upon the retired list of commissioned officers, Rhode Island National Guard, with the rank of Lieutenant Colonel, in accordance with Section 36, Chapter 394 of the Public Laws, as amended, and is entitled on State occasions to wear the uniform of the highest rank held by him."

By order of EMERY J. SAN SOUCI,

Governor and Commander-in Chief.
CHARLES W. ABBOT,
The Adjutant General.

A New Method of Corrections for Air Density and Temperature

(Extracted from a paper by Captain B. J. Sherry, Signal Corps)

The Signal Corps has just completed a study of the practicable methods of making observations of the temperature and air density at various altitudes for the use of the Artillery in fire control. The difficulty of properly exposing and reading meteorological instruments on an airplane, the difficulty of procuring aircraft for making meteorological observations when needed, the time consumed in transmitting the results of the upper air observations to a central station and making the necessary computations therefrom, render it impracticable to get upper air observations and compute ballistic temperatures and ballistic densities in time for these data to be of use to the Artillery operating under field conditions. It was considered necessary therefore, to devise a method whereby ballistic temperatures and ballistic densities could be determined from meteorological observations made at the ground.

In "An Aerological Survey of the United States" by W. R. Gregg, U. S. Weather Bureau, recently published as Supplement No. 20, Monthly Weather Review, a comprehensive summary of upper air data for the United States, including complete temperature and density tables of conditions in various parts of the United States for various seasons of the year, is presented. Mr. Gregg's paper is probably the latest, most reliable and complete record of upper air data available for the United States. Based on data contained in this article, the Signal Corps has constructed tables which give the average ballistic temperatures and the average ballistic densities for trajectories of various heights. These tables are based on the average decrease in temperature and density with altitude under various temperature and pressure conditions at the ground. From observations of temperature, pressure and humidity the air density at the ground is determined in percentage of standard. Based on the density thus determined and the altitude of the gun the use of the tables gives the ballistic temperatures and ballistic densities for trajectories of various heights. The results obtained from the use of these tables are quite different, especially for high trajectories, from those obtained by the old method of using the surface temperature and surface density for the ballistic temperature and ballistic density, respectively, for all trajectories.

The method here indicated for obtaining ballistic temperatures and ballistic densities gives only approximately correct results. When, however, consideration is given to the fact that the atmospheric conditions are changing continually, and that more than an hour elapses before the data can be placed in the hands of the Artillery if the desired data are obtained from direct observation from aircraft and computation, it is believed that accuracy of the results obtained from the

tables will compare favorably with the results obtained from the longer and more difficult method of making upper air observations and computing the data. A comparison of the results obtained from the use of the two methods indicate that the results obtained from the tables will rarely, if ever, be in error enough to seriously affect the accuracy of fire control by the Artillery.

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BOOKS CATALOGUED

Library, Coast Artillery School, Fort Monroe, Va.

May to December, 1922

Military Science

Unless noted thus "*", these books may be obtained by any Regular Coast Artillery Officer; Warrant Officer, A.M.P.; or Non-commissioned Officer (Grades (1-3), C. A. C., upon request to Librarian.

Airplane Engine, The.....Marks, L. S.
American Campaigns.....U. S. General Staff.
Anti-aircraft Defense. Comp. by Officers of the 1st Anti-aircraft Battalion, C. A. C.*.....
Army of Northern Virginia Memorial Volume.....Jones, J. W.
Army Quarterly, The. October, 1920 to July, 1921. 2 v.....
Australian Victories in France in 1918, The.....Menash, J.
Battery E of the 110th Field Artillery.....U. S. Artillery. 110th Field Artillery.
Battle of Belmont.....U. S. Infantry School.
Battle of Big Bethel.....U. S. Infantry School.
Battle of Bladensburg.....U. S. Infantry School.
Battle of Booby's Bluffs, The.....List, Single, *pseud.*
Battle of Jutland.....Gt. Brit. Admiralty.
Battle-fields of Virginia, The.....Hotchkiss, J.
Biology of War, The.....Nicolai, G. F.
Blanc Mont (Meuse-Argonne-Champagne).....U. S. General Staff.
Campaigning with Grant.....Porter, H.
Causes of the War of Independence, The.....Van Tyne, C. H.
Chemical Warfare.....Fries, A. A.
Combat Orders.....U. S. Army Service Schools.
Communication Procedure Between the Army and Navy.....U. S. Joint Army and Navy Committee on Army and Navy Communications.
Cotangent Method of Anti-Aircraft Control.....Hinman, D. D. and Morgan, M.
Course in Exterior Ballistics, A.....U. S. Ordnance Dept.
Courts-martial Procedure.....U. S. Infantry Association.
Crisis of the Confederacy, The.....Battine, C. W.
Desert Mounted Corps, The.....Preston, R. M. P.
Development of Tactics.....Balck, W.
Direction of War, The.....Bird, W. D.

Drillmaster Based on the Infantry Drill Regulations (Provisional 1919) ..... U. S. Infantry Association.
Elementary Optics and Applications to Fire Control Instruments ..... U. S. Ordnance Dept.
Employment of Machine Guns ..... Short, W. C.
Engineer Service in War, The ..... U. S. Engineer Dept.
Engineer training Manual ..... U. S. Engineer Dept.
Extracts from General Orders ..... U. S. Army. A.E.F.
Extracts from Manual for Army Cooks ..... U. S. Quartermaster Corps.
Field Engineering ..... Bond, P. S.
Four Brothers in Blue ..... Carter, R. G.
Franco-German War of 1870 ..... U. S. Army Service Schools.
General Tactical Functions of Larger Units ..... U. S. Army Service Schools.
Gunners' Instruction (Fixed Mortars), 1921* .....
Gunners' Instruction (Mine Companies), 1921* .....
Gunners' Instruction (Railway Artillery), 1921* ....
History of the Transport Service, A ..... Gleaves, A.
Infantry Drill Regulations Illustrated and Simplified, with Hints to Drill Instructors ..... Bond, P. S.
Infantry Organization Tables ..... U. S. Infantry Schools.
Introduction to Ballistics ..... U. S. Ordnance Dept.
Jena Campaign, The ..... U. S. Army Service Schools.
Manual of Military Training ..... Moss, J. A.
Manuel d'Artillerie Lourde (Matériel) ..... Alvin.
Map Reading and Military Sketching ..... Bond, P. S.
Mass Physical Training for Use in the Army and the Reserve Officers' Training Corpss ..... Raycroft, J. E.
Military Law and Precedents ..... Winthrop, W. W.
Military Signaling ..... U. S. Infantry Association.
Minor Tactics from the Infantry Journal ..... U. S. Infantry Association.
Notes on the Preparation and Use of the Sand Table. U. S. Infantry School.
Organization of Cavalry Division ..... U. S. Cavalry School.
Plattsburg Movement, The ..... Perry, R. B.
Political Economy of War, The ..... Pigou, A. C.
Principles of Strategy ..... Naylor, W. K.
Principles of War, The ..... Foch, F.
Property Accounting for National Guard Organizations ..... Buchwald, M. G.
Red, White and Blue Manual, The. Vol. I. ..... Bond, P. S.
Second Division, Syllabi of the Histories of Regiments and Separate Organizations .....
Solution of Map Problems, The ..... Bundel, C. M.
Soul and Body of an Army, The ..... Hamilton, I. S. M.
Source Book of the Marengo Campaign in 1800 ..... U. S. Army Service Schools.
Spirit of Old West Point, The ..... Schaff, M.
Tables of Organization, Infantry and Cavalry Divisions ..... U. S. Army Service Schools.
Tactical Organization and Employment of Anti-Aircraft Searchlights ..... Pratt, J. S.
Tactical Principles and Decisions ..... U. S. Army Service Schools.
Tactical Problems ..... U. S. Infantry School.
Tactics and Technique of River Crossings ..... Mertens, J. K. L.
Tactics and Technique of the Howitzer Company, Infantry Regiment ..... U. S. Army Service Schools.

Tactics, the Practical Art of Leading Troops in War . Bond, P. S.
Text-book on Field Fortification . . . . . U. S. Army Service Schools.
Thirty-minute Talks . . . . . Stewart, M. B.
Time Fire for Effect for Sweeping the Reverse Slope
of a Crests . . . . . D'Antonio, R.

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BOOK REVIEWS

BIOGRAPHY

George Washington. By William Roscoe Thayer. Houghton Mifflin Company. Boston. 1922. 6″ x 9″. 274 pp. With illustrations. Price, $3.50.

To those who read and enjoyed "The Life and Letters of John Hay" it is not necessary to recommend Mr. Thayer's "George Washington." To all others we say: read both. In this volume Washington is presented as a human being—a vigorous, self controlled man with tremendous powers of endurance, equipped for a supreme conflict. Added to Mr. Thayer's keenly analytical delineation of character are many quotations from Washington's letters and documents which add to the reality and truth of the author's presentation.

With the living Washington before us we see more clearly the period in which he labored and the difficulties he conquered. With nothing of hero-worship in his treatment, yet Mr. Thayer has added materially to the undying fame of the great "Father of His Country."

Under Four Administrations. By Oscar S. Straus. Houghton Mifflin Company. Boston. 1922. 6¼″ x 9-3/8″. 456 pp. With illustrations. Price, $4.00.

Another distinguished American citizen has told us of his rise from obscurity to the heights of success. His is a book of personal recollections, a record of public service, with intimate glimpses of contemporaries of the period of which he writes. The book is of value in its presentation of the opportunities afforded by America to any of its citizens.

GOVERNMENT, HISTORY AND SOCIOLOGY

The Divine Right of Democracy. By Clarance T. Wilson. The Abingdon Press. New York. 1922. 5″ x 7¾″. 144 pp. Price, $1.00.

We have had many books on government by professors, students, politicians and "statesmen", but seldom do we find one by a clergyman. The volume before us is an interpretation of Democracy from the religious point of view.

The author endeavors to show that notwithstanding the failure of our forefathers to mention the name of the Diety in the constitution, they were largely influenced by the teachings of the Bible. For "the Bible was the book from which in childhood they were taught to spell, the book from which they took their first reading lesson, which became the law book of the colonies and the classic in the home, the book that was consulted by lawyers for precedents, by judges for decisions, by orators for eloquence, by literary men for style, by historians for facts, by lawmakers for models."

The chapter, "Pagan Inroads on American Democracy" affords the author an opportunity to indicate the "steps upstairs" to Christian democracy in the United States. Among the steps included to his mind the most important is that the Bible shall come back to the public schools.

The author's idea as to what part the "church" shall take in the affairs of government may be obtained from the following: "We do not seek to unite the church with the state, nor to make the church domineer the state, nor to let the state oppress the church, but we will help to see that the church aids the state in maintaining good government, and thus to furnish a fullness of uplift for the moral betterment of mankind."

Disenchantment. By C. E. Montague. Brentano's. New York. 1922. 5"x7½". 280 pp. Cloth.

Mr. Montague is an Englishman who went through the War first as a soldier and then as an officer, and he now has written his analysis of the causes of the tragic disillusionment and disenchantment which has swept away from the spirit not only of English people, but also of all the people of America and Europe, the remarkable optimism and devotion with which the finest men and women in England, France and America first attacked their share in the winning of the War.

After all, *Disenchantment* is perhaps not alone the picture of decaying confidence peculiar to the World War. It is probably a true picture of all War and of the inevitable effects of War in the minds and hearts of those who are brought to the door of disenchantment. Mr. Montague scolds the old Regular Army of England, both officers and men, whom he realizes had not been prepared in the years before the War to live up to the tremendous opportunity and responsibility that was thrust upon them when the War came. Probably if Mr. Montague had lived with the American Army he would have found just cause for similar disenchantment with the American Regular Army. But if so, we could also expect him to recognize that the American Regular Army at the time of the War, was like the British Regular Army, largely what its government and people demanded and permitted it to be. Mr. Montague is equally severe with the English politician. Indeed there is no class in English life which somewhere does not come in for cold-blooded appraisal. And apparently in no station was there the man who was not found wanting.

But the book is neither misanthropic nor furious. No one who has gone through America's share in the War can feel that *Disenchantment* does not face facts, does not tell many great if unpleasant truths. For the sake of the share that we in the Army may sometime have again in controlling the Nation's destiny in time of war, everyone of us ought to read this book, just as surely as the official source books of tactical and strategic operations.

From Isolation to Leadership. By John H. Latane. Doubleday, Page and Co. Garden City, New York. 1922. 4¾" x 7¼". 296 pp. Price, $1.20.

This little volume by Professor Latane on American foreign policy, first published in 1918, now appears in a revised edition. The first nine chapters are reprinted with but a few changes. Chapter X, "The War Aims of the United States," has been rewritten, and Chapters XI, "The Treaty of Versailles," and XII, "The Washington Conference," have been added.

Concerning his retention of the original title, we quote from the author's preface: "In view of the subsequent course of events, some of my readers may question the propriety of the original title. In fact, one of my friends has suggested that a more appropriate title for the new edition would be 'From Isolation to Leadership, and Back,' but I do not regard the verdict of 1920 as an expression of the final judgment of the American people. The world still waits on America, and sooner or later we must recognize and assume the responsibilities of our position as a great world power."

The following extract from a speech, made recently by Carl Ackerman, former war correspondent, is of particular interest in this connection. "The world revolution of opinion, which broke out in Europe after the Peace conference and which has its repercussion in the United States in the election of an isolationist Government in 1920, has reached its second and critical stage. The first reaction from the war which manifested itself here as well as in Europe, was the crystallization of nationalism in the Governments of the world.

"Search below the surface of local issues and behind personalities and I think you will discover that November, 1922, marks the beginning of the second stage of the world revolution of opinion, the critical and decisive stage perhaps, depending upon the outcome of this period of revolution in the United States."

Professor Latane summarizes his idea of what America's foreign policy should be in the concluding paragraph of his book. "Meanwhile we are still drifting, so far as a general European policy is concerned. President Harding's idea of holding aloof from 'Europe's League,' as he prefers to designate the League of Nations, and of having a little league of our own in the Pacific, will not work. The world's problems cannot be segregated in this way. Europe's league includes all of the principal nations except the United States and Mexico, while our Pacific league includes the two leading European powers. As soon as the American people realize—and there are indications that they are already waking up to the reality—that the depression in domestic industry and foreign commerce is due to conditions in Europe and that prosperity will not return until we take a hand in the solution of European problems, there will be a general demand for a constructive policy and America will no longer hesitate to reassume the leadership which she renounced in the referendum of 1920, but which the rest of the world is ready to accord to her again."

Imperial Washington. By R. F. Pettigrew. Chas. H. Kerr and Co. Chicago. 1922. 5¼" x 7¾". 441 pp. Price, $1.25.

Echoes of discord in the workings of that part of the machinery of our Government, Congress, have been manifest in the formation of blocs. We have been reading of the new Congress bloc "to drive special privilege out of control of government." In the book before us we may read an account of a one-man-fight against "privilege." This story of American public life from 1870 to 1920 is told by R. F. Pettigrew, formerly United States Senator from South Dakota.

In his foreword Senator Pettigrew indicates his purpose in writing this book. "It is my ambition to tell my fellow-countrymen what has happened during the half century that I have known public life. I know what went on because I saw it. I want others to have the same knowledge. During my public career I have received very definite impressions as to others. I want to do this because I believe my country is in danger; I believe that the liberties of the American people are already well-nigh destroyed; I believe that we are moving forward to a crisis of immense significance to the future of the American people, and the ideas and ideals for which the United States has stood before the world. We are far along on the road to empire, and we are travelling faster towards that goal than any nation in history ever traveled."

This book on government, although not philosophical, and withal extremely bitter, yet apparently is a sincere account of one man's experience in public life.

In the publisher's note, Charles Edward Russell is quoted as follows: "I particularly recommend the book to those that are weary of the pedantic twaddle and verbal genuflectious of the schoolmen. Here is something real; here is a man on the level. O rare and joyous discovery! Let him batter the social structure with mattocks and shiver its windows with bricks if he will—at least he

feels something and means something, and a country half choked with rhetoric ought to hail him with grateful relief."

Labor Turnover in Industry. By Paul F. Brissenden and E. Frankel. The Macmillan Company. New York. 1922. 5¾″ x 8¾″. 215 pp. 54 tables, 10 charts. Price, $3.50.

There are two limited classes of Coast Artillery officers to whom this important book will be of interest, first the small but serious group who in connection with their observation of the world of affairs have found it desirable to interest themselves in a detailed study of the problems of organized labor, and second the other group, of whom a considerable number are known, who are interested in the scientific process of research and statistical analysis. To both of these classes this up to date effort of Messrs. Brissenden and Frankel will be of extreme interest and real value. First let it be said that to the student of the interpretation of statistical data this book affords in both an incidental and direct fashion one of the most complete guides imaginable for the collection, arrangement and interpretation of statistical material, and for the formulation of conclusions based upon such interpretation. The methods used by the authors, while to a certain extent standard, are so plainly set forth and their results so apparent in this work, that a study of the book would be of as equal value to an officer doing research work in gunnery as to the employment manager of a large industrial concern.

From the standpoint of its contribution to specific information in the labor problem, the book is particularly valuable in that it presents a total of 54 tables and 10 charts covering the widest examination of factors entering into the problem of "Labor Turnover," or more inclusively "Labor Mobility." The data entering into this compilation were obtained from a survey involving more than 500,000 laborers in a wide variety of industries in different parts of the United States, and covering periods both prior to and subsequent to the War period. As one result, the book furnishes an interesting commentary of fact on the widely sensed but little appreciated spirit of unrest which is known to pervade American life since the War.

The authors found it necessary to adopt a definite basis in "Turnover" computations, and a precise definition for certain rates involved in a study of labor which had not been previously standard or uniform in the studies of workers in this field. The authors have adopted as a basis for computation the actual number of hours of labor put in by all employees in a given plant for the given period under consideration. This basis avoids the effects of payroll padding when the payroll is used as a basis, and the difficulty presented by using the average daily work force of different establishments by reason of varying lengths of the working day in different plants in different parts of the country. While the title of the book indicates its primary concern with the "Turnover" rate, which the authors define as the replacement rate, yet the scope of the book goes much further, including all the factors entering into labor mobility such as the accession rate, the separation rate, the labor increase rate, the labor decrease rate and the flux rate.

On the basis of these different and well defined factors affecting labor mobility the authors have used the material at their disposal to build up statistically a careful examination of the influence of official policy on labor stability, a comprehensive examination of the extent of labor mobility, both throughout the country and on the basis of individual plants and industries, an investigation of the causes of instability, with a chapter especially devoted to seasonal influences and finally an examination of the influence of length of service and the character of the different labor groups as factors in labor mobility. Obviously this is not

a book for casual inspection. It will be, however, of definite profit to him and him only who needs and knows how to use the information here available.

Politics. By Frank Exline. E. P. Dutton & Co. New York. 1922. 5" x 7½". 226 pages. Price, $2.00.

All men will agree that there is something wrong with the present forms of government. The rich are getting richer, and the poor, poorer and more numerous. There is discontent everywhere and many of our best people recently were fearful that even the United States was on the verge of a revolution.

Mr. Exline develops the idea that Government is a science that even to-day is little understood. All other sciences are taught in schools and Universities by men recognized as leaders in their particular branches, and who are practically licensed to instruct in those subjects. The real science of government is taught by popular speakers and newspaper writers, men who are not only not masters of the science, but who are usually forwarding the ideas and interests of those who control them. They are not even true to their own ideas. The only Public Opinion that really exists is the Editorial Opinion of the Newspapers, as the general public is not articulate and has neither the time, interest nor education to think deeply about anything. The efforts to improve our Government by reforms such as popular election of Senators, schemes of referendum, and recall of Judges, are steps in the wrong direction, as the public at large has no intimate knowledge of the men voted for even in State Elections, and has little understanding of the real meaning of the intricately worded reform motions usually put on the ballot. Governments should be controlled by only the best minds of the country or community. They are controlled generally by self seeking individuals who are willing to sacrifice their own principles and ideas to curry favor with the classes that elect them, in order to stay in power. The best of our people are so preoccupied with their own private concerns and pursuits that they shirk performance of public duties. If they vote at all, it is only a perfunctory performance of a duty, with little or no sense of personal interest or responsibility.

The author points out the fact that many of the lower offices in our Government are now filled by men especially selected for their particular qualifications by means of Civil Service Examinations. He believes that the most important offices should be handled in a similar manner. He believes that examinations should be held regularly for all those desiring to take them and that men who show themselves best fitted for appointment and promotion in this way should be given the best jobs. This idea is successful in the Army and Navy and might be in Government. There would be little opposition to this as the general public wishes to be well governed, but does not care to take any really active share in the process or its responsibilities. They would cheerfully adopt any reform that would achieve this result.

While many will not admit the feasibility of this scheme for general application to Government, most people would favor any scheme which would put real leaders in control rather than practical politicians.

The Return of the Middle Class. By John Corbin. Charles Scribner's Sons. New York. 1922. 5⅜" x 8". 353 pp. Price, $2.50.

In some respects Mr. Corbin follows a similar path in his discussion of present day problems as has been done in Edward Elsworth Ross's "The Social Trend," McDougal's "Is America Safe for Democracy," and Drake's "America Faces the Future." However, in this book the author makes a significant departure from the thought of his contemporaries in his paramount emphasis on the im-

portance of the Middle Class. After having commented with some asperity on the modern tendency to crystallize the national community into only two strata, Capital and Labor, he takes infinite pains to show that there is a very distinct element in the human mass which can not be herded either into the Capitalistic or the Proletariat group.

Mr. Corbin has attempted to define the Middle Class. He shows that in spite of the tendency to merge it into Capital on one side and Labor on the other, there are two distinguishing criteria which must both be present in order to denote an individual as a member of the Middle Class; first, he must have to work in order to live, and second, he must be one whose principal asset is his skill and ability. Consequently, among others whom the author includes in the Middle Class are the members of the professions, farmers, small tradesmen, salesmen, clerks, stenographers, teachers and college professors, the many sorts of scientific specialists and the members of the Army and the Navy.

In his consideration of the problems facing American life today and the importance thereto not only of Capital and Labor but of the Middle Class, the author covers a wide field of examination. Almost every item in the content of sociology receives some notice, the increase of industrialism, the development of socialism, education, immigration, eugenics, science, suffrage, legal procedure, political organization, national transportation. While in all this discussion there is a deal of significant contribution to the fund of comment on present day problems, there are two things which perhaps stand out above all others. The first of these is the necessary influence of the women of the Middle Class if American life is to continue its progress, with an examination of the real but unconscious hostility of organized Labor to the needs and rights of the Middle Class woman, while the other specific contribution is the argument for the further development of what is in fact a fourth arm of government, adding to the legislative, judicial, and executive forms of government the specific function of national administration. The essence of this new department of administration, which began to develop quite unconsciously with the creation of the Interstate Commerce Commission in 1887, is that it must necessarily include in its methods some which are quasi-legislative, some quasi-judicial, and some quasi-executive. The full development of the method had indeed occurred before its specific characteristics were recognized and defined. Following the establishment of the Interstate Commerce Commission, occurred the rapid creation of federal, state and municipal commissions for the control and regulation of all sorts of internal affairs. The latest phase of the development is the vesting in a head of a government department, the Secretary of Agriculture, of a similar kind of control over the meat packing industry. The author foresees the necessity for the rapid exploitation of this device.

In all the problems which he brings to our attention, the author unvaryingly emphasizes the conviction which is the justification for this book, that a complete and intelligent solution of each of these problems can be attained only by the return of selfconsciousness to the great Middle Class.

A Short History of the World. By H. G. Wells. The Macmillan Company. New York. 1922. 6¼" x 9½". 455 pp. Pro. Ill. Price, $4.00.

After reading "A Short History of the World" one wonders what H. G. Wells will next attempt. It had seemed that in his "Outline of History" he had approached the limit in condensation of the story of mankind. But here in this new book he has done something else and something quite distinct. Although the story begins long before the appearance of even the simplest life upon the earth and swiftly traverses nine chapters before the main character of the story

is introduced, yet it is easy to believe that the author had in mind as a central theme the story of the development of the common man. While Pharaohs and Kings and Presidents and Popes are introduced in the scene, their entrances and exits are after all such as to leave the feeling that they are all minor characters. We have here almost a moving picture in which the broad background of time and place and momentous occasion is swiftly unrolled to afford the theme for the frequent *close-ups* of what man—comman man—has been and has become. It is doubtful if any history has ever been written which has so subordinated circumstance to the human interest, the story of mankind. The great epochs, the great deeds, the great religions of the world are flashed before the mind's eye in swift and comprehensive panorama, each one linked before and behind with the general picture, and all subordinated to the compelling figure of the simple man. Although embracing more than 400 large pages, one reads this book as easily and as connectedly as a novel. Unlike most histories, one is not left with the feeling that as he finishes the account of any one of the many epochs in world history, he has finished a separate chapter. Each event looks back to its causes and sweeps forward with compelling interest to its results.

If H. G. Wells hoped by this book to recruit a vast number of men and women to an appreciation of the historical perspective who never before have grasped a true historical outlook, one may predict that his hopes will amply be fulfilled.

But the value of his work does not end here. Even to the historical student—yes, even to the student who here and there must sharply take issue with Mr. Wells's point of view—this book will come as a refreshing illuminant of many of the things he had known before, and as a ready help to a quick synthesis of the inner meanings which his plodding studies in limited fields have not disclosed. Perhaps inevitably many previously informed readers will clash here and there as has the reviewer, with Mr. Wells's deductions. But these differences in point of view are not important enough to mention. The significant thing to record with regard to this book is that here we have a clear and remarkably interesting panorama of the world's progress with always a sympathetic if subdued spotlight thrown on the affairs of individual man.

Society and Its Problems. An Introduction to the Principles of Sociology. By Grove Samuel Dow. Thomas Y. Crowell Company. New York. 1922. 5¾″ x 8¼″. 594 pp. Price, $2.75.

This book is a masterly survey of the problems confronting society today. The author is optimistic in his treatment of the subject, recognizing however that we have still some distance to go in solving our problems. He divides his subject into six parts: The nature of sociology; population; social institutions; analysis of society; social maladjustment; social progress. Under population there is an excellent chapter on immigration, and his discussion of the subject of poverty with its causes and treatment is particularly well handled. The book is wide enough in its scope and simple enough in its treatment to be of interest to the general reader as well as to the student of social problems.

Why Europe Leaves Home. By Kenneth L. Roberts. Bobbs-Merrill Company. New York. 1922. 5½″ x 8¼″. 355 pp. Cloth. Price, $3.00.

Why Europe Leaves Home is only one of several vitally interesting subjects contained in this book. In addition to giving the reasons which cause Central Europeans to overrun America, Mr. Roberts explains why "Russians are rushing to Constantinople, what coaxes Greek royalty and commoners into strange byways and hedges, and what it is that induces Englishmen and Scotchmen to go out at night." Altogether there are five separate subjects which are of the utmost in-

terest to every American today. Through it all, the reader has the comfortable feeling that he is reading accurate information gathered first hand by the author himself in England, Scotland, France, Belgium, Holland, Germany, Danzig, Poland, Czecho-Slovakia, Italy, Turkey and Greece during the tempestuous years of 1920 and 1921.

Mr. Roberts writes in his usual fascinating style. All of the unpleasantness and squalor of which we read is told in his inimitable semi-humurous vein which robs his otherwise flat condemnation from any sting.

MISCELLANEOUS

Principles of Command. By Major R. E. Jones, Inf. Riker's Booksellers. Iowa. 1922. 4½" x 6¼". 81 pp. Price, $1.00.

This little book consists of a series of brief observations on many of the factors entering into success in military command, the emphasis being laid as much, if not more, upon administrative command, as upon tactical command. The volume carries a commendatory foreword by Brigadier General Fox Conner and is highly commended by General Shanks, General Holbrook and others.

While it contains many observations which should be applied by commanders of the highest grades, yet the conciseness and simplicity of statement indicate its particular usefulness in suggestion to junior officers.

Sentinels Along Our Coast. By Francis A. Collins. The Century Company. New York. 6" x 8". 272 pp. Cloth. Price, $2.00.

To the average Coast Artilleryman who is in the habit of regarding the lighthouse in his particular water area as a datum point on which he may orient his telescope, there is a fund of information at his disposal in this book.

The reviewer commenced this book with the secret feeling that he was something of a sea-farer himself. However this idea was soon dispelled, as his knowledge of what the author speaks of as commonplaces unquestionably placed him in the Landlubber class.

From the standpoint of men who feel that we constitute the coast defense of this country, it behooves us to know more of our modest and silent co-workers, the lighthouses. Mr. Collins tells the history of the lighthouse in a manner that is entertaining and most interesting.

Who's Who in America. Edited by A. N. Marquis. A. N. Marquis & Co. Chicago. 1922. 750 pp. 6" x 7¾". Cloth. Price, $7.50.

This is the American issue of a form of book which is becoming increasingly popular year by year. England has her "Who's Who," France its "Qui Etes Vous," Germany its "Wer Ists," but none of them approach the size or completeness of this present edition of our own biographical reference book.

Starting with Aaron and terminating with Zygman, this present Volume includes 24,278 biographies of which 3339 are new. Owing to their custom of dropping all biographies of deceased notables, they have omitted 1088 names which were in their 1921 edition.

A very useful appendix gives the pronunciation of difficult proper names, something which very few reference books attempt to do except in a general way. Another appendix gives statistics of the birth place and present residence of all the names mentioned, as well as a geographical index grouping all biographies under state and city of present residence.

The "qualifications for Admission" as given in the preface terminate with the significant phrase "not a single sketch in Who's Who in America has been paid for—and none can be paid for."

TECHNOLOGY

Automotive Repairs. By J. C. Wright. John Wiley & Sons, New York, 1922. 5¼" x 8¾". Volume I, 530 pages. Price $3.50. Volume II, 420 pages, Price $3.00.

In these days of falling salaries and increasing prices, when so many try to run a Rolls Royce on a Flivver income, when garage work is expensive and generally unsatisfactory, many of us are forced to enlist the services of the Company Mechanic and the Post Plumber, and attempt our own repairs. To those, and they are numerous, these two volumes will fill a great need.

They are adapted to the needs of the amateur owner, to the general repair man, or for text books in Motor Transport Schools. The various troubles are listed, the operation and tools necessary for the job are shown, and the whole well illustrated, so one can get a good idea as to what will be encountered before the work is attempted. Each chapter is followed by a series of questions, which bring out clearly the important points covered.

Volume I is devoted to General Repair Work, with Chapters on chassis, En gine and Electrical Systems, Trouble Shooting, Body and Radiator Work, Lubrication, Fuel, Carburetors, Cooling System and Tires. This volume is particularly recommended to all automobile owners.

Volume II is devoted to Electrical Service Work and is intended more especially for the Electric Repair man and as a School Text Book, as few amateurs have the necessary tools and equipment to handle this class of work. Part I is an Instruction Manual of Repair Jobs, and covers everything from Spark Plugs to Starting Motors and Generators. Part 2 is a study of Electricity as applied to the needs of the Electrical Service and is more in the nature of a Text Book. Chapters are devoted to Magnetism, Electrical Units of Measurement, Electrical Measurements, Batteries, Generators, Starting Motors and Ignition. All features of the Electrical Systems are well covered and profusely illustrated, in a way that is both interesting and instructive.

These two volumes are to be followed by two more volumes, Volume III for Battery Service Men, and Volume IV for Tire Service Men. When all four volumes are issued they should form a compact library of motor transport which will be of great value to all interested in the repair of automobiles, or who have to instruct along these lines. They are fully up to the Wiley Standard, and worthy of a place in any Officer's Library.

The author, Mr. J. C. Wright was formerly Chief of the Industrial Education Service, Federal Board for Vocational Education, and is now Director of that Board.

The Complete Airman. By G. C. Bailey, D.S.O., R.A.F., B. Sc., A.M.I.C.E. E. P. Dutton and Company, New York. 1920. 5½" x 8½". 272 pp. 19 Ill. Price, $6.00.

In "The Complete Airman" the reader will find at least a short discussion of practically any phase of aviation. The author undoubtedly has a thorough knowledge of his subject and has produced a book that is interesting, and, in which the subject matter is well and pleasingly presented and logically arranged. He has however attempted entirely too much in a book of less than 300 pages.

He has chapters on everything from "Mechanics" to "The Weather," and, after reading the book one has the impression that he has heard a lengthy discussion of various subjects but that the discussion of each subject has been incomplete. The real fault with the book is indicated in the first paragraph of the introduction in which the author states that he "Aims at providing the airman with a reasonably complete outline of such knowledge as he ought to possess"

and then includes under the title "Airman," the pilot, and all who fly, the mechanics and the director and manager of commercial enterprises. It is too short for a reference book and too long for the ordinary reader merely interested in the theory of flight. One will not be bored while reading it and finishes with the hope that the author will write several more books on the subject matter covered in this one.

A First Book in Logic. By Henry B. Smith. Harper and Bros. New York. 1922. 5¼″ x 8¼″. 172 pp.

Professor Smith has embodied in the small compass of 170 odd pages, an elementary course in logic that is clear, as well as concise.

In addition he sets himself the task of disproving the claim that the traditional method is so far inferior to the newer method developed by Peano, Frege, Russell and others, that it no longer deserves the attention once bestowed upon it. This claim he endeavors to meet by introducing no symbols whatever, with the exception of those used in traditional logic itself, and by keeping modern developments always in mind while following the traditional order of treatment. His treatment has been such that the average intelligent reader has no difficulty in following him.

Although the author confines himself within the limits of a first book in logic, nevertheless his effort to reconcile the older with the more modern methods is entirely satisfactory.

General Psychology. By Walter S. Hunter. University of Chicago Press. Chicago. 1922. 5¼″ x 7¾″. 351 pp. Profusely illustrated. Price, $2.10.

Psychology! That much abused word. We are so accustomed to its many and varied appearances in our daily reading ration—the newspapers and popular magazines—that those of us who have had little acquaintance with this ancient and honorable science in our student days have become worse confounded. It isn't a bit strange to learn that while the professional psychologist is busy at his daily tasks in lecture hall and laboratory, the faker has come to the pleasant realization that writing tomes on the psychology of this and the psychology of that is not merely learning to wear out the seat of his pants at a typewriter.

What is psychology? "No growing field of study can be held within the limits of a definition," says Professor Hunter, "for it will go wherever its devotees take it. Psychology has always taken as its general goal the understanding of human nature and human behavior. Until the middle of the nineteenth century chief emphasis was placed upon the intellect, and psychology was considered a part of philosophy particularly as related to the problems of the theory of knowledge. As such it was the study of mind, consciousness, or the soul, and the limits of these marked the uppermost boundaries of the science. In 1830 and the years following, however, genuine scientific movements in psychology began in Germany, France and England. From these early beginnings first one phase of human experience and then another has come under experimental scrutiny until in the past decade the chief contributions have concerned the nature of thinking and the measurement of general intelligence in the various grades of men. With the development of the science has come an increasingly important bearing upon the practical problems of society."

In the present volume the author has adhered closely to the subject-matter and method which have proved successful in his courses. He divides his subject-matter into two classes: the facts of consciousness and the facts of behavior. In the preparation of his text he has had in mind, that students desire more than

general formulas and principles; that they are more interested in accounts of experimental facts and procedures and are willing to leave the other for the manual of advanced students. The arrangement of the text, the pictorial material as well as the references at the end of each chapter, will appeal to the teacher, the student and the general reader.

A Practical Manual of the Compass. U. S. Naval Institution, Annapolis, Md. 1921. 7" x 10¼". 234 pp. Ill. Cloth. Price, $3.90.

Part I is a short treatise on the errors of the magnetic compass with methods employed by the U. S. Navy for the compensation of deviation. All complex mathematical theory has been omitted, but a clear explanation of cause and effect enables the student to understand ordinary problems that may arise.

Part II by Lieut. Commander H. D. McGuire, U. S. N., is a complete treatise on the principles of the gyro compass.

This book is very comprehensive and is of interest to the artilleryman who is concerned with compass deviation almost as much as the deep water man.

The Religion of Science. By W. H. Wood. The Macmillan Company. New York. 1922. 5¼" x 7¾". 176 pp. Price, $1.50.

The author of *The Religion of Science* is professor of bibliographical history and literature in Dartmouth College and it is easy to see that in this compact essay he has sought to express his impatience with the class of scientists whom he has chosen to call Science-Theologians or metaphysical scientists, who are not content to permit pure science to remain dominant in its own field, but who have sought to extend the pretensions of science by clothing it with the sanctions of a religion. Dr. Wood shows a surprisingly comprehensive familiarity with the aims and accomplishments in the development of science and in the methods of scientific investigation. He disarms opposition to his thesis by a frank and sincere respect for the attitude of mind and accomplishments of the scientist. However, he is distinctly irritated with the point of view of certain scientists which has sought to accomplish either one of two things, first, to modify the existing sanctions of religion, or second to attempt to harmonize religion and science by plausible assertions that true religion lies in the scientific outlook and attitude.

Dr. Wood establishes a very clarifying basis for the discrimination between actual physical or scientific law and the convenient and necessary hypotheses and theories by which the scientist is able systematically to formulate the results of experience and observation. Dr. Wood shows that the logical scientist understands clearly that his hypotheses and theories are to be considered not as physical laws, but as preliminary statements of truth which are nevertheless subject to revision and re-statement when demanded by the results of further investigation. The gist of the author's disagreement with the science-theologians is that the latter unconsciously jump from science to metaphysics when they include the postulates of theory in the formulation of the scientific creed which they expect to be accepted as the basis of a true religion. This clarifying process is very helpful to the thoughtful person who has not been able to arrive unaided at these logical distinctions, and certainly many readers will be gratified at the service which Dr. Wood has rendered in enabling them to agree with him that science and religion are things separate and apart, each with its own sanctions and each with its own proper field in the service of humanity. The book is not easy reading, as the author has deemed it necessary in the expression of his varied discussions to resort to a considerable degree of repetition which the reader may find tiresome until he has proceeded far enough to appreciate its necessity.