

The Coast Artillery Journal

Vol. 59 No. 5 NOVEMBER, 1923 Whole No. 207

The Coast Artillery and the Engineers

By Major General F. W. Coe

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Military Engineer



THE late war, with its tremendous expansion of artillery materiel and its unceasing demands for officer personnel, materially changed the pre-war conception of the Coast Artillery, as being the "fixed" or "harbor defense" artillery alone. As progress is always spurred by necessity, so under the stress of a national emergency, the Coast Artillery was altered and moulded to play its part in the World War. Thus was its mission defined:

"The Coast Artillery Corps is charged with the service of the fixed and movable elements of the land and coast fortifications, all railroad artillery, antiaircraft guns and trench mortar artillery. Its primary weapon is the cannon, the antiaircraft gun and the submarine mine; the other weapons are auxiliary."

ACTIVITY DURING THE WORLD WAR

The first egress from the paths of its pre-war mission as guardians of the coast defenses came in the fall of 1917, soon after America's entry into the war. The Allies desired a nucleus of American heavy artillery troops on French soil and, following this plan, a brigade of Coast Artillery to man French railway artillery materiel was dispatched overseas in August. This original brigade was the beginning of the United States "Railway Artillery Reserve." It also formed the nucleus for the development of the heavy motorized artillery in France.

Late in 1917 and in the spring of 1918, other calls were made upon the Corps for artillery troops and it was given the assignment of heavy motorized artillery, the antiaircraft gun and the

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE NOV 1923		2. REPORT TYPE		3. DATES COVERED 00-00-1923 to 00-00-1923	
4. TITLE AND SUBTITLE The Coast Artillery Journal. Volume 59, Number 5, November 1923				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Coast Artillery Training Center,Coast Artillery Journal,Fort Monroe,VA,23651				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 86	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

trench mortar. In other words, the Coast Artillery was expanded to meet the artillery needs of the army, while the Field Artillery was being expanded to meet the artillery needs of the division; both branches contributed to the artillery requirements of the corps.

At the outbreak of the war the United States was not equipped with any railway artillery materiel or heavy tractor drawn artillery. Development work was started promptly, the Allies furnishing us with the plans and specifications for their heavy guns and carriages. However, the construction of large cannon, with their massive special design carriages, is a slow process and the war was over before quantity production was attained.

We now have on hand, as a result of the war, a good supply of railway artillery.

MATERIEL

A brief study of the materiel required to fulfill the mission of the Coast Artillery shows a great variety of equipment:

Major caliber guns (12-inch, 14-inch, 16-inch) emplaced for harbor defense.

Intermediate caliber guns (6-inch, 8-inch, 10-inch) emplaced for harbor defense.

Minor caliber guns 3-inch, emplaced for harbor defense.

Mortars, 12-inch, emplaced for harbor defense.

Howitzers, 16-inch, emplaced for harbor defense.

Antiaircraft guns (5-inch, 3-inch, 4.7-inch and 37-mm) mobile or emplaced.

Railroad artillery (8-inch, 12-inch, 14-inch guns and 12-inch mortars).

Mobile tractor artillery (155-mm G. P. F. guns).

Trench mortars, 6-inch.

The greatest post-war development of heavy cannon is the 16-inch, 50-caliber gun which, as mounted on land, will outrange any gun now mounted on battleships. This gun is of wire wound construction, is approximately 70 feet in length overall, and weighs, with its recoil band, about 200 tons. It is equipped with a drop breech block operated by compressed air. With its charge of 850 pounds of smokeless powder, the 2,340-pound armor piercing projectile will penetrate 14 inches of armor at a range of over 28 miles. The carriage is of simple barbette design permitting accurate and rapid maneuvering.

The post-war railway artillery materiel consists of the 8-inch, 12-inch and 14-inch guns and the 12-inch mortars. By its great mobility and rapidity of emplacement, the railway artillery permits the defense of any portion of the coast line reached by a standard

gauge railway. Thus it is seen that this type of artillery constitutes a mobile coast defense, of great value as a reserve, and capable of concentration at important points to meet a threatened attack.

It might be of interest to note that in installing railway artillery for firing, the larger type of guns are removed from the rails and belted down to simple concrete platforms which can be prepared in advance at small expense. In the absence of concrete platforms, they may be fired directly from the ground. At Fort Story, the 14-inch railway gun has been removed from the tracks, installed for firing and remounted on the rails in the space of seven hours.

For this type of artillery, there is no need of massive concrete magazines. Simple structures, sufficient to protect the powder from the weather, are all that is necessary.

As to the potential possibilities of these long range cannon against naval targets, a concrete example will give enlightening information. During the recent "Joint Training Coast Artillery and Air Service" maneuvers, a 14-inch gun railroad mount was temporarily emplaced at Fort Story, Virginia. Without the use of terrestrial observers or the conventional fire control systems, the target was located by an aeroplane observer, its position described to the battery commander by use of radio, and fire conducted entirely on information received in this manner. Of course, the results lacked the accuracy to which the Coast Artillery is accustomed when using the highly refined methods possible with long horizontal bases for determining exact ranges. But the results show that ranging with aircraft far beyond the limits of vision from the gun, is a possibility on sea as well as on land, and that even in its present undeveloped stage shots may be directed beyond the horizon with an accuracy that would cause a battleship commander to pause and consider—for a single deck hit by a 16-inch shot might easily destroy the 30-million-dollar ship he commands. Future developments may so greatly increase the range of both land and naval guns as to require all ranging by aircraft.

The heavy tractor drawn materiel, especially the 155-mm G. P. F. gun, is an excellent substitute for the fixed intermediate caliber gun. In the future it is not intended to mount any intermediate caliber guns in fixed emplacements. The G. P. F., possessed of great mobility and a range of 25,000 yards, is indeed an active factor in either harbor defense or the protection of the long coast line between fortified points. Against naval targets the G. P. F. has by experience proved to give excellent results.

ANTI-AIRCRAFT MATERIEL

Antiaircraft artillery is still in the experimental and development stage. Our present materiel, consisting of .30 and .50-caliber machine guns and 75-mm and 3-inch guns, is but a transitory step to the 37-mm machine gun and 4.7-inch rifle. Endeavoring to secure a gun of high muzzle velocity, light weight, great mobility, all around field of fire, high rate of fire, and using a shell with a maximum danger space, the Ordnance has indeed a difficult problem to solve. However, with a .50-caliber M. G. already finished and a 4.7-inch gun being built, we feel that great strides are being made toward the ultimate goal.

The current belief, that antiaircraft guns are more of a negative than a positive factor in that their mission is to hamper the enemy rather than destroy him, is not borne out by experience. In the recent "Joint Training Coast Artillery and Air Service," a naval airplane towed a sleeve target which was fired upon by antiaircraft guns at Fort Monroe. The results of this practice were illuminating in two respects; first, the practicability of firing at a target towed by an aeroplane; second, the accuracy of antiaircraft fire, five hits being registered in 22 shots.

With the advent of long range artillery, the necessity for some system of fire control, independent of terrestrial visual observation, is apparent. For the solution of this problem the Coast Artillery is working along two lines. The first, cooperation with the Air Service, has already been briefly mentioned. The second, a method of subaqueous sound ranging, is briefly referred to here.

The subaqueous sound ranging system being developed has two definite objects in view. Primarily, it is to develop a system of detection and location of enemy ships by means of their under water sounds with sufficient accuracy to serve as a means of directing artillery fire; second, it is to develop a spotting system for our own artillery fire, based on under water detection of the sound caused by the impact of the projectile on the water.

In the first problem, the solution has been maneuvered down to a system of binaural listening by means of sensitive microphones planted well off shore on fixed bases of known length. Unless the source of sound is directly on the normal of the microphone base, the sounds reach the two microphones at slightly different times. By either acoustic or electric compensators, the received currents of sound can be brought into the time phase and the amount of compensation required is a function of the difference in the distances of the sound source from the base ends. Two such bases give an intersection as the location of the target.

The spotting system has been developed to a point where it has been used for the adjustment of mortar fire without other aids, and with results comparing favorably with existing methods. For this purpose microphones on long bases, several thousand yards, are used, and the time interval recorded with a mechanism similar to that used for aerial sound ranging. Having the time interval from two or more pairs of stations, the impact is plotted as in aerial sound ranging, such as developed during the war.

Although development work for neither of these two purposes is complete, both are sufficiently advanced to be used in emergency as valuable aids to the coast fortifications in coping with hostile naval operations under the cover of darkness or fog.

FUTURE USE OF THE COAST ARTILLERY

No one can predict the exact use which will be made of the Coast Artillery in the next war, but the following assumptions may be made:

First—That, in a war with a nation possessing an inferior navy—in which the fighting would be done on foreign soil—the rôle of the Coast Artillery will probably be similar to the task assigned it in the World War.

Second—That in a war with a nation possessing a strong navy, the wide field of its activity and the suddenness with which hostile attacks on naval frontiers develop, the demands on the Coast Artillery will call for the highest degree of strategic and tactical mobility compatible with its ballistic power and flexibility of fire against naval targets. Even in harbor defense proper, the lessons of the war show that mobility, dispersion and concealment of the armament are valuable assets of this defense.

The requirement of mobility added to the demands of efficiency and economy, forbid the installation of fixed armament for any purpose other than securing extreme range and power which can only be attained by materiel, the tonnage of which requires fixed emplacements. This materiel is limited to a comparatively small number of batteries. The missions of *harbor defense* in this case are:

(a) To deny to the enemy seizure or occupation of the harbor, its approaches and adjacent roadsteads.

(b) To prevent bombardment of the port.

(c) To prevent the enemy from blocking channels or inflicting damage upon harbor utilities or shipping.

(d) To insure our fleet the cover of long range fire while in disadvantageous formations entering or leaving the harbor.

(e) To insure our fleet a refuge in which it may safely refit or refuel.

The missions of open coast defenses are:

(a) To deny the enemy the occupation of roadsteads and littoral waters from which landing operations can be undertaken.

(b) To destroy or drive out troop bearing craft in their efforts to approach.

(c) To prevent landing parties from gaining a foothold on the beach.

(d) To restrict further movement of the landed enemy by confining him to unsuitable areas, or by preventing the landing of materiel, supplies, means of transportation or reinforcements.

(e) To drive the landed enemy from the foothold he has gained by counter-offensive operations.

COOPERATION WITH THE ENGINEERS

Close harmony of spirit and coordination of forces have always existed in the past and must always continue to exist in the future between the Corps of Engineers and the Coast Artillery Corps. In the past, the Coast Artillery Corps has been dependent upon the Corps of Engineers for the design and construction of emplacements, fire control stations, and various buildings utilized in connection with the fortifications, for the necessary repairs thereto and modifications thereof to meet changing conditions. Similarly, in the future, the Corps of Engineers must be looked to in a still wider field for the design, construction, repair and modification of emplacements, fire control stations, etc., for our 16-inch rifles, for roads and bridges for our heavy tractor materiel, for the collection of data concerning railroads required by those responsible for the movement of our railroad artillery materiel, and for the construction, in many instances, of railroad spurs and gun blocks for use in emplacing, in desired positions, our railroad guns of large caliber.

The modern conception of Coast Artillery—not only its functions in connection with harbor defense in the permanent fortifications, or even with coast defense, with its mobile materiel, but, as necessity and experiences acquired by the Railway Artillery Reserve in the World War have dictated, as the sponsor of the Army (heavy) Artillery—very considerably broadens the field of mutual interest between the Corps of Engineers and the Coast Artillery Corps. These conditions bind the two arms in a correlated and inseparable service, in which all of us—both Engineers and Coast Artillerymen—must pull together in closest harmony, to the end that there may result that team-work which is a positive forerunner of success in any undertaking. This can be accomplished in no better way than by each service acquiring an understanding of the powers and limitations of the other.

The Conduct and Handling of Von Kluck's Army from August 10th to September 15th, 1914

By Major Arthur W. Lane, Infantry. (D. O. L.)



IN this critical analysis of the operations of the I German Army from the opening of the 1914 campaign to include the Battle of the Marne, an attempt will be made to bring out the important principles involved in the operations and to show how these principles were adhered to or violated in the conduct and handling of Von Kluck's army. The events narrated will be limited to those deemed to be essential to an intelligible presentation of conclusions as to the soundness of Von Kluck's most important decisions and actions. The general plan of the German Supreme Command and the execution of this plan other than on the front of the I Army will be considered only in so far as they have a bearing on the operations of the I Army.

THE GERMAN PLAN OF OPERATIONS

The basic idea in the German plan for the campaign on the Western Front in August, 1914, was a rapid strategic envelopment of the Allied left; the main forces of the German army (I, II, III, IV, and V Armies in the order named from right to left) were to advance through Belgium and Luxemburg into France, their advance being a wheel pivoting on the fortified area of Thionville—Metz; the VI and VII Armies and certain fortress troops were to protect the left flank of the forces making the wheel and contain the French right by operations between Metz and the Upper Rhine.

Of the 68 active and reserve divisions (exclusive of Ersatz divisions) allocated to the Western Front, 52 were assigned to the armies making the wheel; 7 of the 10 cavalry divisions also operated with these armies. Of the 52 divisions mentioned, 24 were assigned to the I and II Armies which were to cross the Meuse between Namur and the Dutch frontier and advance rapidly on the west side of the Meuse, their advance regulating the wheel of the III, IV, and V Armies. It will thus be seen that the density of the German forces was greatest on their right.

An essential operation preliminary to the advance above indicated was the capture of the fortress of Liege since this fortress controlled one of the two main railroad systems by which the German armies were to be supplied and also the main roads required for the initial advance of the I and II Armies through the narrow corridor separating

the northern Ardennes from the Dutch frontier. This operation was to be undertaken immediately upon the outbreak of war by a force commanded by Von Emmich and drawn primarily from the II Army but reinforced by two infantry brigades from the I Army. The IX Corps of the I Army was also temporarily allotted to the II Army. As soon as this Corps moved forward the I Army was to advance through Aix-la-Chappelle; when Liege had been taken and the I and II Armies were in position on the roads of advance, level with Liege, the general advance of the main forces was to be ordered by the Supreme Command.

FROM AIX-LA-CHAPELLE TO BRUSSELS

(Aug. 13th to 20th incl.)

The I Army (Von Kluck) consisted of the II, III, IV and IX Corps, the III and IV Reserve Corps, three Landwehr brigades, and the necessary Army troops, making a total of 142 infantry battalions, 32 cavalry squadrons, 110 batteries of artillery, and 21 pioneer companies. Such of these troops as were with the II Army and Von Emmich rejoined the I Army on August 16th (after the fall of the last of the Liege forts), but the III Reserve Corps was detached for operations against Antwerp after August 20th; the IX Reserve Corps also belonged to the I Army but never joined, being used first on the N. W. coast of Germany and later at Antwerp. It will thus be seen that Von Kluck commanded 5 corps (10 divisions) during the greater part of the period under consideration.

The road system and the shape of the Dutch frontier made Von Kluck's first problem one of logistics, namely: how to move over 200,000 troops with all their baggage through the defile formed by Aix-la-Chapelle (which was only about 2,000 yards in breadth), how to cross the Meuse north of Liege on a front of only six or seven miles with one of the principal bridges destroyed, and finally, after clearing this defile, how to take a formation suitable for advance against the Belgian Army. The necessity for a rapid advance as soon as the capture of the Liege forts had cleared the way and the difficulties of moving a large force on a narrow front caused Von Kluck to plan to start his advance through Aix-la-Chappelle before the concentration of his army was completed. Under the concentration schedule the detrainment of the fighting troops of the first corps to arrive was to be completed by August 11th; similarly the last corps was to detrain on the 14th. The original plan was to move through Aix-la-Chappelle on the 10th but the resistance offered by the Belgians at Liege made it impracticable to start this movement before the 13th. On this date, after careful preparation and under strict traffic control, the three leading corps moved forward, each having a single road; the other corps followed as rapidly as possible. On the

14th (i.e., before the last of the Liege forts had fallen) the II, IV, and III Corps reached the Meuse and the two reserve corps, marching as a second line, began to pass the Belgian frontier west of Aix-la-Chappelle. On the 15th the leading corps were about 12 miles west of the Meuse and hence clear of the troublesome defile; on the 16th a halt was made to allow the troops in rear to close up and for the troops which had been engaged in the Liege operations to join. (See Map No. 1 for lines reached on the 15th and subsequent dates until September 5th.)

On the 17th the I Army advanced while the II Army (Von Bülow) halted, this advance being preparatory to the general advance of all the armies and designed to place the I and II Armies in proper relative position for action against the French in the Namur section of the Meuse and against the Belgian Army in position west of the Gette River from the vicinity of Tirlemont to Diest. The German cavalry (Von Marwitz) operating under the Supreme Command had been in contact with the Belgians since the 12th; it had fought unsuccessful engagements at Haelen on the 12th, and at Tirlemont and Enghezee on the 13th.

On the afternoon of the 17th, Von Kluck received the following order from the Supreme Command:

"The I and II Armies and the II Cavalry Corps (Marwitz) will be under the orders of the commander of the Second Army during the advance north of the Meuse. This advance will begin on the 18th August. It is most important that the enemy's forces reported to be in position between Diest—Tirlemont—Wavre should be shouldered away from Antwerp. It is intended to initiate further operations of both armies from the line Brussels—Namur, and measures must be taken to secure their flank against Antwerp." (The March on Paris, 1914—Von Kluck, p. 21.)

Von Kluck resented his unexpected subordination to Von Bülow but apparently made no protest at this time. His orders issued at 11:15 PM on the 17th stated in part: "The army will attack to-morrow and envelop the enemy's left wing, driving him away from Antwerp." The right (II) corps was directed to make the envelopment; the 2d Cav. Div. (which had been placed at Von Kluck's disposal) was ordered to move so as to cut off the Belgian retreat; a line of departure to be crossed by the first line corps at 8:00 AM was designated, its position and direction being such as to require a movement of several miles by the II Corps prior to that hour; the left (IX) corps was ordered to hold out a strong reserve on its left flank to act against a possible enemy advance from the southwest.

On the 18th the Belgian Army found itself with vastly superior forces on its front and threatening both its flanks; it was isolated to such an extent that combined operations with the French and British troops were not thought possible. Accordingly, after some resistance particularly near Tirlemont and Diest, orders were issued for a retirement in a northwesterly direction to be made at dusk so as to be in

position at daybreak on the 19th on the left bank of the Dyle River near Louvain. However, at daybreak on the 19th the II German Corps came into collision with a brigade of a Belgian division retiring on Aerschot, and according to the Belgian General Staff account it was soon clear that the German enveloping movement had progressed so rapidly that the Belgian Army would not be able to occupy the position on the Dyle. In consequence, a hurried retirement to the forts of Antwerp took place and on the 20th the Belgian Army gained the shelter of this fortress without having been seriously compromised in its retreat. One reason for this is indicated by Von Kluck's statement to the effect that after the 2d Cav. Div. had engaged two infantry regiments it went into billets as soon as the troops of the II Corps arrived, leaving only the infantry advance guards to pursue.

Brussels was occupied on the 20th and the III Reserve Corps sent to cover the flank of the Army towards Antwerp. At the same time Von Kluck ordered the 2d Cav. Div. to advance between Brussels and Antwerp reconnoitering for the British believed to be arriving from this direction, this duty being specified as of "urgent importance." One infantry brigade of the IV Reserve Corps was left at Brussels.

COMMENT

During this phase of the operations Von Kluck had no opportunity to make any decisions of special importance; his actions and orders were all based on decisions made by his superiors. In the execution of the orders he received, Von Kluck acted in accordance with recognized principles. In his prompt and efficient measures for passing through Aix-la-Chapelle and for crossing the Meuse at the earliest practicable moment, Von Kluck displayed energy and an aggressive character which were to produce less happy results at a later date. His order for the attack on the 18th was in accordance with the principles of movement, simplicity, and security, i.e., a simple envelopment of one flank in accordance with his mission, with ample provision for the security of the other flank. That this order did not result in preventing the withdrawal of the Belgian Army into Antwerp was not the fault of Von Kluck; the success of the withdrawal was due primarily to the promptness with which it was initiated, and secondarily to the insufficiency of the cavalry force allotted to the I Army coupled with the failure of the 2d Cav. Div. to act aggressively in the execution of Von Kluck's orders to cut off the enemy's retreat. The proper application of the principle of security is also illustrated by Von Kluck's orders to the III Reserve Corps and 2d Cav. Div. regarding protection of the Antwerp flank, and reconnaissance to determine the supposed British advance.

This operation showed what may also be deduced from Von Kluck's

subsequent action against the British, namely: that when an enemy undertakes a voluntary withdrawal it is extremely difficult if not impossible to pin him down and effect his destruction without the employment of strong forces of *greater mobility* than those to be held in position or forced to retire in a particular direction. If the German Supreme Command really believed that it was "most important" to prevent the Belgian Army from retiring into Antwerp, it should have placed the bulk of Von Marwitz' Cavalry Corps at the disposal of Von Kluck. It may be added, however, that in all probability it was better for the Germans to have the Belgian Army in Antwerp than to have them withdraw to the south-west and join the French or British.

FROM BRUSSELS TO THE SOMME

(August 21st to 29th incl.)

On August 20th when the I Army occupied Brussels and the Belgian Army retired to the fortress of Antwerp, the British Army had not been located by the Germans; actually it completed its concentration south of Maubeuge on this date and was preparing to advance towards Soignies north of the Sambre River, operating on the left of the French V Army which was then in the angle formed by the Sambre and the Meuse; the British line of communications was to the south-west, Le Havre being the port of debarkation. Throughout the 20th the French and German cavalry had been in contact north of the Sambre and along the line Charleroi-Nivelles. The II Army had begun its operations against the fortress of Namur with its left wing and with its right was moving to meet the French forces which had been reported to be advancing on Gembloux (10 miles N.W. of Namur); at the same time the III German Army was advancing toward the Meuse to attack these same French troops from the east.

As the Belgian Army had not been dispersed and as the British had not been located, Von Kluck made a short advance on the 21st to the south-west of Brussels with his right corps echeloned back and covering Antwerp; he conceived that this formation and advance was in accordance with what was now the most important mission of the I Army, viz.: to protect the right flank of the other German Armies, particularly against the expected advance of the British *from the west*.

When, on the 21st, Von Kluck learned that the country as far as the line Ghent-Audenarde-Tournai was clear of the enemy, he wished to move his army to the south-west with its left flank passing west of Maubeuge but keeping touch with the right flank of the II Army. He thought that by so moving he could best accomplish his mission of flank protection and be in a position from which he could readily maneuver and attack either to the south, west, or north-west according to the

direction of the enemy's advance. However, Von Bulow thought that "the I Army might get too far away and not be able to support the II Army at the right moment" and accordingly, on the 21st ordered the I Army to conform to the movement of the II Army which was to cross the Sambre on the 23d, the movement of the I Army to be such that, if needed, it would be able to operate west of Maubeuge in support of the II Army after it (I Army) had invested the north and north-east fronts of that fortress. On the same date, the 2d Cav. Div. passed from Von Kluck's control and joined the remainder of Von Marwitz' Cavalry Corps which then reconnoitered *to the west* looking for the British.

On the 22d the I Army made long distance reconnaissances to the south, west, and northwest, and again advanced with its right corps echeloned to the rear. On this date the German divisional cavalry came in contact with the British cavalry near Casteau (N.E. of Mons), and a British air-plane was shot down near Enghien. This appears to be all the exact information that Von Kluck had for he mentions nothing more in his orders for the 23d, despite his claim that on the 22d he knew of the presence of British troops near Mons (where they were in fact.) These orders directed: "The I Army will continue its advance tomorrow to the area north-west of Maubeuge, masking that fortress;" the right of the line to be reached on the 23d was specified as east of Periwulz and the left as between Mons and Maubeuge. This kept the army facing to the south-west whereas the British left wing (II Corps and a separate brigade) faced north along the canal from near Condé to Mons; the British right (I Corps) was echeloned to the rear south-east of Mons. It is clear that Von Kluck's orders for the 23d were for an advance and not for an attack, that he was surprised by the presence of the British near Mons, and that the action of the 23d (so far as Von Kluck was concerned) was a meeting engagement.

The march of the I Army, on the 23d, was therefore shrouded in the fog of war, and quite early in the day delay was caused by a report that Tournai was held by British troops. These were actually two French territorial battalions, but under the impression that they were British, orders were sent to the three leading corps to halt on the Leuze—Mons—Binche road in view of the possibility that it might be necessary to make a wheel to the right so as to envelop Tournai. Later reports showed that the British were in strength on the Mons—Condé canal, and that the troops at Tournai, now known to be French, had retired towards Lille. The advance of the I Army was therefore resumed but the orders for resumption of the march were late in reaching two of the corps. The result of this, together with the fact that the German advance was oblique to the British position, was that the left corps came into action first followed successively by the two corps on its right. There is nothing to indicate that Von Kluck issued any attack

orders for the 23d, had any particular plan of maneuver, or made any effort to coordinate the action of his corps. However, the direction of advance of the different corps together with the position of the British left wing with reference thereto and the strong resistance offered by that wing, had the effect of causing a convergent attack on Mons from the north and north-east. This, together with the German superiority in numbers, forced the British to retire so that by nightfall on the 23d the left wing was about three miles south of the canal; the right wing had not been seriously engaged.

In the belief that the British line of communications lay to the west (instead of to the south-west as they did in fact), Von Kluck's plan for exploiting his success of the 23d was to have his three leading corps apply a "uniform pressure" on the 24th and force the British back into the fortress of Maubeuge, while the other two corps (which were echeloned to the right rear) were to advance in conjunction with Von Marwitz' Cavalry Corps, which was now placed under Von Kluck's orders, with a view to cutting the British line of communications. However, due to the withdrawal of the French V Army which opposed the II German Army at the battle of Charleroi (Aug. 21-23), the British commander decided to retire to a previously reconnoitered line west of Maubeuge and issued orders to this effect in the early hours of the 24th. Nevertheless, no stand was made west of Maubeuge and the British retirement continued until their army was south of the Marne on September 4th.

During the British retirement the battle of Mons continued on the 24th, the battle of Landrecies—Solesmes took place on the 25th, and the battle of Le Cateau—Cambrai on the 26th. All of these actions represent various phases or incidents of the British effort to break away and of Von Kluck's effort to pin the British to some position long enough for him to effect their destruction, generally by some form of envelopment. Von Kluck was unable to accomplish the Cannae or Sedan that he seems to have had in mind and the British were able, after the battle of Le Cateau, to withdraw to the south and cross the Somme near Ham on the 28th, whilst the I German Army bore off to the south-west, apparently not maintaining close contact with the British and not realizing the true direction of their withdrawal. The direction of the German advance at this time also seems to have been influenced by the presence of the 84th French Territorial Division which had retired through Cambrai to the south-west where it was joined by the 61st and 62d Reserve Divisions sent from Paris. French cavalry had also gotten to the west flank of the British and helped to attract the I German Army to the south-west. On the 29th, this army was across the Somme south-west of Péronne with four corps, the other being echeloned to the rear at Albert (i.e., north of the Somme).

On the 27th Von Bülow had ordered Von Kluck to furnish one division for the investment of Maubeuge; Von Kluck thought this unnecessary and referred the order to the Supreme Command and at the same time asked whether his subordination to Von Bülow was to remain in force. As a result Von Kluck became independent of Von Bülow and the latter was required to invest Maubeuge with his own troops.

At midday on the 28th Von Kluck proposed to Von Bülow that a wheel inwards should be made by the I and II Armies, the I Army moving on Compiègne—Noyon and the II Army with its right flank on Quierzy and Chauny. This proposal was based on the idea that the left wing of the main French forces was retreating in a southerly and south-westerly direction in front of the victorious II and III Armies; also (apparently) on the idea that the British had been completely routed and were a negligible factor. However, the inward wheel was not made at this time for during the evening of the 28th, the following order was received from the Supreme Command:

"The I Army with the II Cavalry Corps under its orders, will march west of the Oise towards the lower Seine. It must be prepared to cooperate in the fighting of the II Army. It will also be responsible for the protection of the right flank of the armies, and will take steps to prevent any new enemy concentrations in its zone of operations.

"The II Army, with the I Cavalry Corps under its orders, will advance across the line Laon—La Fère towards Paris. It will also invest and capture Maubeuge and later La Fère, as also Laon in cooperation with the III Army.

"All the armies will mutually cooperate with one another and support each other during the fighting. The strong resistance which is expected to be met on the Aisne and later on the Marne may necessitate a wheel inwards of the Armies from a south-westerly to a southerly direction."

Von Kluck construed this order to mean that the advance to the south-west would be continued for the time being, but that it did not exclude the possibility of a wheel inwards to the south, such as he had proposed to Von Bülow, should the general situation make it appear necessary. He complains, however, that he was not given sufficient information of the general situation of the German armies, as for example the transfer of two corps to the Eastern front.

COMMENT

The reconnaissances and dispositions made by Von Kluck prior to the Battle of Mons were in accordance with his mission and the principle of security.

The presence of the British in force at Mons undoubtedly came as a surprise to Von Kluck, but even in this matter Von Kluck himself does not appear to be at fault for it appears from his book (page 40) that on the evening of the 21st he ordered that on the 22d the IX Corps should make a long distance reconnaissance to the line Ath—Mons—Givry, six miles north of the Maubeuge forts, and that the flying section of that corps should observe the area Valenciennes—Maubeuge—

Solismes. These reconnaissances should have given more information than they did, assuming that they were actually made as ordered which seems doubtful, for the British were then within the limits of the areas designated to be observed or reconnoitered.

It seems probable that this surprise at Mons might have been avoided if the Supreme Command and Von Bülow had had a different conception of the principle of cooperation as applied to the relation of an army charged with flank protection to the available cavalry mass. Actually Von Kluck had control of nothing but the divisional cavalry squadrons, while Von Marwitz' Cavalry Corps operated under orders of the acting group commander (Von Bülow) and was required to furnish information to Von Kluck. This was a faulty disposition and Von Marwitz should have been subject to the orders of Von Kluck from the 21st to the 23d as he was thereafter. His mission at this time was a proper one, namely, to locate the British who were the principal enemy to be expected on the right flank. The fact that the Germans made an incorrect estimate as to the direction of the British advance is no ground for the criticism that sending Von Marwitz to the west was an unwarranted detachment violating the principle of economy of forces. However, there is ground for the criticism that too much cavalry was sent to the west in view of the possibility that the British might advance from the south-west; if Von Marwitz had been under Von Kluck's orders it is not unlikely that Von Kluck would have made a more effective reconnaissance to the south-west and in consequence made a more effective attack at Mons.

Von Kluck certainly had the spirit of the offensive and the idea of maneuver but in his pursuit of the British he was handicapped by the fact that initially Von Marwitz's cavalry was not favorably disposed for combat, and by the fact that his troops had marched anywhere from 140 to 200 miles in the 11 days preceding the Battle of Mons. The engagements beginning with Mons and ending with Le Cateau also reveal a weakness in the tactics of Von Kluck, namely, a tendency to conceive of a maneuver involving envelopment but failing to effect this envelopment by not taking proper measures to restrain the ardor of the troops engaged in what should be nothing more than a holding attack; the enemy retires before the envelopment can be completed. A similar tactical error was made by the II Army which pushed across the Sambre and fought the battle of Chaz'eroi without waiting for the I and III Armies to reach a position where they could make an effective envelopment; as a result the V French Army and the British withdrew and the vastly superior forces of the Germans lost the golden opportunity to destroy, or at least to inflict a decisive defeat on, their isolated opponents.

Von Kluck's idea of keeping well to the west when moving from

Brussels to the south-west seems to be more in accordance with the principle of movement than Von Bülow's order for the I Army to remain close in to the II Army. Whether the British came from the west as expected or from the south-west as they actually did, Von Kluck, by keeping well out could better have accomplished his mission of flank protection and could have more closely adhered to what was the basic idea of the Supreme Command, i.e., strategic envelopment. In his concern for his own (II) army Von Bülow seems to have forgotten the objective of the entire maneuver of all the German armies. Von Bülow's orders at this time and subsequently, show the futility of expecting an army commander acting as an army group commander in addition to his other duties, to have the same point of view as a separate group commander having no army command; the necessity for a group commander other than an army commander is also shown by Von Kluck's attitude towards Von Bülow.

In connection with the pursuit of the British which was such a disappointment to the Germans because the British escaped, it should be noted that rapid action by Von Kluck was also difficult because of deficiencies in the supply system; Maubeuge blocked the railways that might have supplied Von Kluck's troops; many of the bridges across the Mons canal had been destroyed and had to be rebuilt before traffic could be resumed. The railroad bridges at Mons were not repaired and available for use until August 29th, beyond Cambrai until the 31st, and beyond St. Quentin until September 10th.

FROM THE SOMME TO THE GRAND MORIN

(Aug. 30th to Sept. 5th incl.)

On the 29th and 30th Von Kluck's forces were engaged with Manoury's forces in the vicinity of Amiens. After some severe but desultory fighting, Manoury's troops retired towards Paris; the rapidity of Von Kluck's advance had prevented an orderly concentration and offensive by these troops on the Somme as planned by Joffre.

Meanwhile, on the 29th and 30th, the II German Army had been engaged with the V French Army in the battle of Guise at the conclusion of which the latter retired in accordance with orders from Joffre. Von Bülow thought or pretended that he had decisively defeated the enemy and at 6:30 PM on the 30th Von Kluck received a message from him asking for cooperation: "To gain the full advantages of the victory, a wheel inwards of the I Army pivoted on Chauny towards the line La Fère—Laon is urgently desired." Von Bülow had previously informed Von Kluck that strong forces were retiring on La Fère and that the British who were barring the Oise southwest of La Fère, were also retreating in a southerly and southeasterly direction. Von Kluck did

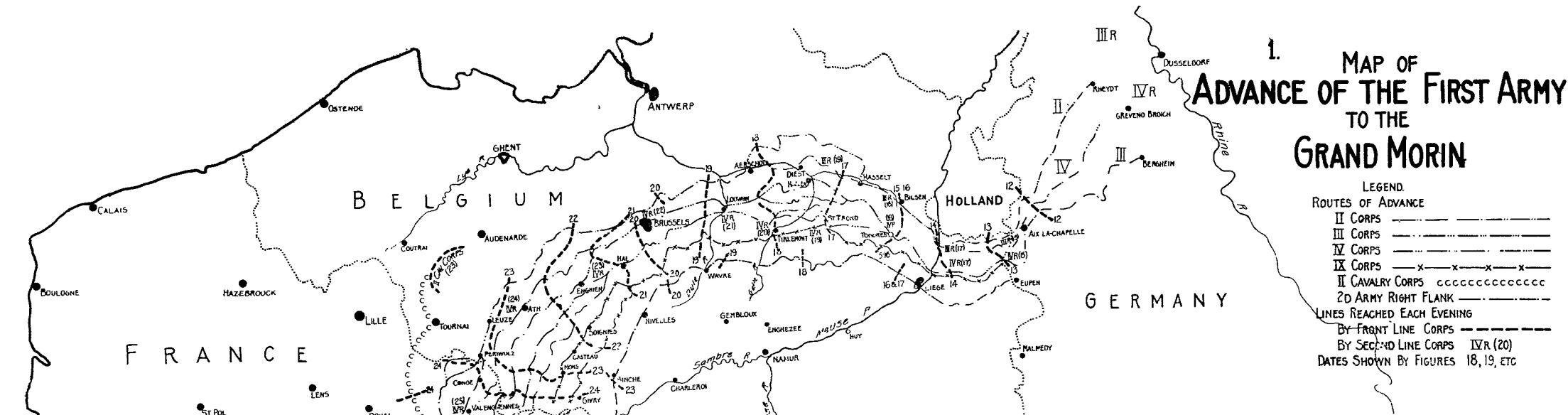
Cavalry Corps (less 1 division) were south of the Grand Morin between Esternay and Coulommiers, and constituted the maneuvering wing; the II Corps west of Coulommiers, and the IV Reserve Corps and 1 cavalry division north of Meaux, were assigned the duty of protecting the right flank of the army.

On the morning of the 5th (after the troops had started for the positions just indicated) Von Kluck received a wireless message from the supreme Command which had been dispatched the previous evening. This message stated: "The I and II Armies are to remain facing the eastern front of Paris; the I Army between the Oise and the Marne occupying the Marne crossings west of Chateau-Thierry; the II Army between the Marne and the Seine, occupying the Seine crossings between Nogent and Mery inclusive. The III Army will march towards Troyes and east of it." This signified a further change in the direction of the main effort of the German armies.

As the I Army was already across the Marne this order meant a two or three days' retreat which did not appeal to Von Kluck and for which he could see no justification judging by the conditions on his own front. He thought that the enemy should be forced across the Seine before the new order was executed and that before the enemy forces reported to be concentrating at Paris could be sufficiently strong and ready for battle there would be time to finish the offensive against the Seine. These views he submitted to the Supreme Command and to Von Bülow, making no effort to discontinue the advance already started on the 5th but making preparations for compliance *on the following day* with the orders of the supreme command.

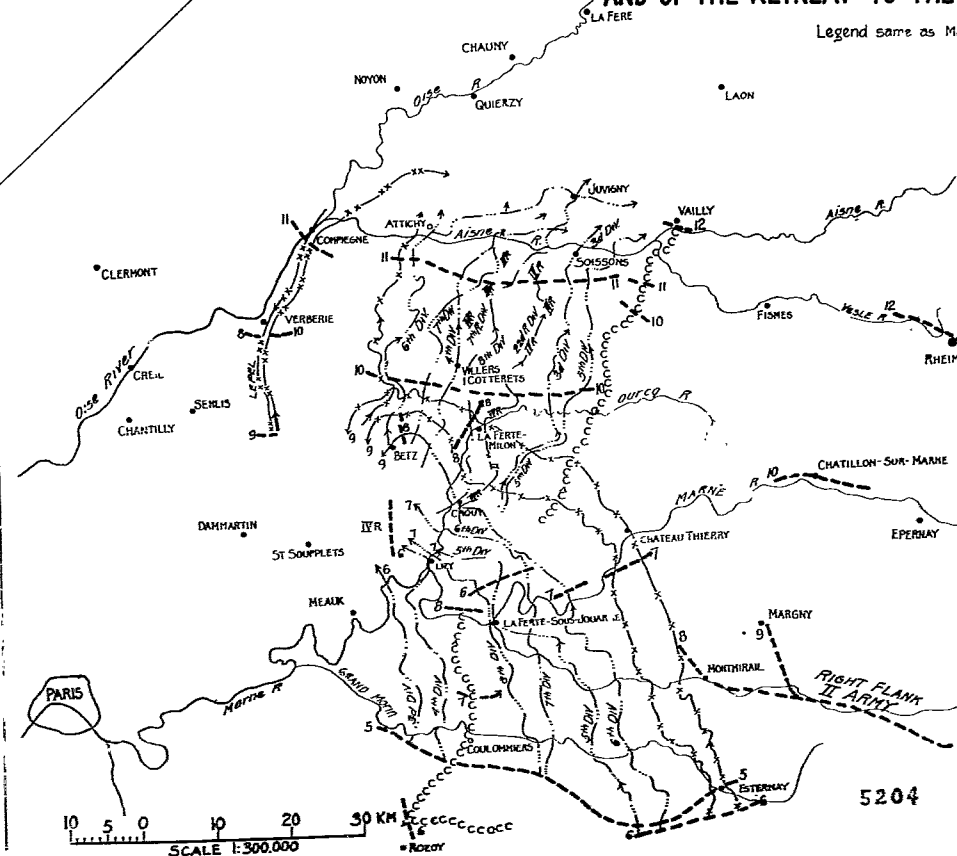
On the evening of the 5th written instructions from the Supreme Command were brought to Von Kluck by a staff officer; these instructions amplified and explained the order he had received in the morning. As a result Von Kluck became aware that conditions on his front were not typical, that conditions elsewhere were such as to give the enemy some freedom of maneuver and make it quite possible that the enemy was bringing troops from his eastern wing to protect Paris and threaten the German right, and that retirement was inevitable. The French actually did move their eastern forces as threatened.

Von Kluck's realization of his danger was intensified by what he learned later that night as to the action of the IV Reserve Corps during the 5th. On this date that corps and the 4th Cav. Div. which were protecting the flank of the I Army west of the Ourcq attacked French troops which had advanced from the direction of Paris to the vicinity of St. Soupplets for the purpose of clearing up the situation on that flank; finding the French forces strong the IV Reserve Corps Commander withdrew his command, after dark, to a position behind the Therouanne stream near Lizy, and made an urgent demand on Von Kluck for re-



2. MAP OF THE MARCH OF THE FIRST ARMY TO THE OURCE AND OF THE RETREAT TO THE AISNE.

Legend same as Map 1.



10 5 0 10 20 30 40 50 KM.
 SCALE 1:500,000

10 5 0 10 20 30 KM
 SCALE 1:300,000

inforcements. This engagement was the beginning of the Battle of the Marne.

COMMENT

Von Kluck's wheel to the south-east and advance toward the Oise in response to Von Bülow's request were justified, on the 30th and 31st, by his orders and by the principles of security and cooperation; this is not true with reference to the advance on September 1st and 2d for reasons discussed below. The orders received by Von Kluck on the 28th directed him to march west of the Oise (i.e., to the south-west), to cover the right flank of the armies, and *to prevent new enemy concentrations*, but it also directed him to cooperate in the fighting of the II Army. On the evening of the 30th the enemy was retreating on all parts of Von Kluck's front but he had no prospects of turning their defeat into a rout. Under these circumstances there was nothing in his primary mission of flank protection to prevent him from seeking for more decisive action through cooperation with the II Army if a favorable opportunity was presented. According to Von Bülow's messages to Von Kluck the favorable opportunity did exist; the II Army had "decisively defeated" the V French Army which was retreating, the British were retiring and were not within supporting distance of the French, while Von Kluck was on the left flank of the French and situated so that he could move through the gap between the French and British and strike the V Army on the flank or rear. A better opportunity for cooperation between the I and II Armies was not likely to occur. As a matter of fact Von Bülow had *not* decisively defeated the V French Army which withdrew under orders from Joffre, but this does not alter the fact that a favorable opportunity for cooperation was presented; if the V Army continued to remain north of the Serre Von Kluck's chances of striking it on the flank and rear would be so much the better.

But real and effective cooperation with the II Army called for a decided change of direction at least for that part of the I Army intended to strike the V French Army. The movement suggested by Von Bülow, namely, a wheel towards the line Laon—La Fère pivoting on Chauny was open to the objection that in all probability it could not be executed in time to strike the enemy if he was really retiring. On the other hand, an advance by the I Army on Compiègne and Noyon promised more success if followed by a rapid movement of the left wing eastwards towards the Chemin des Dames. On the 31st Von Kluck's movements seem to be directed to this end, but on September 1st he turns to the south instead of to the east with his left wing thereby abandoning his mission of striking the V French Army. This was certainly an error if the situation of this army on the 30th and 31st was as given in the *Encyclopaedia Britannica* (Vol. 31, p. 330) which states that on the 30th this army gained the high ground north of the lower Serre and

Souche and that "by the 31st the V French Army was disposed in a great semi-circle around Laon." If this is true Von Kluck should have moved his left wing towards the Chemin des Dames on September 1st. That he did not do so can probably be explained by the fact that he thought the western flank of the V Army had retired on the 31st from La Fère through Soissons, which, if true, would have shown that it was now too late for the contemplated flank attack.

But even if action against the V Army was no longer practicable, and though the British really were retiring from the Aisne towards the Senlis—Villers-Cotteret line, Von Kluck's movement to the south on September 1st was not justified; if he could not cooperate with Von Bülow in action against the V French Army as approved by the Supreme Command, then his orders to advance west of the Oise should have governed and he should have directed his movements to this end; this he could easily have done since on the evening of the 31st he had only $1\frac{1}{2}$ corps east of the Oise. In the absence of further orders, Von Kluck should have directed his principal efforts against Manoury's concentrations north and north-east of Paris, and not against the British.

To the possible objection that the resumption of movements to the south-west would have created a gap between the I and II Armies, it may be answered that on the 30th the I Cavalry Corps (attached to the II Army) had reached Noyon and was in position to maintain connection between the two armies. We must therefore conclude that on September 1st Von Kluck permitted himself unnecessarily to be diverted from his real mission; by so doing he violated the principle of the objective and prepared the way for all of his subsequent difficulties.

Von Kluck's action in attempting to comply with the spirit rather than the letter of the orders received on the night of September 2—3 is believed to be justified by the principle of cooperation; his interpretation of the spirit of his orders was not unreasonable in view of the situation of the I and II Armies with which Von Kluck was familiar and in view of his lack of information as to the general situation elsewhere. Having made an error on the 1st, Von Kluck was not where the Supreme Command expected him to be, but, on the other hand, he was in a position where it seemed he could make a real contribution to the success of the new movement of the German right wing to the south-east. Under these conditions Von Kluck's movement to exploit the success of his IX Corps in securing a foothold south of the Marne at Chateau-Thierry, was justified; it seems that in this instance Von Kluck was governed by the principle of the objective and the principle of cooperation in one of their less obvious aspects.

On the other hand, the continuation of the advance on the 5th is not considered to be justified by the same principles. In this case it was by no means obvious that by advancing to the Seine Von Kluck

would make any real contribution to the success of the new plan, and there was the possibility that failure to return promptly to the north bank of the Marne might endanger the success of the entire operation; under these circumstances literal and prompt compliance with orders was essential. Von Kluck should have discontinued the march begun on the 5th as soon as he received his new orders and then retired north of the Marne. By so doing he would have been in a position promptly to reinforce his IV Reserve Corps west of the Ourcq; such prompt reinforcement would probably have prevented Manoury's attack from gaining the headway that it did on the 6th and 7th in which case it would have been unnecessary to move the entire I Army west of the Ourcq thereby making a wide gap between the I and II Armies with the disastrous consequences described below.

BATTLE OF THE OURCQ AND WITHDRAWAL TO THE AISNE RIVER

(September 6th to 15th)

When information from the Supreme Command and the report of the commander of the IV Reserve Corps finally made Von Kluck realize his danger and that of the entire German right wing, he acted with characteristic energy, first rushing troops to assist the IV Reserve Corps in checking Manoury's attack and finally transferring his entire army (less two divisions of cavalry) to the west of the Ourcq and making a strong counter-attack by enveloping Manoury's left. Late in the night of September 5—6 Von Kluck sent an urgent order to the II Corps to retire early on the 6th so as to be in a position to support the IV Reserve Corps if required. This support was required and given on the 6th for on that date the IV Reserve Corps (north of Meaux and still short a brigade left at Brussels) was heavily attacked by the VI French Army (Manoury), which gained some considerable tactical success. See map No. 2.

On the 7th, this army, having been reinforced by a cavalry corps and a reserve division, continued its attack. It made some progress but was slowed up by the arrival of divisions of the II, IV, and part of the III German Corps, which were thrown into the fight as they arrived without regard to corps organization. This is the date of the famous move of a French brigade by taxicabs.

On the 8th there was particularly severe fighting, both the French and Germans attempting to envelop their opponent's north flank. Manoury's advance was definitely checked on this date.

By the 9th, Von Kluck had gotten all his troops (except two divisions of cavalry) west of the Ourcq and was able to make an enveloping attack from the north. This attack was progressing favorably but was discontinued as a result of orders issued in the name of the Supreme

Command by a Staff Officer (Lieut. Colonel Hentsch.) The reason for this order is shown below.

The I Army fell back in good order but in considerable haste and on the 12th was north of the Aisne on the line Attichy—Soissons—Vailly. The British and the French (Manoury's force) pursued and were able to cross the Aisne on the front indicated, but between the 13th and 15th Von Kluck was able to establish himself firmly on the high plateau somewhat north of the Aisne. He was ordered by Von Bülow (under whose orders Von Kluck had been placed again on the 11th) to close the gap still existing between the I and II Armies but was unable to do so; the gap was finally closed by troops released by the fall of Maubeuge on the 7th and by troops of the VII Army sent from Alsace.

Going back to the 6th when Von Kluck began his retirement from the Grand Morin it is to be noted that in building up a force on the Ourcq sufficient to make a successful counter-offensive against Manoury, Von Kluck had been obliged to recall the III and IX Corps which he had placed at the disposal of Von Bülow on the 6th. At 11:15 AM on the 7th he sent to Von Bülow this message: "Assistance of III and IX Corps on Ourcq is urgently required; enemy considerably reinforced. Send corps in the direction La Ferté Milon and Crouy." (The March on Paris, 1914. p. 122—note) The withdrawal of these two corps created a gap between the I and II Armies of some 25 or 30 miles, filled only by a composite brigade and the II Cavalry Corps (less one division.) This force fought a delaying action but was not strong enough to stop the British and part of the V French Army from penetrating between the I and II German armies and crossing the Marne, thus threatening both Von Kluck's rear and Von Bülow's right. This situation so alarmed Von Bülow that he decided to retire; it was this retirement together with conditions on the front of the other armies which caused Lieutenant Colonel Hentsch to use his discretionary powers and direct the retirement of the I Army at a time when it was engaged in an attack which promised success, at least locally.

COMMENT

So far as logistics and tactics are concerned the withdrawal to the west of the Ourcq followed by the counter-offensive against Manoury are greatly to the credit of Von Kluck; on the other hand the movement of any considerable part of the III and IX Corps west of the Ourcq is thought to have been a strategic mistake. This movement does not seem to have been justified by the principles of cooperation, objective and economy of forces; these were unduly subordinated to the principles of the offensive and mass. The time had come when Von Kluck's mission was necessarily defensive and conditions were such that he could not adopt the offensive-defensive west of the Ourcq with-

out the gravest danger to the forces to the east thereof. He should therefore have cooperated with Von Bülow and economized his forces west of the Ourcq so as to have as many troops available as possible for the defense of the Marne from the mouth of the Ourcq to Chateau-Thierry; he ought to have been able to utilize the IX Corps and the greater part of the III Corps for this latter purpose.

It has been argued that if Von Kluck had been permitted to continue his envelopment of Manoury on the 9th and Von Bülow had not started his retirement, the I Army would have been able to defeat the VI French Army and then turn on the British and French troops in the gap between the I and II Armies, and that the I and II Armies could then crush these troops by action from both flanks. This argument is not convincing. It is quite likely that Von Kluck might have been able to force Manoury to retire from the Ourcq in the direction of Paris, but there is little likelihood that he could have administered such a decisive defeat on the VI French Army as to incapacitate this army for further action and thus give Von Kluck freedom to maneuver against the British. Success on the Ourcq could not be so decisive; the ultimate retirement of the German right wing was inevitable after Von Kluck had opened up the gap between the I and II Armies. It seems clear that Von Kluck's chief fault was an over-developed spirit of the offensive which led him to make a serious strategical error in playing his part in the Battle of the Marne. His error serves to show that important as the principle of the offensive really is, it should not be construed to mean that the defensive is never justified; the offensive or the defensive must be adopted as best serves the successful attainment of the ultimate objective of the army as a whole.

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The Cole Spotting Board

By Captain J. M. Cole, C. A. C.

In the design of a spotting board, the main objects to be attained are:

1. Accuracy
2. Speed
3. Simplicity
4. Adaptability.

It is hardly practicable to obtain all these requirements to the same degree. It is evident that in some cases accuracy must be sacrificed to obtain rapidity of operation and vice versa; or, simplicity, which implies the use of minimum personnel and matériel, must be sacrificed to make the board adaptable to all conditions at the battery. It is believed that the spotting board described herein fulfills the above requirements to a reasonable degree.

A. DESCRIPTION OF THE BOARD

As may be seen from Figures 1 and 2, the board consists of a circular wooden table (a) 21 inches in diameter. Mounted on the periphery is a movable brass ring (b) graduated in degrees (or mils) to represent an azimuth circle. The diameter of the board represents the Gun-Target line and normal to it are two slots, $4\frac{1}{2}$ inches long by $\frac{1}{2}$ inch wide at $7\frac{1}{2}$ inches from the center of the table.

Underneath the table and under each slot is a cylindrical brass roller (c), of about $\frac{1}{2}$ inch diameter, with a square end over which is fitted a socket wrench having a handle for turning the rollers. A range-deflection scale (d) on tracing cloth, not wider than the size of the slots, is rolled on these brass rollers, and thus the scale can be moved and range set. The center of this scale is placed coincident with the Gun-Target line.

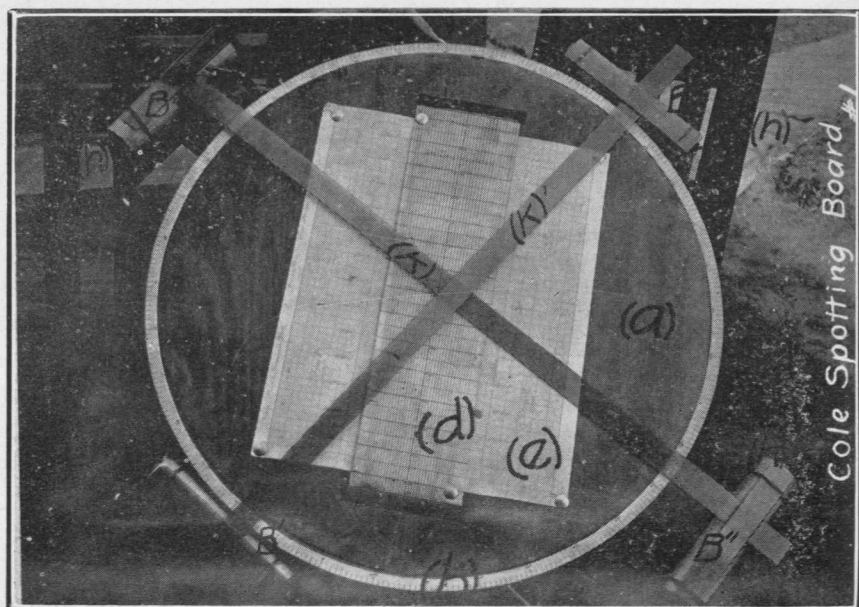
At the center of the board, which represents the target, and under the range deflection scale, is placed a piece of coordinate paper (e), a heavy line is drawn on (e) through the target and normal to the Gun-Target line; the upper half represents range deviations "over" and the lower half "short". The scale used in the figures is 200 yards to the inch, and the graduations on the co-

ordinate paper are marked to correspond to this scale. The wooden table is mounted on a cast iron circular base (f), for convenience in operation.

There are two arms, (g and g'), representing rays from the two observing stations B' and B'' . These can be moved and set at any reading on the azimuth circle. At each end of each arm is a wooden cylinder (h), 6 inches in length by $1\frac{1}{2}$ inches in diameter. On each cylinder is pasted a deflection scale, B' and B'' , graduated to conform to the interior scale of the azimuth instrument, with three in the center. The distance between the graduations depends on the ranges from B' and B'' respectively to the target. One arm is longer than the other to permit clearance for the cylinders on the shorter arm. Two pieces of xylonite (K and K') are used as primary and secondary arms. These are kept from slipping while being set by means of other strips of xylonite which are fastened to the cylinders (h) by rubber bands.

The range-deflection scales (d) are constructed in the following manner: Take any two ranges along the GT line, say 8,000 and 14,000 yards. At 8,000 yards one tenth of one degree is subtended by 14.2 yards. Similarly at 14,000 yards, one tenth of one degree is subtended by 24.9 yards. Using these data a pencil of rays is drawn on the tracing cloth to the required scale.

To construct the B' and B'' scales, measure the displacement of the cylinders from the center of the board. In the figures, this displacement was 13.26 inches and 11.32 inches, representing 2652 and 2264 yards respectively at the scale of the board. For a range of say 10,000 yards to the target or the center of the board, the near roller of one pair of cylinders would be at 10,000 minus 2652 yards and the far roller at 10,000 plus 2652 yards. One tenth of one degree at 7348 yards and 12652 yards is subtended by 13.05 and 22.49 yards respectively. Take any other range and compute the length of a chord subtending one tenth of one degree. The scales are then constructed similarly to the range deflection scale, except that the vertical scale of the B' and B'' charts is greatly distorted. Horizontal lines, 1 per 1,000 yards are placed about .3 inch apart. Using the above data a set of curves is drawn for and pasted upon each cylinder (h). In operation the cylinder is set at the nearest 1,000 yards in range from the observing station to target. The error, for a one degree deflection, due to this setting of the rollers at the range plus or minus 500 yards is about 9 yards.



B. OPERATION OF THE BOARD BY RAILWAY ARTILLERY

Batteries E and F, 52nd Artillery (Railway), at Fort Eustis, are using the board in conjunction with bilateral observation of fire on moving targets.

The range and azimuth of the set-forward point as determined on the Cloke plotting board are used by the spotting board operators to orient the board and set the range deflection scale. The center line of the range deflection scale (d) is made coincident with the GT line of the coordinate paper (e); the rollers (c) are turned and the set-forward range to the nearest 200 yards is set at the center of the board. The azimuth circle (b) is turned until the nearest whole degree of the set-forward azimuth is opposite an arrow indicating the GT line.

The range to the target from each observing station is determined periodically on the plotting board; the cylinders (h) bearing the B' and B'' deflection scales are revolved until the required range to the nearest 1000 yards is at the top of the cylinders and the xylonite arms, K and K', are set so that they intersect at the center of the board and are at the center of the scales B' and B''. When the shot is fired both spotters are notified by the spotting board operators. Both spotters then read the azimuth of the target from their respective stations and telephone these data to the spotting board operators. The arms g and g' are then set at the required angle of intersection at the target by revolving them until the xylonite arms K and K' are at the azimuths just received from the spotters. At the conclusion of the operation the xylonite arms (K and K') must be intersecting at the center of the board and must pass through the normal of the scales B' and B'' on the cylinders (h).

When the splash occurs the spotters report the angular deviation of the splash from the target, to the spotting board operators. The operators then move the xylonite arms (K and K') across the tops of the cylinders (h) to the required setting on the scales B' and B'', being careful not to disturb the setting of the arms (g and g').

The intersection of the xylonite arms (K and K') represents the position of the splash with respect to the target and the longitudinal deviation and deflection of the splash may be read on the range deflection scale (d).

Two operators and a recorder in addition to the two spotters are used by railway artillery organizations in obtaining deviations.

The average speed of operation is about ten seconds. The deviations compared favorably in accuracy with the deviations obtained from camera records and a Whistler-Hearn plotting board.

The Board is portable, weighing but 40 pounds, is of rugged construction, is simple and relatively accurate. It can be used for any base line and is adaptable to either unilateral or bilateral observation methods, that is, if an observing instrument be used at the battery for determining directly the lateral deviations, the assumption can be made that all shots (after the first few corrections) are line shots and only the angular deviation from the flank station need be set on the board, with a consequent increase in speed of operation.

Let the Oozlefinch Scream!

In competition with the units of the Hawaiian Department, the first platoon of Battery B, 41st Artillery Battalion, Coast Artillery Corps, has taken first place in the platoon drill in the precision drill competition held in the Department during the early part of October.

The units were judged in precision of drill, neatness in drill and proficiency in the school of the soldier. A series of elimination contests were held in the various posts and stations of the Department. The best drilled units met on October 4, at Schofield Barracks for the final contest.

The winning platoon, commanded by Second Lieut. Dean Luce, was presented with a silver cup and streamer for the battery colors by Major General C. P. Summerall, commanding the Hawaiian Department on October 20. The troops of the Hawaiian Coast Artillery District paraded after the presentation on the main parade ground at Fort Shafter, Honolulu.

Judges for the drill competition were: Lieut. Colonel Stephen O. Fuqua, General Staff Corps; Lieut. Colonel Harry T. Mathews, Coast Artillery Corps; Major Hamilton Templeton, Field Artillery; Capt. W. E. Chambers, 27th Infantry, and Capt. James Urquhart, 21st Infantry.

Coast Artillery Summer Training Camps

CITIZENS' MILITARY TRAINING CAMP, FORT HANCOCK, N. J.

By Captain Raymond D. Spaun, C. A. C.

THE number of candidates who reported to take the course at the Coast Artillery Citizens' Military Training Camp, held at Fort Hancock, New Jersey, from August 1st to 30th, 1923, was 86, divide as follows:

Advanced Red Course	29
White Course	38
Blue Course	19
	<hr/>
	86

The candidates from New York, New Jersey and Delaware, ranging in ages from 17 to 25 years, arrived at Fort Hancock by Government boat from New York and by rail from the south. They were given a thorough physical examination immediately on arrival. All were found to be in excellent condition and the examining

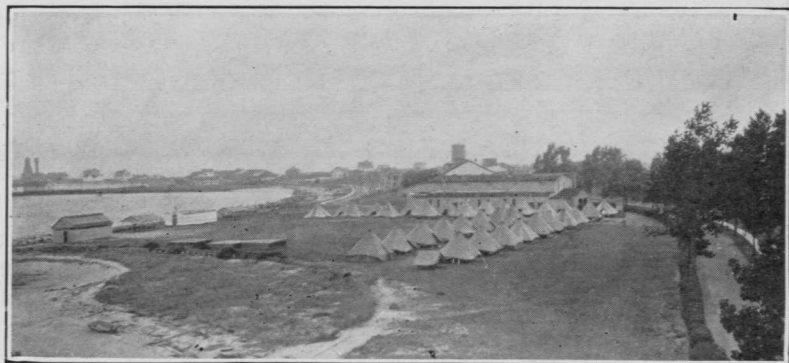


FIG. 1
C.M.T. CAMP, FORT HANCOCK, N.J., 1923

Surgeon remarked that it was very unusual to find any group of men from civilian life who were in so excellent a physical condition. All have had previous military training, the greatest percentage having attended a previous C. M. T. Camp.

All clothing and equipment was issued and the men formed into companies and assigned to tents before 6:00 P. M. the first day.

The camp site itself was ideal and was located on a grassy plot about 200 feet from the water; drainage being excellent. Shower baths, individual wash basins, latrines, etc., all in first class shape, were conveniently located near the water's edge. Sanitary drinking fountains were situated near heads of company streets. All tents were floored and furnished with electric lights and mosquito bars. Adjacent to the camp is the Liberty Theatre, part of which was set aside for a Service Club and Canteen. Here boxing matches, dances and movies were held and on Sundays, church services.

A cantonment mess building, about two hundred yards from the camp, was used. This building is in good repair and well screened. No attempt was made to use individual mess equipment as this did not prove satisfactory last year.



FIG. 2

FRONT ROW (SITTING): CHAP. S. C. RAMSDEN; MAJ. W. R. MCCLEARY; COL. J. F. BRADY; LT. COL. L. S. EDWARDS; MAJ. E. K. SMITH; CAPT. N. BOUDREAU; SECOND ROW (STANDING): CAPT. E. R. HARRINGTON; 1ST LIEUT. W. T. GAENCY. Q.M.C.; 1ST LIEUT. J. A. PIXLEY; CAPT. J. L. LEWIS; CAPT. R. D. SPAUN; 1ST. LT. G. A. PATRICK; CHAP. W. R. ARNOLD.

On August 2nd, the candidates were sworn in. Addresses were made by Brigadier General Hugh A. Drum, U.S.A., District Commander, and by Colonel James F. Brady, C.A.C., Camp Commander. A tour of the post was then made, interesting and historical points pointed out, and all types of armament visited. Intensive training began on the 3rd.

Company "A" was assigned to the 12" disappearing rifles at Battery Richardson, and Company "B" to Battery Peck, a 6" Bat-

tery. The average schedule called for Infantry Drill in the early morning, a short rest followed by a half hour lecture and then two and one-half hours of artillery work at the batteries. The afternoon was spent with lectures, calisthenics, athletics, swimming, etc., followed by parade.

Both batteries were manned throughout by the candidates and at each battery a candidate acted as Battery Commander. As it was decided to fire Battery Richardson on the 15th and Battery Peck on the 17th, thorough instruction and drill was given each man in the duties he was to perform and strict attention to detail was required of each man. All candidates took hold in good spirit and two days before firing excellent drills were being conducted at both batteries.



FIG. 3
TUG OF WAR, Co. "A," vs. Co. "B"

Battery Richardson was fired on the 15th of August, Lester M. Friedman, of New York City, a candidate in the Blue Course, acting as Battery Commander. The firing and adjustments of fire were carried out by him. The practice was conducted at a moving target, indirect fire being used. Visibility was good but owing to the field of fire being continually crossed by small boats, it was only possible to get off eight rounds.

At Battery Peck on the 17th, twenty-five rounds were fired, Ferdinand Gladzik, of Brooklyn, New York, a Blue Course candidate, acted as Battery Commander and conducted the firing. Direct fire at a moving target was conducted.

Following the practices at Batteries Richardson and Peck Company "A" was assigned to the Antiaircraft Battery and Company "B" to 155-mm G.P.F. Tractor Battery. Practices were held by these companies on the 27th of August. The Antiaircraft Battery

firing at bursts and the 155-mm G.P.F. using indirect fire at a moving target.

Excellent results were obtained by the C.M.T.C. personnel at the various firings. The coordination of the various duties, the spirit shown and the work as a whole, were a surprise and gratification to the officer in charge.

Athletics and Recreation were allotted a considerable portion of the schedule. Calisthenics and swimming were given each day, while certain periods were set aside for voluntary athletics, such as baseball, volley ball, tennis, boxing, etc.

Two baseball games were played between the C. M. T. Camp at Fort Hancock and the one at Camp Alfred Vail, which is about 13

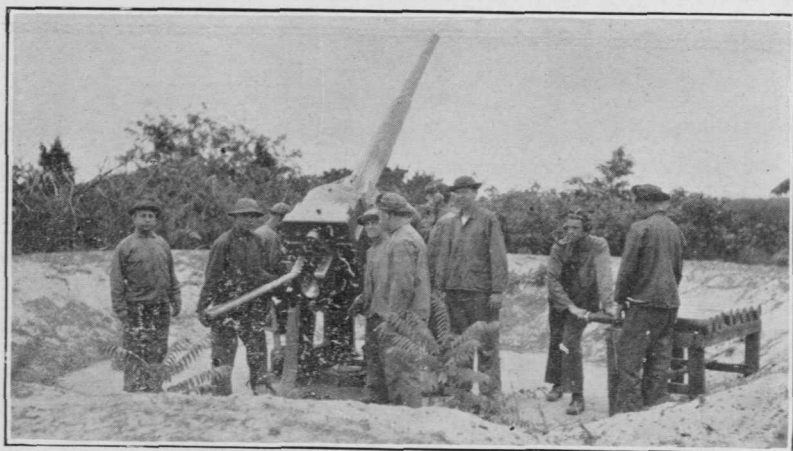


FIG. 4
Co. "A" AT TARGET PRACTICE

miles distant. The games resulted in a victory for each camp and rivalry was increased. Boxing matches were held in the Liberty Theatre on August 11th, five bouts were conducted, making about twenty-five rounds of good and interesting boxing. Movies were given at the theatre three times a week. A trip to the Mardi Gras at Long Branch, N. J. was made on Saturday, August 4th and on Sunday, August 19th the Mine Planter "ORD" carried the candidates from both Fort Hancock and Camp Vail direct to Coney Island. An enjoyable time was reported by all. A number of successful dances were held by the candidates, the ladies coming from nearby towns.

The spiritual needs of the Camp were served by Chaplain Arnold, Catholic, and by Chaplain Ramsden, Protestant, services being conducted at St. Mary's Chapel and at the Liberty Theatre.

Both Chaplains are able and capable men and one remained present at the Camp at all times. Services were also held at the Y. M. C. A. several times a week. The "Y" was very fortunate in securing the services of a number of very prominent speakers.

Certain prizes were offered for excellence in various activities and served to create considerable competition. Sigmund Eisner, of Red Bank, N. J., presented a 15-jewel Elgin gold watch, suitably engraved, to go to the champion athlete of the camp. Three gold fountain pens and pencil sets were given, one each to the candidate having the highest standing in each of the courses, Advanced Red, White and Blue. A competitive squad drill took place and gold cuff links were given to each member of the winning squad. Gold watch fobs were given by A. G. Spaulding and Co. for each candidate mak-

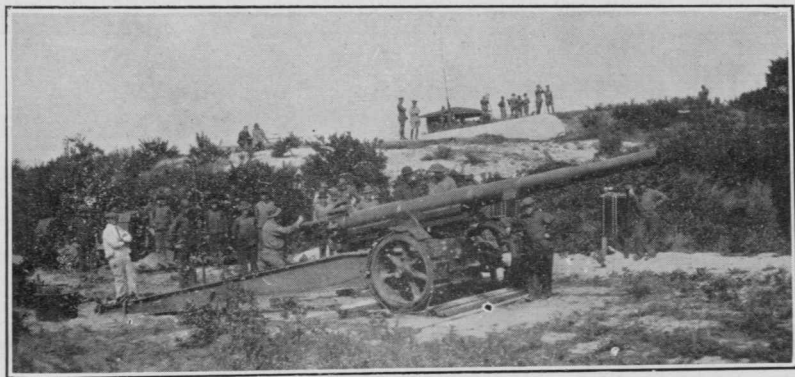


FIG. 5
Co. "B," 155-MM G.P.F.

ing the baseball team. Colonel Walter Scott, of Butler Bros., New York, presented a magnificent cup which was won by Company "A", showing the best all-round military efficiency. Another cup was won by Company "B", the best drilled Infantry Company. A trophy consisting of an assembled three-inch R. F. cartridge case and shell, beautifully plated and lacquered and suitably engraved, was won by Company "A" for the best target practice and artillery drill. Competition and rivalry was very keen between the companies and made for excellent results.

The morale of the candidates was of the best and was due to a number of causes. First, the camp was ideally located and the location possessed many natural as well as artificial advantages; second, the work was interesting and the instructors were well grounded in their subjects; third, the recreation was good, wholesome and varied; fourth, the enlisted personnel as well as the officers assigned

to the camp were untiring in their efforts to make things go off smoothly and with a snap; and fifth, particular attention was paid to the mess and the same was exceedingly good and well conducted.

Graduation exercises were held the afternoon of the 29th which was made Visitors' Day. Owing to the rain the exercises were conducted in the Liberty Theatre. An inspection of the companies was made by Brigadier General Hugh A. Drum, the District Commander, and his Staff. Addresses were made by the Camp Commander, by Captain Nathan H. Lord, ORC., Civilian Aide for State of New York and C. M. T. C., Mr. Ruford Franklin for the State of New Jersey, and closing address by the District Commander. Certificates were awarded and prizes presented. Out of nineteen candidates who took the Blue Course sixteen were recommended for commission as Second Lieutenants and three for further training in the Blue Course. Of a total of thirty-eight Whites, thirty-one were recommended for training in the Blue Course and seven for further training in the White Course. Of a total of twenty-nine Advanced Reds, twenty-seven were recommended for training in the White Course, one not recommended for further training, undesirable, and one for no further training in the C. M. T. C. as he held a commission as 2nd Lieut., CA-ORC.

On the following day, August 30th, all equipment was turned in and the candidates were given a royal send-off. Busses conveyed a number to the railroad station at Highlands, N. J. and other towns in the vicinity while a special boat trip was arranged for the candidates living on Long Island and then proceeded to the Battery, New York City. The Band was on hand at the dock and the boat left amid the rousing cheers of the candidates for the camp authorities and the music of the band.

The Camp was commanded by Colonel James F. Brady, C.A.C., who was also Commanding Officer, Coast Defenses of Sandy Hook. He was assisted by the following administrative and tactical staff: Lt. Col. L. S. Edwards, C. A. C., Executive; Major Wm. R. McCleary, C. A. C., Senior Instructor; Major H. W. Stuckey, M. C., Surgeon; Major Edwin K. Smith, C. A. C., Adjutant; Major S. C. Ramsden and Captain Wm. R. Arnold, Chaplains; Captain A. B. Smith, C. A. C., Camp Exchange Officer; Captain R. D. Spaun, C. A. C., Morale and Publicity; Captain R. E. Harrington, C. A. C., Recreation and Athletics; 1st Lt. Wm. J. Gainey, Q. M. C., Supply and Mess Officer; 2nd Lt. Albert J. Wick, C. A. C., Finance Officer and Personnel Adjutant. The following officers were on duty as Instructors: Captains A. M. Jackson, Napoleon Boudreau and J. T. Lewis, and 1st Lts. G. A. Patrick and J. A. Pixley, all C. A. C. Of

these officers "A" company was commanded by Captain Jackson and "B" company by Captain Boudreau.

THE FORT MONROE, VIRGINIA
R. O. T. C. COAST ARTILLERY CAMP
1923

By Lieut. Colonel Hartman L. Butler, C. A. C.

The camp of the Reserve Officers' Training Corps held at Fort Monroe this summer from June 14 to July 25, under the command of Lieut. Colonel A. A. Maybach, C. A. C., is the fourth camp of its kind. The first camp was held here in 1919, was attended by about sixty men, and other camps have been held each year since.

The camp held in 1920 was a larger one than the 1923 camp. The 1921 and 1922 camps were also attended by a larger number of men. The reason for this is that the Coast Artillery R. O. T. C. has been split up into four groups, thus distributing over the country the men who previously all attended two camps.

The men here were divided this year into three batteries. The institutions represented were as follows:

Battery "A"

Virginia Polytechnic Institute	58
University of Kansas	21

Battery "B"

University of Cincinnati	3
University of Michigan	34
Kansas State Agricultural College	21
The Citadel	19
University of Kentucky	1

Battery "C"

Michigan Agricultural College	25
University of Pittsburgh	23
University of Minnesota	13
Washington University	16

Total	234
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Infantry drill, work on small arms, mortars, rifles, antiaircraft, equitation, 155-mm guns and 75-mm guns occupied the study hours on week days, while swimming, baseball, tennis and track were the main forms of athletics in which the men participated.

Each battery made Saturday inspection trips to Langley Field, the nearby Aviation Base, to the Norfolk Navy Yard at Portsmouth, and to the Coast Artillery School. Many men obtained passes for week-end trips and Virginia Beach, Ocean View, Buckroe Beach, Norfolk, Yorktown, Jamestown Island and other places were visited.

The first three days of the camp were spent in organizing and equipping the students. Then followed a period of five weeks of intensive instruction. The five weeks of instruction embraced the following:

Summary of Program of Instruction

	A	B	C	Place
1st Week	Small Arms	Rifle Battery Equitation	A. A. A. 155 M.M.	Fort Monroe
2nd Week	Rifle Battery Equitation	Rifle Battery	Small Arms	Fort Monroe
3rd Week	Rifle Battery	155 A. A. A.	Mortar Battery Equitation	Fort Monroe
4th Week	155 A. A. A.	Small Arms	Mortar Battery	Fort Monroe
5th Week	12 in. Ry Mtrs	12 in. Ry Mtrs	8 in. Ry Rifles	Fort Eustis

During this period the students conducted target practice with the small arms, with the 75's and 155's at a stationary target, with heavy fixed guns and mortars at a moving target, and with the heavy railway rifles and mortars at a fixed land target, using high explosive shell. The students also drilled on various elements of the antiaircraft defense and witnessed a night demonstration which embraced the firing of .30-caliber and .50-caliber antiaircraft machine guns, the 3-inch antiaircraft artillery and the operation of the 60-inch searchlights.

In these practices the students manned all the positions, from cannoneer up to and including battery commander. Adjustments of fire were promptly secured and the results of the firings were excellent.

One R.O.T.C. Battery in firing the 12-in. Ry. mortars at Fort Eustis placed all three of its record shots within 30 yards of the target.

During the last three days of the camp, parades, competitions, a track meet, and the physical efficiency tests were conducted. On the last day equipment was turned in, commissions as 2nd Lieutenant, O. R. C. were awarded to seventeen candidates, the men paid, and the 1923 camp closed.

THE FORT BARRANCAS R. O. T. C. CAMP

By Major William C. Washington, C. A. C.

The Fourth Corps Area held its first Coast Artillery R. O. T. C. Camp this year at Fort Barrancas, Florida. The experiment proved very successful from every standpoint. It is certain that the morale of the students was higher at this camp than it has been in previous camps held at Fort Monroe, Va. This is attributed to the fact that the number of students was less and consequently more intimate acquaintances sprang up between the individuals. Also the people of Pensacola made the young men feel that they were welcome in their homes and the best young ladies of the town attended the weekly R. O. T. C. dances in large numbers. Another reason for this pleasant state of affairs was the fact that our Commanding Officer was most careful to impress on all officers and instructors the necessity of requiring just the amount of discipline necessary for a well conducted camp but no more. In other words, super-efficiency was not encouraged.

Three Coast Artillery units were represented. Georgia School of Technology sent 11 basic and 39 advanced course students; Mississippi A. and M. College 16 basic and 26 advanced students; and University of Alabama 10 basic and 11 advanced course students.

The officers and instructors on duty with this camp were as follows:

Colonel Frederick E. Johnston, C. A. C.	Camp Commander
Major Edward P. Noyes, C. A. C.	Director of Training
Major Alvin J. Bayley, M. C.	Camp Surgeon
Major Andrew L. Pendleton, III, C. A. C.	

	Executive Officer and Adjutant
Major William C. Washington, C. A. C.	Senior Instructor
Captain Richmond T. Gibson, C. A. C.	

	Athletic, Recreation and Publicity Officer, Asst. Instructor
Captain Shuey E. Wolfe, C. A. C.	Camp Supply Officer
Captain K. S. Purdie, C. A. C.	

	Company Commander and Ass't Instructor
Captain W. T. Andrews, C. A. C.	

	Company Officer and Ass't Instructor
Captain M. C. Handwerk, C. A. C.	

	Company Officer and Ass't Instructor
Captain J. H. Gilbreth, C. A. C.	Personnel Adjutant
Captain Maurice E. Barker, C. A. C.	Assistant Instructor
Captain James J. Weeks, D. C.	Dental Surgeon
1st Lieutenant R. D. Patterson, C. A. C.	Mess Officer

The students were organized as a single company of four platoons, and each platoon assigned to a barracks of two floors. By this arrangement a friendly spirit of rivalry was developed and keen competition for various honors resulted. This competition, however, did not extend to the final target practice with the 10-inch rifles at *Battery Cullum* at Fort Pickens. Everyone here pulled together with a vim and succeeded in making a record number of hits for an R. O. T. C. Battery. Five hits out of ten shots at a range varying from 10,000 to 8,000 yards is something that regular Coast Artillery companies would mention with pride. Three of these hits actually passed through the pyramidal target.

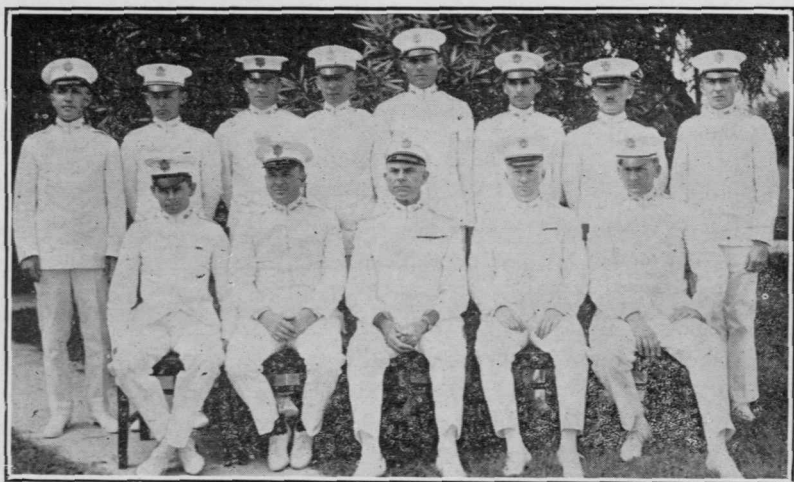


FIG. 6

FRONT ROW (SITTING): MAJ. E. P. NOYES, MAJ. A. L. PENDLETON, COL. F. E. JOHNSON, MAJ. A. J. BAGLEY, MAJ. ELLIS. SECOND ROW (STANDING): CAPT. J. J. WEEKS, MAJ. W. C. WASHINGTON, CAPT. K. S. PURDIE, CAPT. M. C. HANDWERK, CAPT. W. T. ANDREWS, CAPT. R. T. GIBSON, CAPT. J. H. GILBRETH, LT. R. D. PATERSON.

Aside from the strictly official activities the students edited a weekly double page section of the *Pensacola Journal* and called it *The Recuperator*. Quite a bit of interest was taken in editing this newspaper and the subscriptions to it were practically 100 per cent.

The most successful undertaking of the student body, however, was the edition of a Camp Annual called *The Salvo*. It was also successful from a financial standpoint. Due to the unstinted support of the business houses of Pensacola in taking ten pages of advertising, we were able to give the members of the camp a first class souvenir book of a very pleasant summer spent here among the

charming people of Pensacola, for the nominal price of 50 cents per copy. The support received from the students was shown by the fact that one hundred and fifty copies of the Annual were sold to one hundred and twenty-five students and officers.

All was not work for there were three very pleasant Saturday morning trips arranged during the period of the camp. The trip through the U. S. Naval Air Station, only a short distance away, was not only very interesting but instructive as well. The trip to the old half sunken Massachusetts was of keen interest to the embryo Coast Artillery Reserve officers. A close inspection of the results of firings from the railway gun and mortars was made

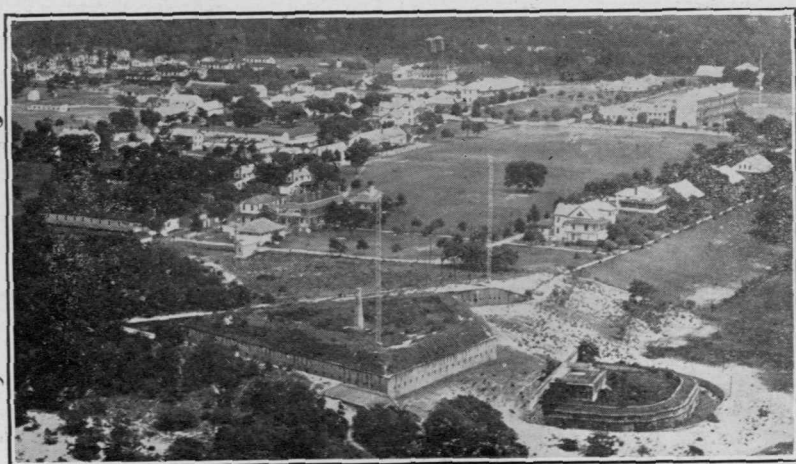


FIG. 7
FORT BARRANCAS

aboard the vessel. Probably the most enjoyable trip was the run out to the red snapper banks eight or ten miles in the Gulf. Nothing will be said of the amount of fish caught but it was a novel experience for those who had never before felt the sensation of ground swells.

The 8th Infantry Band from Fort Screvens, Ga., was assigned to the Summer Training Camps and assisted very materially in enlivening the activities of the Camp and Post. It not only played for parades and ceremonies but for dances, movies and receptions. Twice weekly it gave concerts to which the people of Pensacola and the Navy Yard were invited. In fact the band probably contributed more toward making the social side of camp a success than any other single agency.

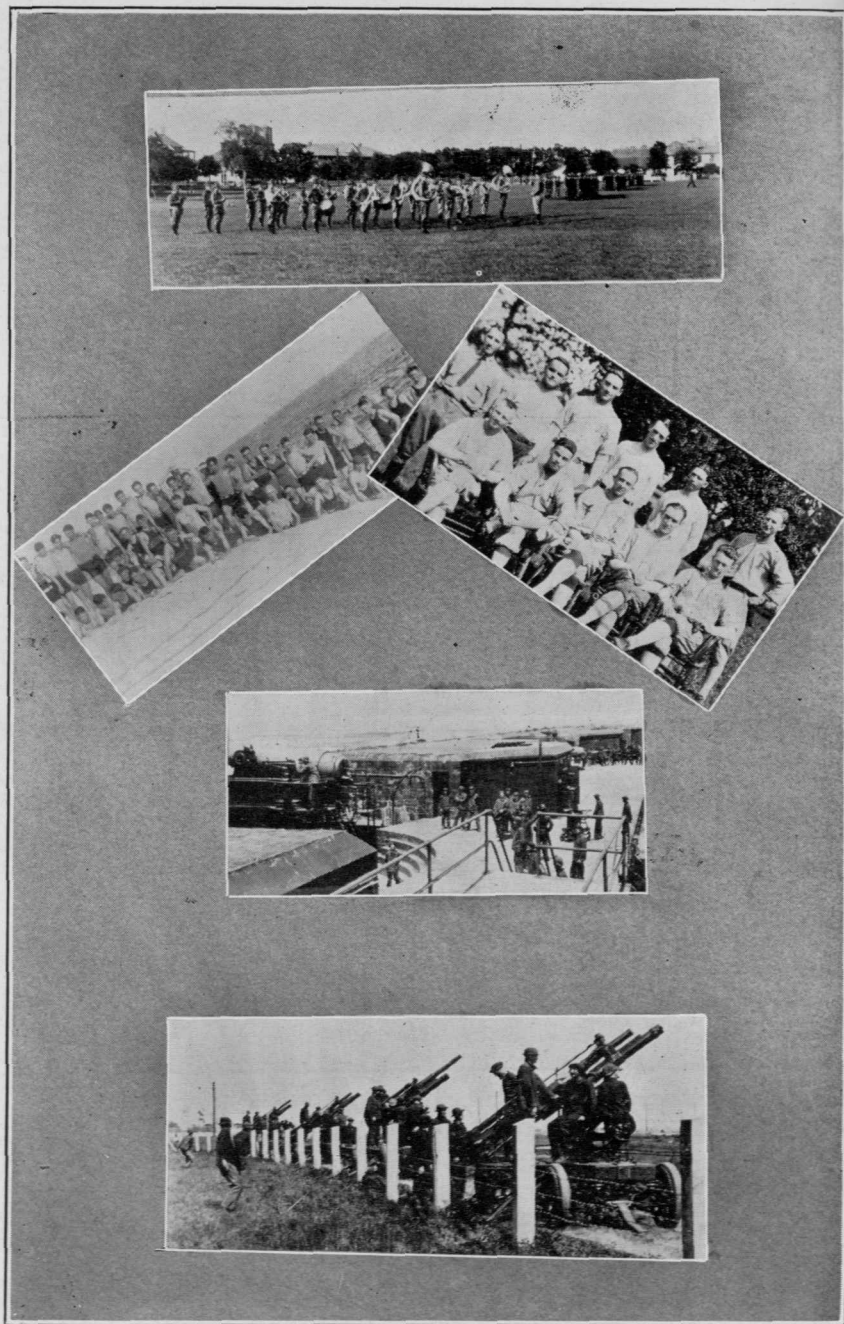


FIG. 8

COAST ARTILLERY OFFICERS' RESERVE CAMP

Fort Hancock, New Jersey

By Captain Napoleon Boudreau, C. A. C.

The following officers of the Coast Artillery Officers' Reserve Corps attended the Coast Artillery Officers' Reserve Camp at Fort Hancock, N. J., held from noon July 17, 1923 to noon July 31, 1923:

Major Archibald E. Tanner, Major Albion N. Van Vleck, Major Aiken Simons, Captain Robert E. Kelton, 1st Lieutenants Charles S. Lumley, Abbott Oberndorfer, Carl E. H. von Sothen, Melville Moritz, William J. Loughran, James P. McKittrick; 2nd Lieutenants Harry Myers, Lester J. Hensley, Ross E. MacGregor, George Fein, Clayton W. Ramsden, Winfield W. Lattomus, Thomas W. Mulrooney, Henry S. Scherer, William J. P. Smith, Herman C. Kasten.

The afternoon of July 17th was utilized in receiving the officers and allowing them to adjust themselves in the quarters provided. They were furnished two large squad rooms in the surplus brick Ordnance Barracks, messing at the Officers' Mess nearby.

Soon after their arrival appeared General Drum, District Commander, who gave a half hour talk interspersed with a few words of welcome, of encouragement and of what was expected of them during the coming period of instruction. In the evening a smoker was given by the officers of the post and for one short hour, smoke and a variety of air rolled about the "Old Ordnance Brick House."

In general, the work accomplished was as follows:

a. Materiel: For the first working day all officers, in one group, were taken by machines to one end of the post and, beginning at the searchlight, stops were made at each station, power plant, casemate and battery. At each place an officer instructor with all personnel necessary to man and operate the materiel were present and after having explained in general terms the object, functions and purposes of the materiel, actual functioning and operation of same was demonstrated. This method proved very satisfactory, interesting and due to limited time, was far superior to class room lecture consuming the same length of time.

b. Adjustment of Fire: Perhaps the most monotonous part of an officer's career is to stand in the Battery Commander's Station, give a lot of firing orders, see nothing accomplished except simulated movements and motions, hear no firing, see no splashes except in a

visionary way. To avoid this prospective monotony adjustment problems were conducted by firing a full service ammunition target practice projectile with a three-inch rapid fire gun. The interest and enthusiasm was very marked, and it is believed that no better method of test fire adjustment could have been followed. Each officer fired one problem allowing a maximum of fourteen rounds to obtain his adjusted elevation.

c. Sub-Marine Mines: Instruction in the "duties in the loading room", "duties on the water", "duties in the casemate", and "plotting room", were given. All the work was accomplished in detail and complete assembly of compound plugs, testing of mines and cables, loading them on planter, dropping them in the water, making joints, raising mines and laying out a mine field was thoroughly demonstrated. Time did not permit the officers actually to do all the work but all saw all of the work in detail. Sub-mines were planted and two sub-mines fired.

d. 6-inch, 12-inch, 155-mm, and 3-inch Fixed A-A. Guns:

Service target practice was held with 6-inch and 12-inch guns. The gun crews were enlisted men of the post. Plotting rooms, base end and B. C. stations were manned entirely by Reserve Officers. The results of the practice were very good, personnel errors were negligible and the methods of adjustment of fire were correctly followed and corrections properly applied.

Firing with A-A. guns was probably the most interesting and spectacular of all. Officers manned all instruments and after a few hours of continual firing all felt that they were really here primarily to learn to shoot.

Several attempts were made to fire the 155-mm guns but either shipping or poor visibility prevented firing.

e. Infantry: For infantry instruction four companies were formed, utilizing every available man at Fort Hancock. Reserve Officers were assigned as company officers and right and left guides. Each Company Commander lectured to the company one minute, drilled it five minutes, then rotated with other officers until each had filled all of the positions, viz: left guide, right guide, 2nd lieutenant, 1st lieutenant and captain. Upon completion of drills either parade, escort of the color, review or guard mounting was held. Four officer instructors corrected mistakes.

f. Miscellaneous, Pistol: A three hour period was devoted to pistol firing, each officer fired a number of rounds, dismantled the pistol, cleaned and assembled it. Major Tanner was the only officer qualifying as sharpshooter. Lieutenant von Sothen qualified as marksman.

Sketching: Two and one-half hours was devoted to military sketching and map reading.

Manual of the Sabre: One hour practical instruction with the sabre was given.

Equitation: There were twenty officers and only three horses, so no one was exerted from over-riding.

In addition to the above, the following lectures were given:

General organization of the Army and its Component parts, by Major C. B. Ross, C. A. C.

General Organization and Function of Coast Artillery, including Harbor Defense, Railway, Tractor and Antiaircraft Artillery, Sound Ranging and Trench Mortar, by Major J. R. Cygon, C. A. C.

Tactical Organization and Employment of a Coast Artillery District, a Coast Defense, a Fort, a Fire Command, a Mine Command, and a Battery, as Outlined in TR 435-20, by Major Wm. R. McCleary, C. A. C.

Positive System of Coast Defense, by Major Wm. R. McCleary, C. A. C.

Illustrated Problem of the Functioning of a Coast Defense and Fort Command, by Major J. R. Cygon, C. A. C.

Mobilization of Coast Artillery for War, by Major Wm. R. McCleary, C. A. C.

Relations of the Corps of Engineers to the Coast Artillery Corps, by Captain T. D. Weaver, C. of E.

Combat Orders, by Major Wm. R. McCleary, C. A. C.

During the two weeks' stay of the Reserve Officers at the garrison the social life took on an added impetus. A card party and a dance were given for them collectively and each officer was entertained individually by several of the Post officers. The Reserve Officers entertained with a dance for the members of the garrison on one of the last evenings of their stay.


The Reserve Officers also found time to enjoy the swimming and fishing facilities afforded at the post as well as the automobile drives on the Jersey shore boulevards. The L-40 was put into service on one occasion for a fishing trip and picnic lunch off shore.

When time came for saying "Au revoir" the officers and ladies of the garrison parted with an enthusiastic group of Reserve Officers, not at all scant in their expressions of approval of a two weeks' period of combined professional profit and recreation.

The Training of Antiaircraft Machine Gunners

By Second Lieutenant Halstead C. Fowler, C. A. C.

INTRODUCTION

N antiaircraft machine gun organizations the training of gunners is of primary importance. The accuracy of anti-aircraft machine gun fire depends primarily upon the eye and hand of the man pulling the trigger. The fire effectiveness of an antiaircraft machine gun battery varies directly with the training of its gunners. If the gunners are well trained, the fire effectiveness of that organization will be of the highest order. If, on the other hand, the training of the gunners has been inferior, the fire power of the organization will be correspondingly lowered.

Practically all antiaircraft machine gun firing is done by direct pointing on a target moving rapidly in range, elevation and direction. It is thus apparent that antiaircraft machine gunners must be accurate of eye and rapid of hand. Thorough training from the basic to the most advanced stages on a progressive scale is necessary to produce gunners of high efficiency.

The need of some definite program for the training of antiaircraft machine gunners has been felt since the organization of the First Antiaircraft Battalion on July 1, 1921, and it is in an attempt to fill this need that the following plan of training is submitted. It might be well to state in this connection, that the ideas contained in this article are not theoretical concoctions made at a desk, but that they are the result of two years' experience in the training of antiaircraft machine gunners and have been found to be of practical benefit in antiaircraft machine gun training.

While this program refers especially to the training of a Regular Army organization, its construction is such that it can be used, with certain proportional modifications of the time allotted to the various subjects, by National Guard and Reserve units or for that period of intensive training necessary, in time of hostilities, to prepare our citizen soldiery for war.

PRELIMINARY INSTRUCTION

This instruction for Regular organizations in peace times should be held during the gunners' instruction period of the indoor season. For the National Guard this training may be given during

the drill periods throughout the months preceding the summer encampment. When training a large emergency force in war time, this instruction may be covered by a short period of intensive training.

During this time the mechanism of the gun should be carefully taught. Thorough instruction should be given in the nomenclature and assembling and disassembling of the gun, packing of barrels, changing of spare parts, and in the general care and adjustment of the gun and mount. The work can best be covered under the following heads.

NOMENCLATURE, ASSEMBLING AND DISSEMBLING OF GUN AND MOUNT

Instruction should be given in stripping and assembling the gun, in the nomenclature of the various parts, and in the action of the parts during firing. After the training has progressed sufficiently, speed tests in stripping and assembling the gun should be held. The gunners should also be required to perform the test when blindfolded, depending upon their sense of touch, in order to insure their being able to make minor repairs, reduce stoppages, etc., in darkness.

CARE AND ADJUSTMENT OF GUNS AND MOUNTS, PROCEDURE IN CASE OF STOPPAGES

This next period of instruction should cover the care and adjustment of the gun including the changing of barrels, headspace adjustment, and preparation of the gun for firing. Preliminary instruction should also be given in stoppages, their nature, and their reduction. The subject of stoppages will be again considered in the Ground Firing, but it is thought advisable to give as much preliminary instruction in this subject as possible.

AIMING, USE OF SIGHTS

After the gunner has completed the courses just outlined, he should be taught the construction of the sight and should be thoroughly drilled in its use. He should not only be instructed in the mechanism of the sight proper, but should also know the theory upon which it is based and the details of its operation.

If the length of the training period warrants, preliminary sighting practice may be held using miniature targets made to run along wires as shown in Figures 1 and 2. A device similar to those illustrated will aid considerably in teaching the proper use of the antiaircraft sight, and will allow the gunner to get practice in sighting on moving targets before any actual firing has commenced.

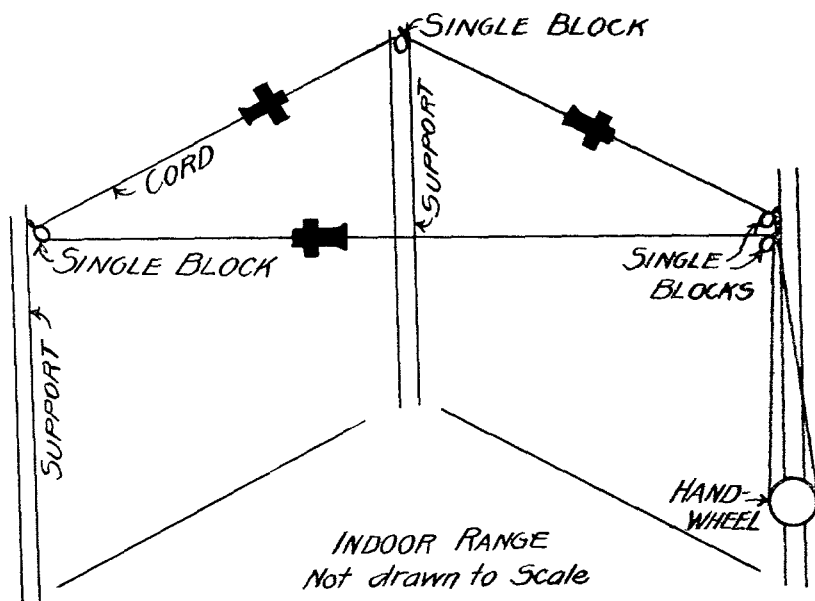


FIG. 1

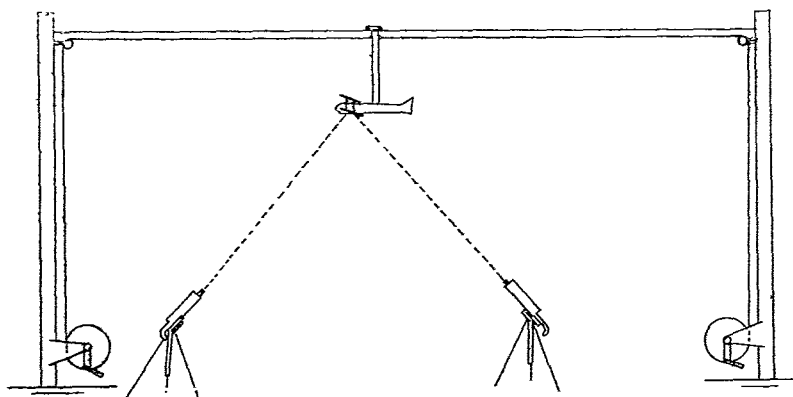


FIG. 2. MINIATURE TARGET TOWED ALONG A WIRE

GROUND FIRING

The object of this firing is primarily to familiarize the gunner with the action of the gun during firing, and to teach that coordination of eye and hand, necessary to obtain accurate results. It also gives him experience in remedying the various kinds of stoppages which occur during firings. This elementary practice can best be held when firing horizontally at fixed targets, as the manipulation of the gun and the mechanism of loading, aiming, and firing is much simpler than when firing at high angles on a moving target. It also allows the accuracy of fire to be checked and errors to be noted and corrected. It might be added that an antiaircraft machine gun organization may sometimes be called on to perform duty as infantry machine gun troops, (as in case of surprise attacks, and riots,)

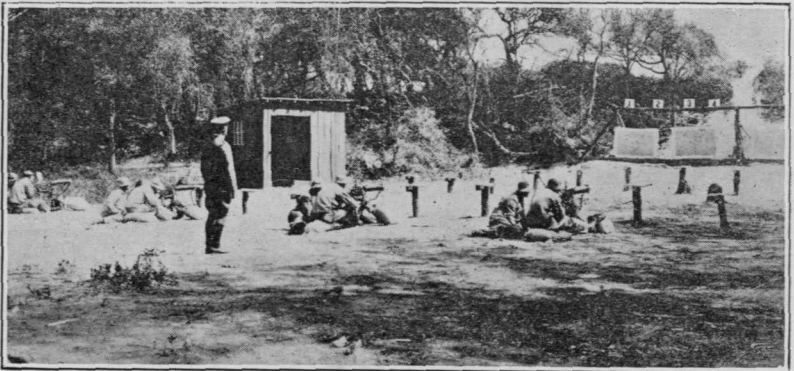


FIG. 3. GROUND FIRING ON 1000-INCH RANGE, 61ST ARTILLERY BN., FORT MONROE, VA.

and it thus becomes necessary for them to know at least the elementary principles of infantry machine gun fire. Since most of the firing under these conditions will be of an approximate nature, a refinement of infantry methods, such as use of the panoramic sight and indirect fire, is unnecessary.

Ground firings should first be held on the 1000 inch range. After sufficient proficiency is attained on this range, further practice may be held at longer ranges (600 to 1300 yards.)

1000-INCH RANGE FIRING

As the name implies, this range is one on which the target is placed 1000 inches from the firing line. (See Figure 3.) The purpose of the 1000-inch range firing is to give the soldier a certain amount of training with ball ammunition against a target of such a nature that his errors may readily be detected and pointed out to

him. Here he has practice in reloading, aiming, holding, squeezing the trigger, assuming correct firing positions, rapid fire, manipulation, and remedying such stoppages as may occur.

A 1000-inch range may be easily and economically constructed in any locality where there is level ground and sufficient open space, and where a bank or other object forms an efficient bullet stop. It will usually be found most convenient to place this range on the flank of a rifle range, or it may be placed on the range itself when not used for other purposes. The 1000-inch range as used in machine-gun target practice is usually equipped with trucks running on steel rails, so that the truck carrying a series of targets may be drawn to the firing point for examination and pasting without interrupting the firing of the remainder of the line. This is desirable for machine gun practice but not necessary. All that is necessary is a row of firing points, the number depending upon the number of men to fire, and a line of targets 1000 inches away, measuring from the muzzles of the firing line. In case trucks and tracks are not available, targets should be marked by the men firing during pauses in the firing.

The standard 1000-inch machine gun target should be used throughout the firing.

A course of firing similar to that given in the following paragraphs, providing a progressive system of training, will give the necessary amount of 1000-inch range firing for antiaircraft machine gun troops.

SCHEDULE OF FIRINGS

1. *Elementary Instructions*

Since the infantry machine gun mount is not considered in anti-aircraft gunners' instruction, it will be necessary before actual practice begins, to devote some time to a description of it and its action during firing. The mount should be described and instruction given in mounting, in the use of elevating and traversing mechanism, and in the operation of the elevation and direction dial. The gunner should then mount his gun as for actual firing on the 1000-inch range, and should go through the movements of sighting, elevating, and traversing necessary to fire the various courses without actually pulling the trigger. The gunner should be trained thoroughly in traversing two mils, either by tapping or by clicks, depending on the type of ground mount he is using. A like training should be given for two mil searching changes; that is, practice in changing his range by two mil increments.

2. Grouping Fire

The object of this type of firing is to teach the gunner to determine the sight setting necessary to place the center of impact on the center of the scoring space corresponding to a given range, and to confine his shot groups within proper limits. The target for Grouping Fire is shown by Figure 4. The shot groups (exclusive of strays) should be within the circumference of an ellipse whose vertical diameter is $2\frac{1}{2}$ inches and horizontal diameter 2 inches. A convenient gauge may be made by twisting a piece of wire into the proper shape. The gunner should fire three bursts of five rounds each at 600 meter sight setting and a similar number of rounds at 1000 and 1300 meter settings. In the first two bursts at each sight

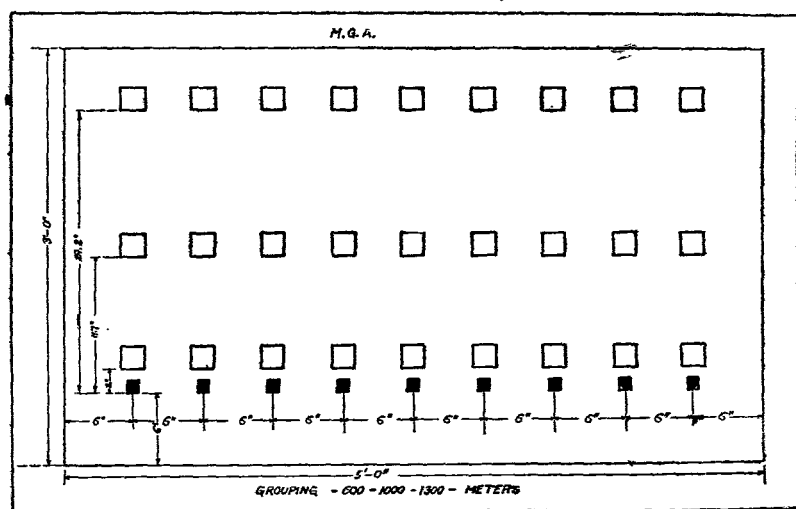


FIG. 4. TYPE OF TARGET FOR GROUPING FIRE

setting, the theoretical height of the center of impact above or below the point of aim and the actual distance of the center of impact above or below the point of aim should be noted, and the difference between these centers expressed in mils. The gunner should be taught to make his corrections by applying the mean of these differences in mil (1 inch at 1000 inches=1 mil) to his elevation dial.

3. Traversing Fire

The object of this firing is to secure an even distribution of fire throughout the entire width of a linear target. The target used is shown by Figure 5. With the sight set at 750 meters, the gunner fires thirty rounds in bursts of five, traversing left to right using either a two mil tap or a two mil click between bursts and then

thirty rounds in bursts of five at 1200 meters, traversing right to left in a similar manner. No aim should be permitted after the first aiming point at each range. The resultant shot groups should show an even distribution of hits along the front covered by the target and the shots should not be more than 2 inches above or below the space containing the center of impact.

4. *Searching Fire*

The object of this firing is to secure an even distribution of fire in the direction of depth and in certain specified amounts, using target shown by Figure 6. The gunner aims at the bottom paster

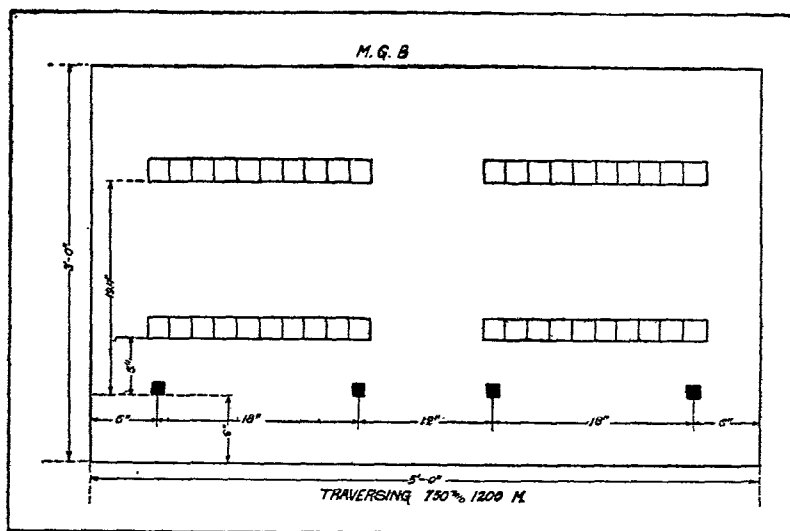


FIG. 5. TYPE OF TARGET FOR TRAVERSING FIRE

with a sight set to hit it (400 meters), and fires thirty rounds in bursts of five, searching up two mils between each burst, then aims at the top paster and searches down in a like manner. No aim is permitted after the first shot in each practice.

5. *Oblique Traversing*

The object of this firing is to secure an even distribution of fire over an oblique linear target. Figure 7 illustrates the target used. The gunner fires thirty rounds in bursts of five with a sight set at 600 meters, traversing left to right two mils and searching up two mils between each burst. He then fires thirty rounds at 1,000 meters in bursts of five, traversing right to left two mils and searching down two mils between each burst.

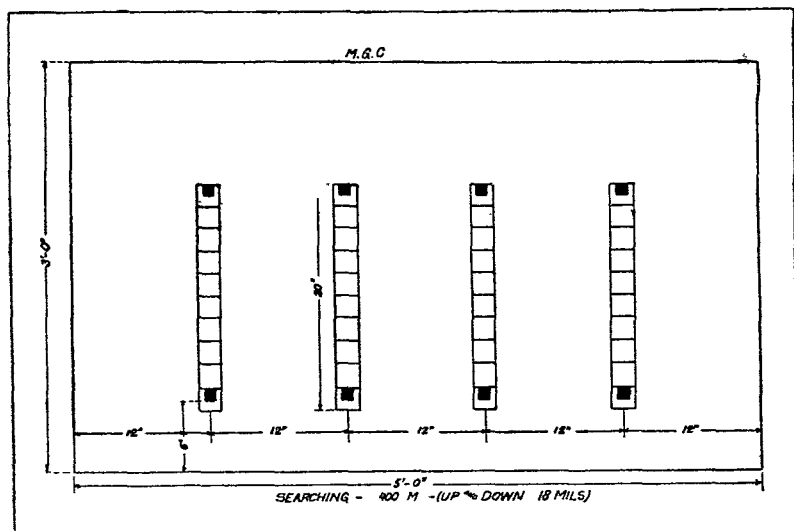


FIG. 6. TYPE OF TARGET FOR SEARCHING FIRE

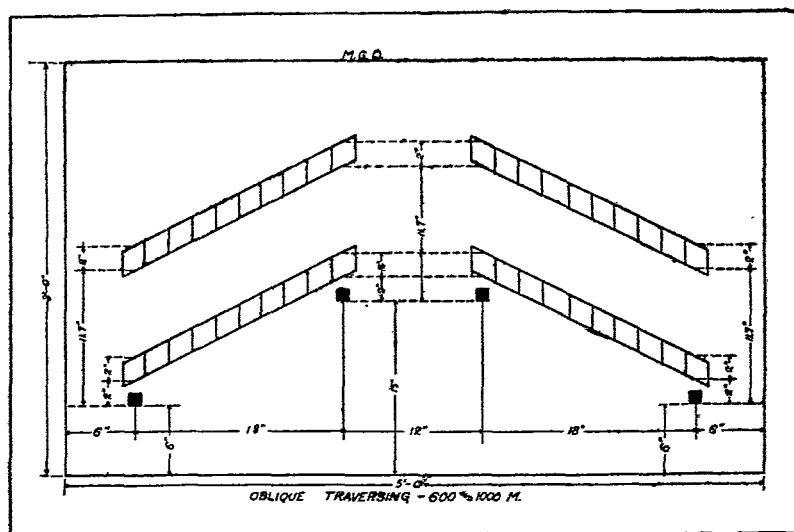


FIG. 7. TYPE OF TARGET FOR OBLIQUE TRAVERSING FIRE

6. *Firing with Stoppage*

The object of this firing is to acquaint the gunner with the various stoppages likely to occur and with the methods of remedying them in the field. Fifty rounds are prepared, including one battered round, one misfire, one thick rim, one separated case, one faulty feed due to empty loop, one due to cartridge not being far enough

in belt, two successive misfires, and one stoppage due to trigger being locked, the last being prepared during reduction of one of the other stoppages. The gunner should be required to determine the cause of each stoppage, remedy it, and continue firing with the least delay.

SERVICE RANGE PRACTICE

After the gunner has become proficient on the 1000-inch range, further ground firings may be held on a service range, preferably one enabling a firing range of 600 and 1,300 meters to be obtained. This will enable the gunner to become familiar with sighting and firing under service conditions. Instruction should be given in firing at target E (kneeling silhouette), and in traversing fire using a target of the type M. G. F. (screen 1 meter high by 12 meters long with ten 1 meter by 1.2 meters scoring spaces).

AERIAL FIRING

The object of this firing is, to train the gunner to direct his fire accurately on a moving target. To accomplish this, firing should first be held at fixed aerial targets, followed by sighting practice on moving aerial targets, after which the gunner should finally be allowed to fire on moving aerial targets. A schedule similar to that given below should be followed.

1. FIXED TARGETS

Bursts made by 75-mm and 3-inch anti-aircraft guns have been found to make the most satisfactory type of fixed targets yet devised. Although these bursts travel somewhat with the wind, this movement is so slight that for all practical purposes they may be considered as fixed. Firing at gun bursts develops in the gunner, ease in maneuvering the gun, and teaches him to open fire on a target at the instant it becomes visible. It also gives him practice in shifting his fire quickly from one target to another, maintaining accuracy of fire all the while.

Firing should first be held using single bursts as targets, the gunner directing his fire by means of tracer bullets. After about five targets of this type, a series of bursts should be put up in rapid succession (3 second intervals.) The gunner should open fire on the first burst, shifting his fire to each succeeding burst as it appears. It has been found in practice, that after about 10 shots have been fired on a burst, the correct direction will be obtained and that further firing is unnecessary and a waste of ammunition. As a general rule, it is best to limit the gunner to bursts of 10, after which he should lie in wait for another burst.

Night firing at this type of target has also been found to provide excellent practice. The searchlights, when in action, should illuminate the burst, and the machine guns open fire immediately. When the searchlights are not in action, firing at the flash of the burst will give good results.

2. SIGHTING PRACTICE WITH MOVING AERIAL TARGETS

Miniature target towed along a wire.—The use of this type is for sighting practice only. It is important that the gunners be carefully trained in sighting on it before any actual firing takes place. Thorough instruction should be given in the use of the anti-aircraft sights, the target being stopped in its flight at intervals, and the gunner's aim checked by the instructor. A convenient target of this type is one with a wing span of 12 inches, arranged for towing along a wire at a distance of 30 feet from the guns on the firing line. A model of this size and at this distance, represents an airplane at an altitude of 1000 feet and angle of sight of 50° , or at a range of 1305 feet, which is one of the basic ranges of the forward area sight.

This practice is in addition to that provided in the indoor instruction. If the gunners are believed to be proficient in sighting and tracking anti-aircraft targets by the time this stage is reached, it may be dispensed with.

As a supplement to this practice, valuable training in sighting may be obtained by having an airplane fly over the gun positions, first at known altitudes and speeds and then at unknown altitudes and speeds. The gunners may then become well trained in sighting on real aircraft and in the estimation of ranges, altitudes, and speeds.

3. FIRING AT MOVING AERIAL TARGETS

DIVING TARGETS

The object of the use of this type is to present vividly to the mind of the gunner, a situation which often occurs under war conditions, and to train him to direct his fire accurately against a plane which is coming toward him at a high rate of speed. It shows the necessity for a continuous burst of fire during the time that the target is visible and how fatal the occurrence of a stoppage may be at such times. A convenient type of target for use in this kind of practice may be built to represent a combat plane of 30 feet wing span and speed of about 200 miles per hour, diving to attack from a distance of 600 feet. The target itself should have a wing spread of 5 feet and should be made to run along 100 feet of cable; from a height of 40 feet to the ground, the cable having about 23° slope.

The machine gun should be placed in a pit, dug to a depth of 5 feet, conforming to the construction of a machine gun emplacement, beneath the cable and about 20 feet from its lower end. See Figure 8. The gunner is thus able to get an angle of fire from 30° to 90° on the target as it descends. The command to commence firing should be given when the target starts on its downward course and the gunner should be instructed to cease firing as it passes over his head. He should be allowed to track the target several times throughout its course, before actually firing.



FIG. 8. FIRING AT DIVING TARGET

STATIONARY TARGET WITH MOVING GUN

While this type of target has not, as yet, been thoroughly tried out, it is believed to be a good idea and worthy of consideration and trial.

The target itself is stationary and should have an altitude of from 100 to 500 feet. It may consist of an anchored balloon, a kite, or a form of sighting point such as a box on the top of a pole situated on the crest of a hill. The target should be placed some 100 or 200 yards from a road or railroad track.

The gun is placed in a truck or on a flat car and manned by the gun crew. The truck or train is then driven past the target, fire being opened and continued as long as practicable. See Figure 9.

This type of target provides good practice for firing on moving aerial targets, for although the target is fixed, the gun is moving and therefore the relative movement is the same. It also gives the

gun crews of mobile antiaircraft machine gun units experience in firing the gun from a truck, a condition which might possibly occur in an emergency, when traveling in convoy or when assigned for the protection of a convoy against aerial attacks.

FREE BALLOONS

When using this type of target the gunners are able to get a large amount of experience in firing on a moving target. By considering the direction and velocity of the wind, when using the free balloon, the gunner may be put to the most severe tests. All angles of fire may be used, and speed in handling the gun, and accuracy of fire may be greatly improved during this practice. The target sug-

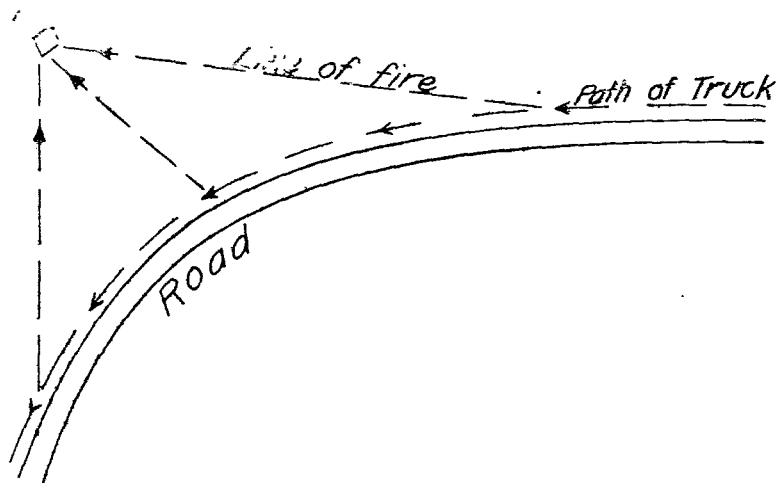


FIG. 9. DIAGRAM OF STATIONARY TARGET WITH MOVING GUN

gested for this firing is the 9-inch meteorological balloon which should be released and allowed to drift with the wind. These balloons attain a height of 1000 feet or more at times. Fire should be opened usually at about 300 to 600 feet. To provide the proper sequence of training, the balloons should first be released within sight of the firing line and the gunners allowed to follow them throughout their course. After tracking for a time fire should be opened. As the training progresses the balloons may be released from points beyond sight of the firing line, the gunners picking up each balloon as it comes within range and firing on it until it is destroyed or drifts out of range. Later two or three balloons may be released simultaneously from different places and the gunners, after destroying one, shift their fire to another.

Night firing with this type of target has also been found to provide excellent practice. The searchlights illuminate the balloon after it is released. Fire is opened when the target comes within range and continued until the balloon is hit or passes out of range.

CONCLUSION

Firing at free balloons marks the conclusion of the individual training of the gunners. The training of the battery as a whole may now be taken up in natural sequence, the work of the individual members of the battery being combined and harmonized with a view to securing that coordination of elements necessary for the efficient conduct of firing problems. This training constitutes the true battery-target practice, and while this article deals principally with individual training, it might be well to mention something concerning battery training.

The training proper may be divided into two parts, namely: (a) Preliminary Drill, (b) Firing Problems.

Immediately upon the completion of the individual training period, a course of intensive training in squad, section, platoon, and battery drill should be begun. Ammunition supply systems and communication systems should be perfected and the battery thoroughly prepared for service firings.


After the battery has attained that degree of efficiency in drill desired a series of battery firing problems should be begun. The problems should include both night and day firings in which gun bursts, searchlight beam intersections, free balloons, and towed sleeves are used as targets. The sleeve towed by an airplane has been found to be the most practical form of target for antiaircraft machine gun fire and it is the acid test of the fire efficiency of the battery. It should therefore mark the culmination of the battery training.

If a logical course of instruction has been laid out and conscientiously followed, the results can not but be satisfactory. The battery is now prepared to enter into the battalion and regimental firing problems and efficiently perform its duty as a cog in the anti-aircraft machine.



EDITORIAL

Prize Essay Competition

HE JOURNAL's Prize Essay Competition closes December 31. The conditions of the competition appear on the inside back cover of this issue. Two points are to be emphasized: first—the competition is open to all readers of the JOURNAL, whether of the Regular Army, National Guard, or Organized Reserves; and second—the author is free to write on any subject, provided only that it relates to some phase of policy, tactics, or technique involved in the efficient accomplishment of the mission of the Coast Artillery. It would be difficult to write an article relating to a Coast Artillery subject that would not come under this broad category. There are no restrictions as to the length of the article or the number of articles that a single competitor may submit. The field is large. There is great latitude in choice of the subjects. It would be hard to find a single Coast Artilleryman who has not decided opinions on some phase of the policy, tactics, or technique of either fixed artillery, anti-aircraft artillery, tractor-drawn artillery, railway artillery or the submarine mine defense. The present policy governing the training and development of Coast Artillery troops gives wide latitude to subordinate commanders. This policy has been adopted with the idea of developing the initiative of all officers and encouraging them to individual effort for the improvement of the Coast Artillery service.

The Corps should today be regarded as in process of development. It is only by the best efforts of every individual and the exchange of ideas and impressions that we can hope to maintain the high standard of technical excellence that has marked its career in the past. The JOURNAL serves one of its principal missions by being the medium through which these same ideas and experiences are recorded and made available for all to read and digest. After all, whether or not a competitor wins one of the two prizes, he can not

help but improve himself as a Coast Artilleryman by having given concentrated thought to the subject he may have selected. Capacity for reflection, logical reasoning, and clear expression of thought may to a very few be a natural gift, but to the vast majority they can be acquired only by hard work, and these qualities are essential to success in nearly every walk of life.

If an article is received after December 31 it can not be considered in the Essay Competition, but nevertheless the thoughts recorded therein may be of great interest and real value to the readers of the JOURNAL. To those officers living in the United States or in the Canal Zone sufficient time still remains to prepare and submit an article for the Essay Competition. Do not hesitate merely because you have had only a few years service and fear that your lack of experience will be a bar to your writing a successful article. Many of the winners of the competitions have had only from three to five years service at the time their articles were prepared. The prize essay competition is almost traditional with the JOURNAL. It was started in 1910 and has been continued annually ever since. During this period not only have the prize winning essays been published but in addition many of the others which were considered to be of especial merit. The author of each of these articles rendered a distinct service to his Corps. It is proper and interesting to record here the names of the officers who have submitted either prize winning essays or essays that received honorable mention. The names, recorded alphabetically, are as follows: Major G. P. Anderson, Major R. L. Avery, Lieut. Colonel H. C. Barnes, Major L. B. Bender, Captain H. H. Blackwell, Major P. D. Bunker (4), Major W. T. Carpenter, Major F. S. Clark (2), Major H. E. Cloke, Major R. B. Colton, Major D. C. Cordiner, 1st Lieutenant H. C. Fowler, Major Q. Gray (3), Major F. M. Green (2), Captain J. C. Haw, Major Sanderford Jarman, Captain J. S. Johnston, Lieut. Colonel H. L. Landers, Colonel Edwin Landon, Captain J. D. MacMullen, Major L. B. Moody, Major H. R. Oldfield, Major R. N. Perley, Captain T. R. Phillips, Major G. A. Wildrick, Major M. Wildrick (2), Major P. H. Worcester.



Outlawing War

The following editorial of Major Jerome W. Howe, Cavalry, appearing in the CAVALRY JOURNAL for July, 1923, sets forth so concisely the logical situation regarding this popular idea which Major Howe truly calls a "shifty shibboleth," that the Coast

ARTILLERY JOURNAL secured permission for its reprinting. Our thanks and those of our readers are due the CAVALRY JOURNAL and its Editor.

An appealing slogan, this: "Outlaw War." Professor Butler, of Columbia, recently remarked that it is the talkers (not the doers or the thinkers) who rule the roost today. We are inclined to think that it has ever been thus, and that this fact can account for many of the ills that have fallen upon the world. This is an interesting sample of the talkers' method, this clever association of words, both rich with connotations which would seem to embody a splendid idea, but which when seriously regarded is discovered to embody nothing but its nine letters.

Outlawry has been obsolete for a century. Outlawry is—or was—an act of war itself. It was a declaration of war by the community upon one who defied its constituted authority. It put its victim outside of protection of the law. Outlawry became obsolete when it was perceived that it was predicted upon unsound principles. We cannot place our brother outside the pale of social cognizance. We are our brother's keeper. That has been accepted by Christianity for two thousand years.

Outlawry, even when practiced, depended upon two fundamental conditions: constituted authority and power to enforce that authority.

How sublimely ridiculous, then, is this proposed outlawry of war! All praise to the efforts of those who aspire to create even a vestige of constituted authority among nations. After all, a greater or less degree of faith and hope is the measure of distinction between League of Nationists and Anti-Leaguers. But what can be said of him who, in face of the existing lack of any general and effective constituted international authority and the existing total absence of any power to enforce such authority if it do exist, cries out fatuously for outlawry of war?

If war is a crime, as it is commonly termed, how outlaw *it*? When outlawry was practiced, it was the criminal who was outlawed, not the crime. The criminal was deprived of all legal protection. The *crime* has no legal protection of which it can be deprived. We speak of and study the laws of war, but war itself is extra-legal.

Perhaps it is more logical to regard war as a ravaging disease which has not been eradicated. A disease cannot be outlawed. It can be conquered, but only as the increasing intelligence of the world—all the human atoms of the world, of which the doctors rep-

resent in this respect only a slightly super-average element—brings the necessary knowledge and control. It takes more than a Pasteur to make the world free from infection of disease. It takes more than a pacifist to make the world free from the infection of war.

That nation that is involved in the throes of war, shall *it* be regarded as a criminal, and shall the unorganized world, in some unexplained fashion, outlaw *it*?

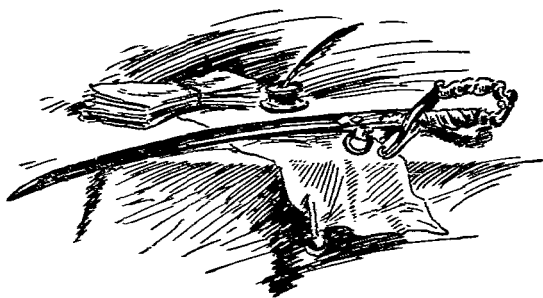
Was our country criminal in '76? Was the North criminal in '61? Was the South? Was Belgium criminal in 1914? Criminality, where not obviously ruled out of court, is throughout history, in most instances, a matter of dispute.

When one regards a nation at war, not as a machine stupidly manipulated by a clever Machiavellian ruling class, but as an aggregation of human beings swayed by human emotions, responsive to every wave of mistrust, fear, exaltation, at once agonized and heroic, pitiable and sublime, all this talk of crime and criminal and of outlawry becomes miserably inapplicable and inane.

"Outlaw war," a shifty shibboleth!

War is a terrible fact! As a counter-fact, only one principle has ever been known. Just as disease is best prevented by sanitation or the organization of society in physical health and strength against the attacks of disease, so is war prevented only by the sound and healthy organization of society to withstand the attacks of war.

When a nation is so organized and is known to be doughty and strong, it is enough to say when assailed, as Charles Francis Adams said to England in 1863, "It would be superfluous to point out to Your Lordship that this is war."



COAST ARTILLERY BOARD NOTES

"Communications relating to the development or improvement in methods or materiel for the Coast Artillery will be welcome from any member of the Corps or of the service at large. These communications, with models or drawings of devices proposed may be sent direct to the Coast Artillery Board, Fort Monroe, Virginia, and will receive careful consideration."

JOURNAL OF U. S. ARTILLERY June, 1922.

Work of the Board for the Month of September, 1923

A. NEW PROJECTS INITIATED DURING THE MONTH OF SEPTEMBER, 1923

Project No. 159, Range Difference Scale for Non-Standard Projectile.

—1. The assignment of two types of projectiles to a single battery led to a decision made Feb. 19, 1923, substantially as follows: Range drums will be graduated to give the settings for a standard projectile; a non-standard projectile will have its range set on the standard drum thru the medium of a range-range relation table. This table gives the setting or range reading on the standard scale to give the desired range to the non-standard projectile. This method was introduced because of the expense and impracticability of widening range drums, and regraduating them to fit any number of projectiles which might be assigned to a particular battery. It is apparent that the use of range-range relation tables involves some inconvenience.

2. Range-range relation tables are prepared by the Coast Artillery Board as requested by Coast Defense Commanders. A study of such tables shows that the standard projectile gives a range which usually differs from that of the non-standard projectile, for a given elevation, by a fraction only of the range. From this, the conclusion is drawn that another form of range-range relation table can be constructed which gives the difference in range between the standard and non-standard projectiles, so that it can be treated as a differential correction. Theoretically this difference could be incorporated in the Pratt Range Correction Chart. This is not recommended, however, because of changes which would be required in the board and chart and the impracticability of using the Pratt Board where the range correction changes rapidly.

3. The addition of a scale to be placed adjacent to the standard scale on the range drum has been suggested. This would permit obtaining the range for a non-standard projectile by graduating on the scale the difference in range between standard and non-standard projectiles for the same elevation. The scale involves essentially the following parts: (1) the scale proper, of sufficient thickness to give it the required rigidity and of material which will not be badly affected by the weather, (2) a sliding pointer, (3) a modified index bracket which will allow the scale to be attached to it so that the pointer can be moved over the whole range of the scale. Figure No. 1, is a drawing of the proposed scale. The scale is supported by the index bracket and screwed on it. The present bracket

requires such modification that it will permit the scale to extend beyond the bracket edges, and also permit the sliding pointer to pass underneath the cross pieces of the bracket. This can be done by cutting the bracket and braising on additional pieces as shown in the drawing, or the modification can be made in some other manner.

4. The scale may be graduated as follows:

a. Attach scale to the index bracket.

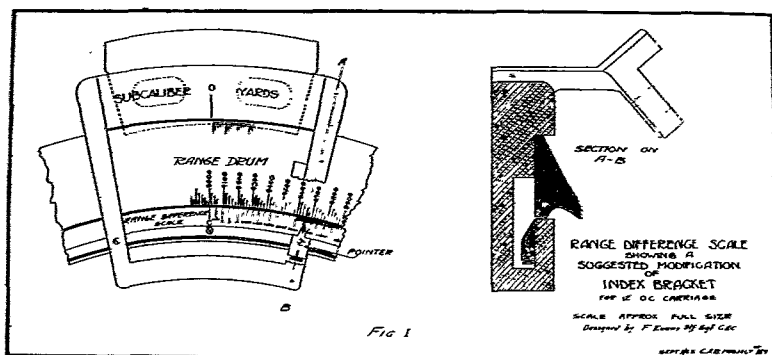


FIG. 1.

b. Mark Zero line on the scale directly above the Zero of the bracket. This fixes its position.

c. Using a range-range relation table, set on the drum the range setting in the second column at the Zero mark.

d. Underneath the drum reading corresponding to the range in the first column, mark a line on the scale and label it the same as the drum reading at this point.

e. This is done for every thousand yards of the first column of the range-range relation table.

f. Intervening 100 yard points are marked in later by interpolation.

5. To make use of the scale set the pointer to the desired range on the scale, elevate or depress until the range drum reading opposite the pointer is the desired range, and the gun is set for the non-standard projectile at the range shown opposite the pointer. The time required to put on or take off the scale is negligible.

6. By making a modification in the bracket suggested, the length of the range difference scale is of slight importance. The maximum length of scale required for the 10-inch gun, model 1888 MII, on disappearing carriage, model 1896, when firing a 510 lb. H. E. shell from a gun graduated for a 617 lb. A. P. shell, is three inches. For the 12-inch gun, model 1895, graduated for the 1070 lb. A. P. projectile on disappearing carriage, model 1897, when firing either a 900 or 975 lb. A. P. projectile, the maximum length of scale is six inches. For a gun capable of elevating beyond the maximum elevation of the disappearing carriage this length would be increased. The 6-inch gun, model 1900, on Barbette Carriage, model 1900, has an enclosed range drum, and to use the proposed scale would require additional modification of the drum housing. It is probable that the scale would be satisfactory for use on 14-inch guns on disappearing carriages,

which use 1400 and 1560 lb. projectiles and which are graduated for the 1660 lb. projectiles.

7. A practical example of the use of the scale was had on August 24, 1923, at Battery DeRussy, 12-inch guns, at Fort Monroe. It was desired to fire 1046 lb. capped instead of 1070 lb. long point projectiles. A revised elevation scale was needed since the drum was graduated for the 1070 lb. long point projectile. Because of the bevel on the drum and previous trouble with paper scales, both battery commander and ordnance machinist considered a scale of the type described to be better than the paper scale which had previously been used for the same purpose. A brass scale was therefore made for this battery for the capped projectile and it was used during target practice by one of the Virginia National Guard companies. It was not considered worth while making a pointer for the scale for this firing. An officer acted as range setter owing to the difficulty of setting the range reading on the difference scale opposite the range on the drum without the use of the pointer. The firing was completed without any difficulty in use of the scale.

Conclusions: The proposed scale would be of value on guns to which it is adaptable. It would save time and avoid the chance for error which exists in using the Range-Range Relation Table. Its use would not interfere with the present approved procedure, and the scale can be used as a supplement to it. Following is a comparative list of advantages and disadvantages: advantages-- (a) Saves time, (b) Eliminates one man and avoids use of a cumbersome table, (c) Avoids one chance of error, (d) Easy to calibrate, (e) Cost is small; disadvantages: (a) May be too long for efficient use in some cases and at high elevation, (b) Can not be used on enclosed drums, (c) Requires modification of bracket.

Recommendations: It is recommended that the Ordnance Department be requested to make the suggested or a suitable modification of index bracket and provide blank scales and pointers for further test for the 10-inch gun, model 1888 MII, mounted on disappearing carriage Model 1896.

Project No. 160, The "Unkles" Deviation Board, Model 1918.—This project is under consideration with several other spotting devices. A description of the "Unkles" Deviation Board appears in Chapter IX, Part IV of Heavy Artillery Matériel.

Project No. 161, Modification of 1918 Azimuth Instrument for use as Spotting Instrument.—This is a consideration of the development of a spotting instrument along the lines recommended in the report of the Coast Artillery Board on Project No. 84, Spotting Devices, as published in the COAST ARTILLERY JOURNAL in November and December, 1922, and January, 1923.

Project No. 162, Review of Training Regulations 435-Mine and Sub-Mine Target Practice.—Study of these regulations is in progress.

Project No. 163, Modification of Rotating Bands to Improve Range and Accuracy.—1. Rotating bands on U. S. Army projectiles which were issued during and before 1918 have been found to be poorly designed from the point of view of range and accuracy. An account of experiments at Aberdeen Proving Ground which describes some of these defects is contained in the JOURNAL for October, 1919.

2. Since 1918, all new projectiles have been designed with a view toward getting the best results from the rotating band. However, there still remain issued, a large number of projectiles which are fitted with the old type band.

For a few of these projectiles, the Ordnance Department had ordered modification of the band to a design which has been found by experiment to give satisfactory results without requiring rebanding of the projectiles. This has been done in the case of the 6-inch, 8-inch and 10-inch H. E. shell by cutting a groove in the steel behind the lip of the band.

3. In the case of A. P. projectiles however, no orders for modification have yet been issued, and it is believed that a loss in range and accuracy will occur in any firings which are made with the unmodified projectiles. It is believed, (especially where the old type lip band is used), that a modification which will improve range or accuracy, or both, can be determined by experimental firings at the proving ground.

Recommendations: 1. It is recommended that the Ordnance Department be requested to make modifications in the rotating bands of A. P. projectiles and all other Coast Artillery projectiles which are fitted with a rotating band which has been shown to be poorly designed.

2. It is further recommended that the Ordnance Department be requested to make a statement of its policy with regard to modification of rotating bands, and that the Board be furnished with a complete list of drawings of all rotating band modifications which have been made on all projectiles issued to the Coast Artillery.

Project No. 164, Table of Asymptote Corrections as a Function of the Asymptote Angle.—This table is being constructed to avoid troublesome interpolations in making asymptote corrections in Sound Ranging.

Project No. 165, Communication System for the Island of Oahu.—The Board is in receipt of a copy of the proceedings of a Board of Officers on the above subject for comment and recommendation.

Project No. 166, Study and Test of 3-Inch Antiaircraft Guns on Carriage Model 1917.—This project has been initiated for the purpose of testing the sighting and breech mechanism of this gun, studying the rate of fire obtainable and loading difficulties at high angles.

Project No. 167, Firing Tables for 14-Inch Gun, Model 1910, Mounted on D. C. Carriage, Model 1907, and the 14-Inch Gun, Model 1909, Mounted on 14-Inch Turret.—These tables have been received from the Ordnance Department and are being examined and studied before giving final approval to the form in which they are to be published.

Project No. 168, Firing Tables for 12-Inch Seacoast Gun, Model 1895, Firing 900 lb. Projectile.—Same remark applies as under Project No. 167 above.

Project No. 169, Stephens Range Correction Device.—This is a range correction board constructed as a series of slide rules for obtaining the ballistic effects as percentages of the range. It was designed by Staff Sergeant Thomas J. Stephens, C. A. C., in the Computers Office of the Coast Artillery Board.

Project No. 170, Range Correction Board, Model E, 1923.—This is a modification of the Pratt Range Board, one roller is on top of the board, the other at the bottom. Paper supporting charts of ballistic curves for various zones is wound from these rollers across the face of the range board. A correction scale and index therefor have been mounted on the correction ruler. The curves on chart include the effects of rotation of the earth, temperature elasticity, and variation in the weights of projectiles from standard. The curves are plotted as percentages of the range and the gross percentage is obtained on the correc-

tion scale mounted on the correction ruler. The application of this board to fixed and railway cannon is being considered.

Project No. 171, Radio Equipment for Vessels Used by Coast Artillery. This project has been initiated by the Coast Artillery Board for the purpose of prescribing adequate standard radio sets for the various types of boats used by the Coast Artillery.

Project No. 172, Searchlights for Antiaircraft Artillery.—This project has been initiated by the Coast Artillery Board for the purpose of keeping in touch with recent developments in Searchlight design and manufacture and to develop the best possible light and controls for antiaircraft artillery.

B. PROJECTS PREVIOUSLY SUBMITTED ON WHICH WORK HAS BEEN ACCOMPLISHED:

Project No. 135, Radio Communication for Mobile Coast Artillery in Field Armies.—

Conclusions: 1. The questionnaire submitted by the Signal Corps to Coast Artillery, each question being followed by the answer thereto is given below:

* * * * *

Q. "If orders are transmitted from the ground to airplane at battalions of Corps and Army Artillery or reports from the airplanes to ground stations at Corps and Army Headquarters are made in plain English, will it endanger the mission of the artillery through information the enemy would thus gain?"

A. Communication between artillery and airplanes, so far as the Army Artillery is concerned, can be conducted in plain English except that names of units, persons, and important localities and certain conventional phrases should be coded. Telegraph communication in code is more reliable, results in less interference and requires a simpler and less powerful set, and is therefore more desirable than radiophonic communication.

Q. "In order to standardize radio equipment furnished Corps and Army Artillery, is the following general policy for governing the design and assignment of radio sets acceptable?"

a. The only units requiring ground to airplane communication in the Corps and Army Artillery are the battalions of 155-mm, the battalions of motorized 155-mm, the battalions of railway artillery, and the battalions of motorized Army Artillery.

b. That the ground to ground radio communication between battalions of Corps and Army Artillery, and the regiments and brigades shall be the same set identical in all respects, with identical power equipment, except where stations of lower units are equipped with a set of greater distance range than is necessary that the actual power supplied to the set may be reduced, or tubes omitted from the set when in operation, or in such way as may be found practicable.

c. That in case regiments or brigades, Corps or Army Artillery, desire radio communication with airplane, such message be transmitted from the battalion station of such units or from the Corps or Army stations furnished for this purpose."

A. a. It is essential that Army Artillery tractor *battalions* and *regiments*, and Army Artillery railway *batteries* be equipped for radio communication with airplanes. Antiaircraft artillery regiments should be equipped with one set per regiment for airplane communication for training purposes only.

b. All sets for Coast Artillery mobile artillery may be of identical type, operated when necessary at reduced power by omitting tubes or batteries or otherwise, provided the equipment for a tractor or antiaircraft station can be carried on one truck capable of marching with and going into position alongside the corresponding headquarters and provided sufficient wave length adjustment is furnished.

c. Messages to planes from higher units can go through the sets listed above as requiring communication with airplanes (i. e., battalions of tractor and batteries of railway artillery).

2. The present approved Army organization is such that there may be expected to be a concentration of tractor and railway Army Artillery on an Army front as follows: 10 regiments (30 battalions) tractor, maximum range 15,000 to 25,000 yards; 1 regiment (6 batteries) railway, maximum range, 15,000 to 46,000 yards.

3. Army Artillery Headquarters is a permanent organization to which Army artillery is assigned as needed. It is believed that there will not be more than one intermediate command between Army Artillery Headquarters and tractor artillery battalions nor more than one intermediate command between Army Artillery Headquarters and railway batteries.

4. The Army tractor artillery and railway artillery are not permanently assigned to an army but are attached from G. H. Q. Reserve for special missions. Railway artillery generally will be retained under the tactical command of Army Artillery Headquarters. A portion of the tractor artillery will be assigned frequently to Corps, and certain of the shorter range armament may be assigned to divisions, hence Army tractor artillery radio sets must be designed for inter-communication with field artillery units.

5. When Army Artillery is attached to Corps it is no longer under the direct jurisdiction of Army Artillery Headquarters. Plans for its communication system, when so used, are not a proper matter for study by the Coast Artillery but rather belong to the Field Artillery.

6. When allowance is made for Army Artillery assigned to Corps it is believed that not more than 6 batteries (1 regiment) of railway and 15 battalions (5 regiments) of tractor artillery will remain under the direct control of Army Artillery Headquarters.

7. Mobile Coast Artillery, in addition to its functions as Army Artillery has a prime mission as Coast Defense Artillery. Hence radio sets furnished such units must have a wave length variation suitable for communication with the Fixed Defenses and Naval and Air Service patrols to the seaward. Furthermore, since Army Artillery, as previously noted often will be turned over to Corps Artillery commanders for use as Corps, Artillery reinforcements, it is essential that a wave length overlap be provided between the sets assigned to the field artillery and the mobile coast artillery.

Recommendations: 1. The following organization of Army Artillery radio communication is recommended:

a. *One army railway artillery net*, comprised of one radio station at Army Artillery Headquarters and probably a maximum of about 3 battery stations, such battery stations to be specified in field orders at the time the batteries move into position. Where railway batteries are located near the main wire axis of the army or of a corps, wire communication only to be used for ground to ground messages and radio stations not to be put in commission unless

needed for airplane communication as provided below. One wave length per army to be allotted for this net.

b. *One army tractor artillery net*, consisting of a second radio station for Army Artillery Headquarters and such regimental and battalion stations as are specified in field orders, usually not exceeding four stations. Where tractor artillery units are located near the Army or Corps wire axes, such units not to establish radio ground to ground communication, but to depend on wire communication. One wave length per army to be allotted for this net.

c. *Airplane Observation Service*.—So far as practicable the radio stations of units not assigned to nets a and b, to be used in this duty. When this is not practicable, net stations to be relieved from the net for airplane observation service. Five wave lengths per Army to be allotted for airplane observation for both railway and tractor artillery.

d. *Antiaircraft net*.—This net to be comprised of all contiguous anti-aircraft units close to the front line. Radio to be used only to warn adjacent units of the approach of hostile airplanes. The service to be in the nature of a broadcast, which necessitates that all units, including those of adjacent armies, work on the same wave length. In order to avoid confusion, the range of each set to be adjusted to the minimum necessary to reach adjacent stations. One wave length to be allotted for this net, the net to include the entire front line. For diagrammatic representation of above organization of army artillery radio communication, see Figures No. 2 and No. 3.

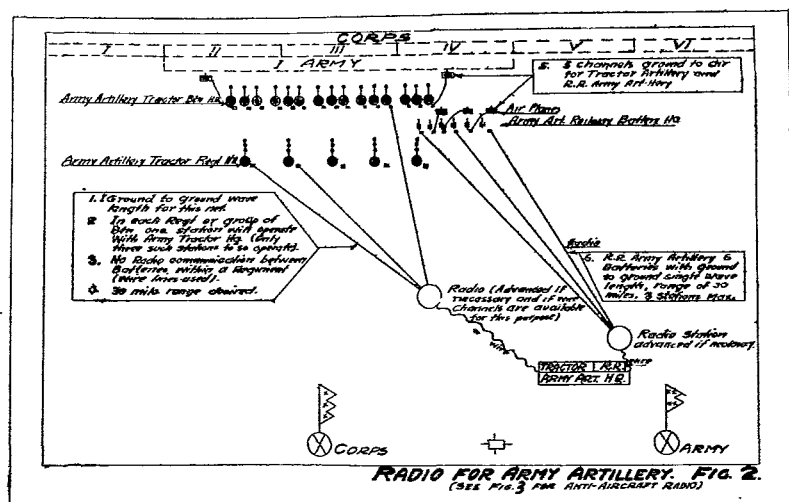


FIG. 2.

2. To carry out the above organization and to provide for use of Coast Artillery units when assigned as Corps Artillery reinforcements in land warfare, and for their use as seacoast artillery, the issue of the following radio sets is recommended.

a. *Antiaircraft artillery.*

- 1 set per machine gun battalion headquarters.
- 1 set per gun battalion headquarters.
- 1 set per regimental headquarters.

These sets should be identical and have a ground to ground range easily adjustable in signalling strength up to and including 15 miles and be arranged for I. C. W. telegraphy, or for C. W. telegraphy in case the Signal Corps can develop a C. W. telegraph set suitable for antiaircraft artillery use. In addition to the above sets one set should be issued per regiment capable of communicating up to 15 miles with planes for training purposes.

b. Army tractor artillery.

1 set per battalion headquarters.

1 set per regimental headquarters.

These sets should be identical and have reliable ground to ground range of 30 miles and a reliable ground to plane range of 15 miles and be arranged for I. C. W. telegraphy and for C. W. telegraphy. In case the Signal Corps can provide sets which will give satisfactory C. W. communication from ground to plane and plane to ground the provision for I. C. W. may be omitted. The sets must be capable of sufficient wave length variation to make them suitable for communication with field artillery, the fixed defenses and naval and air service sea patrols.

c. Army railway artillery.

One set per battery.

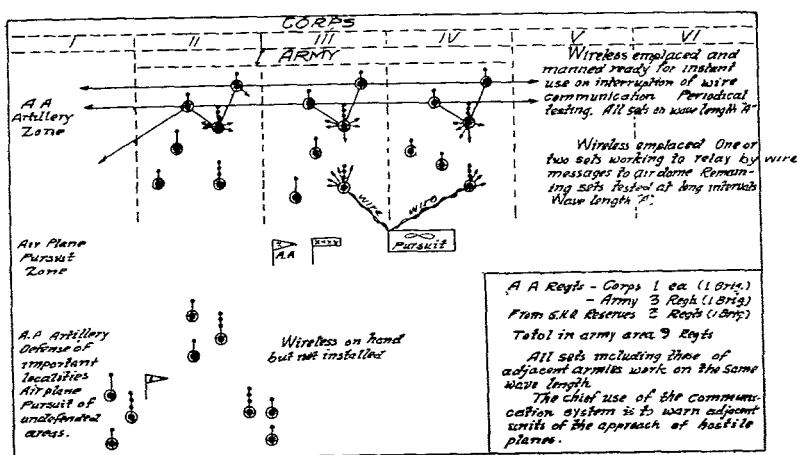


FIG. 3.

These sets should have, for batteries having a range of less than 20,000 yards, a reliable range of 30 miles ground to ground and 15 miles ground to plane; for batteries having a range greater than 20,000 yards, a reliable range of 30 miles ground to plane, which will give them a ground to ground range of about 60 miles. A ground to ground range of thirty miles is sufficient, but it is preferable that only one set be issued per battery. These sets should be similar to and should have the same wave length variation as those provided for tractor artillery. They should be arranged for I. C. W. telegraphy and for C. W. telegraphy. In case the Signal Corps can provide sets that will give satisfactory C. W. communication from ground to plane and plane to ground the provision for I. C. W. may be omitted.

d. Army artillery headquarters.

2 sets for Army Artillery Headquarters.

These sets should be identical and have a reliable ground to ground range of 30 miles. They should be arranged for C. W. communication. They should be designed to operate with sets specified under *b* and *c* above.

Project No. 147, Barrel Wrench for Head Space Adjustment on Machine Guns.—This wrench was designed by 1st Lieutenant G. W. Trichel, C. A. C. The action of the Board on this test was as follows:

Conclusions: 1. The barrel wrench for making head space adjustment on Browning Machine Gun is a satisfactory mechanical means for making the head space adjustment.

2. The facility with which the head space may be changed by this wrench permits tampering by untrained personnel, the tendency being to attribute too many malfunctions to head space adjustment.

3. The method for making the head space adjustment prescribed in machine gun service regulations is satisfactory in that it tends to keep the head space at a minimum, and does not permit tampering with the head space adjustment when the gun is assembled.

4. The need for frequent head space adjustment is not sufficient to warrant the adoption of this device as an article of equipment.

Recommendations: 1. That the barrel wrench for making head space adjustment on Browning machine gun be not adopted.

2. That First Lieutenant G. W. Trichel, C. A. C., be commended for his professional zeal in attempting to improve the machine gun equipment of his organization.

The above conclusions and recommendations were approved by the Chief of Coast Artillery.

Project No. 153, Time Interval Apparatus for Mobile Artillery.—The proceedings of the Artillery Board on this project are as follows:

For diagram of this Time Interval apparatus see Figure No. 4.

Conclusions: 1. The time interval system devised by Technical Sergeant John Brewer and Staff Sergeant Samuel F. Rumford represents a satisfactory solution of the time interval problem for long lines and for mobile artillery except as follows: *a.* A time interval clock is used instead of motor driven timer. *b.* The different telephone lines are magnetically connected offering theoretically an opportunity for cross talk, although circuit constants have apparently been adjusted so as to render this trouble negligible. *c.* No provision is made for the operation of T. I. bells or howlers (telephone receivers arranged to give a loud signal) in such cases as may be desirable.

Recommendations: 1. It is recommended that a copy of this project be furnished the Signal Corps for reference in connection with the design of the sample communication systems recommended in Coast Artillery Board Project No. 111.

2. It recommended that Technical Sergeant John Brewer and Staff Sergeant Samuel F. Rumford be commended for their skill and ingenuity as exhibited by the design and construction of this time interval system.

Discussion: 1. The question of time interval systems was recently dealt with in Coast Artillery Board Project No. 111, dated June 30, 1923.

The following conclusions outlined in that project indicates the opinion of the

board on the subject of time interval systems. *a.* "The time interval system at present in use will not operate satisfactorily on long lines or lines of high resistance. *b.* The time interval system at present standard is quite satisfactory on short lines in the fixed defenses. *c.* The limit of operation of one bell over one line appears to be 5 miles. On shorter lines two or more bells may be operated in parallel. For longer distances two or more lines per T. I. bells must be used. *d.* The regular timing and interrupting apparatus is satisfactory for the fixed defenses and for railway artillery. *e.* The timer and interrupter reported on in

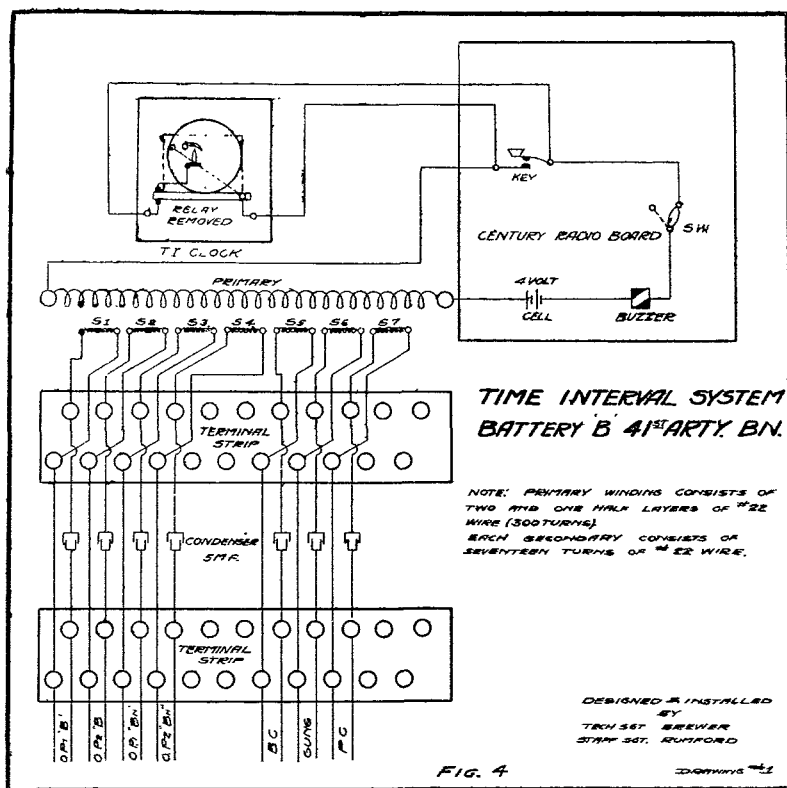


FIG. 4.

Coast Artillery Board Project No. 56 is satisfactory for tractor artillery or railway artillery. *f.* The use of bell signals is satisfactory in most cases in the fixed defenses. For long lines in the fixed defenses and for railway and tractor artillery it is most convenient to introduce a buzzer tone in the telephone system by induction, or to provide a howler in place of a T. I. bell. *g.* Additional windings on the telephone induction coils are not recommended. Two types of transformers should be supplied, each with several taps. One type should be designed to have its secondary in series with an ordinary telephone line, while the other type should be arranged to operate a telephone receiver as a howler. It may be practical to design one transformer for both purposes."

2. It has been recognized generally throughout the Coast Artillery that there are circumstances under which a telephonic signal is preferable to a bell signal. The following experimental installations are known to have been tried out at various times:

a. At Fort H. G. Wright a system has been devised for certain lines whereby the primary of a transformer is connected in series with a battery and a contact on the time interval apparatus, the secondary of the transformer being connected to the telephone line. No buzzer is used, hence the result is merely a sharp click each time the T. I. apparatus makes and breaks contact. This signal has been found quite satisfactory on both long and short lines. b. At Fort Eustis the 52d Artillery (Railway) has been using a combination of the regular Coast Defense time interval apparatus, a model 1917 buzzer, and tertiary wind-

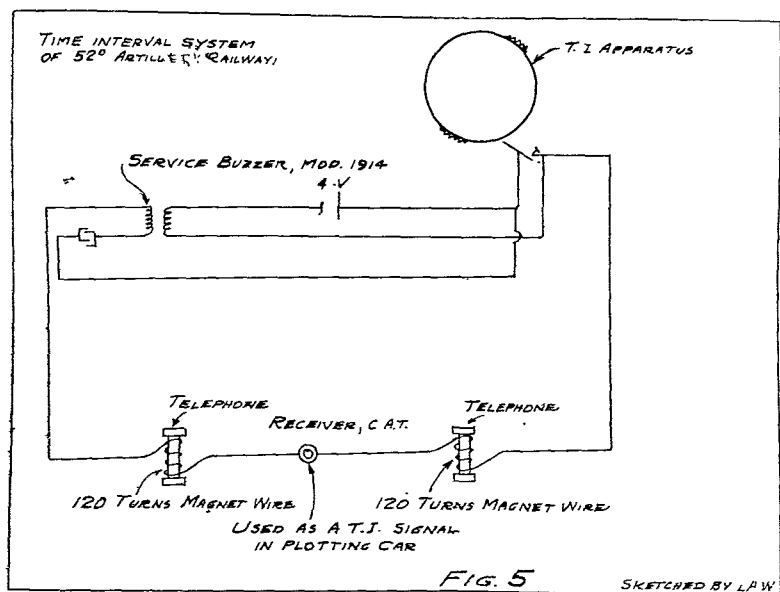


FIG. 5.

ings on the induction coils of the telephones in the plotting car. Howlers were also used. Figure No. 5 is a diagram of this system. This system is of particular interest since provision was made to prevent cross talk, by opening both primary and secondary circuits of the transformer. c. At Fort Eustis the 51st Artillery (Tractor) used a buzzer and telegraph key transformer connected to separate T. I. lines. Howlers (merely telephone receivers) were connected to the T. I. lines at the base end stations. d. At Fort Story, on lines too long for T. I. bells, telephone transmitters were attached to each line circuit and arranged so that they were tapped by the clapper of a T. I. bell. e. The Signal Corps has conducted extensive experiments with a Western Electric constant frequency microphone generator in connection with induction coils for T. I. use. The experiments were apparently discontinued on account of trouble with cross talk.

3. After extensive tests, time interval clocks have been rejected by the Coast Artillery in favor of motor driven apparatus. The T. I. motor mechanism

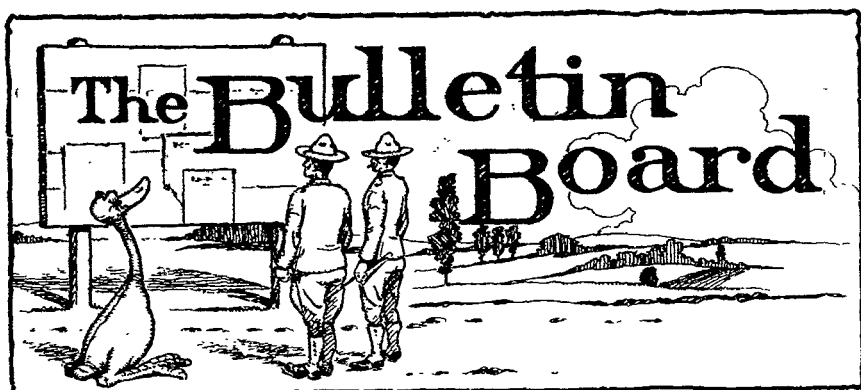
reported on in Coast Artillery Board Project No. 56 requires about 1 ampere at 6 volts and operates about 100 hours on a single charge of the storage battery used to drive it.

4. In general the system constructed by Sergeants Brewer and Rumford represents a satisfactory solution of the time interval question for mobile artillery. While the telephone lines are magnetically interconnected, circuit constants apparently have been adjusted so as practically to eliminate cross talk. The use of the time interval clock probably was dictated by the necessity of using apparatus available. The system can easily be constructed to furnish externally audible signals by inserting a second transformer to furnish a high voltage signal for use in connection with howlers on separate T. I. lines.

Project No. 154, Review of Section VII, Training Regulations 205-5, Observation Aviation in Cooperation with Coast Artillery.

These Training Regulations were studied by the Board. Only minor changes were recommended.





Target Practice of the Virginia National Guard, 1923

The First Coast Defense Command of the Virginia National Guard which was encamped at Fort Monroe from August 12th to August 26, 1923, had, considering the opportunity of the companies to drill on coast defense guns, a particularly successful and gratifying target practice. The practice was held on August 22nd under conditions that were largely favorable. Visibility was excellent and a cross wind of rather high velocity served the good purpose of keeping the field of fire free of small craft which went far toward offsetting the difficulties caused by such a condition.

As a whole, and indeed without any exception, the work of the guardsmen was good. In general the personnel showed satisfactory knowledge of their duties and performed them efficiently. In no instance could it be said that the practice was poor when the limited opportunity for preparation for it is taken into consideration, and it was gratifying to observe the general improvement over the preceding year. This view of the work of this Command is borne out by the fact that on August 22nd six of the companies completed their firing between 8 A. M. and 4 P. M., two companies firing eight rounds each on 10-inch guns, two eight rounds each on 12-inch mortars, and two sixteen rounds each on 6-inch guns. However, in the command some of the organizations stood out in a manner that is worthy of notice.

The Headquarters Detachment commanded by Capt. Jasper W. Knapp, Jr., who is also Artillery Engineer, performed the duties required of enlisted specialists remarkably well. This detachment consists largely of graduates and undergraduates of military schools and the men assigned to technical duties were well prepared to perform them as is evidenced by the results obtained.

The 410th Company of Gordonsville, Virginia, commanded by Capt. Lester L. Shannon, although one of the smallest companies of the Command, won the Rifle Team Trophy and the Baseball Cup in the face of the keenest competition.

The outstanding performance, however, of any organization from the viewpoint of this branch of the service was the firing at Battery Eustis by the 409th Company of Lynchburg, commanded by Capt. Alonzo E. Wood. Out of seven, shots fired there were at least five hits. The seventh shot cut the tow line immediately in front of the target and thus interrupted the completion of the scheduled series of eight shots. The following table showing longitudinal and lateral deviations in yards speaks for itself:

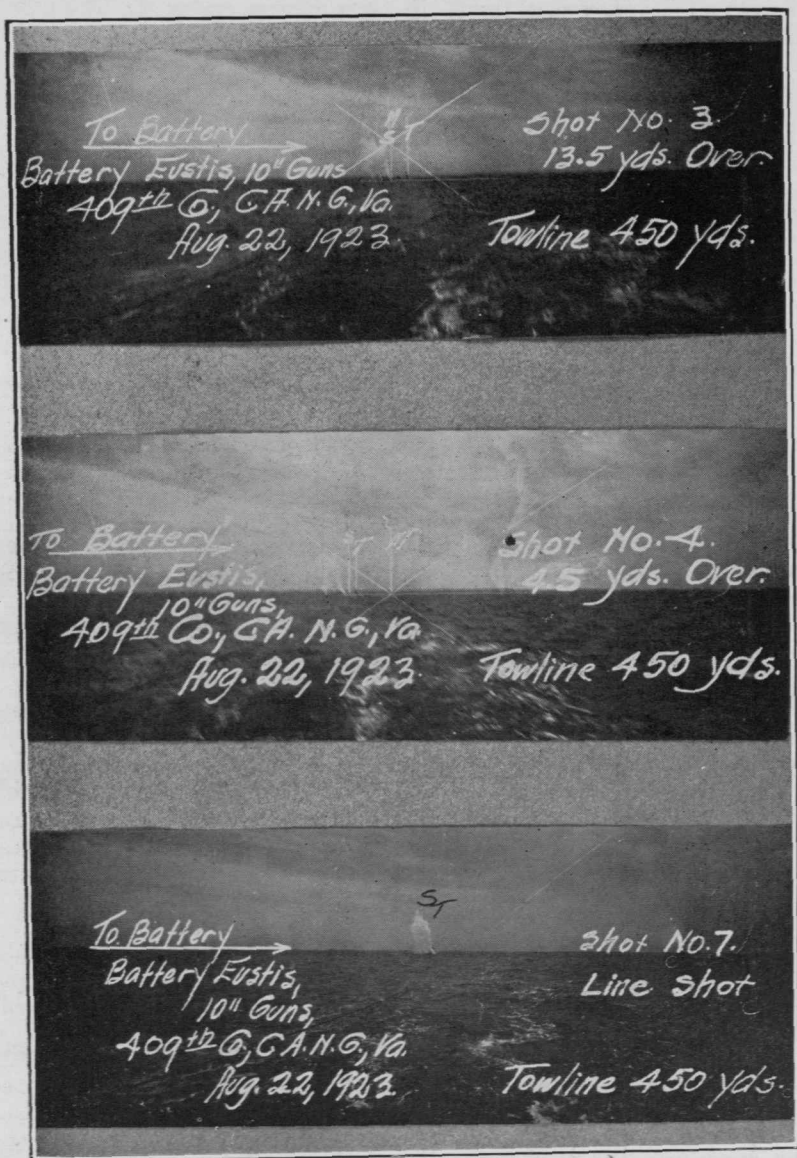


FIG. 1.

Shot No.	Longitudinal Deviation	Lateral Deviation
1.	208 over	12 left
2.	27 over	24 right
3.	14 over	6 left
4.	5 over	12 right
5.	82 over	12 left
6.	29 over	18 right
7.	Line	6 left

In commenting on the firing of this company as well as on the general work of the Command, Brigadier General Wm. R. Smith commanding the Third Coast Artillery District, has in a letter to Colonel Milton, Commanding Officer of the First Coast Defense Command, the following to say:

"I have noted with particular satisfaction the excellent condition of instruction which exists in the various units of your Command. In particular, I have had called to my attention the results of the target practice conducted on August 22, 1923, by the 409th Company at Battery Eustis. This Battery fired seven shots at a moving target at an average range of 7030 yards, of which at least five would have had effect on a capital ship. The steadiness of the personnel and the consistent accuracy of results were such as would do credit to any regular Coast Artillery Battery and deserve especial commendation when achieved by an organization with the limited opportunity for service at the guns afforded to National Guard organizations.

"I wish to seize this opportunity of expressing to you and your officers and men my personal appreciation and commendation for the marked progress of the Coast Defense Command, Virginia National Guard, toward the goal of Coast Artillery efficiency."

The Hawaiian Flag

By Sidney Ballou, Lieutenant C. A., O. R. C.

As no less than four Coast Artillery units ⁽¹⁾ have the stripes of the Hawaiian flag on their coats of arms, some notes on the history of that flag may be of interest.

The Hawaiian flag in its present form dates with certainty from 1845, as we find in the "Polynesian" of May 31 of that year the following item: "At the opening of the legislative council, May 25, 1845, the new national banner was unfurled, differing little, however, from the former." Then follows an heraldic description of the flag as now known, the portion relating to the stripes being as follows: "It is octo, parted per fess, first, fourth and seventh argent: second, fifth and eighth gules: third and sixth azure; for the eight islands under one sovereign". The slight difference from the former banner not further explained.

Two years previous, in 1843, the Hawaiian Islands had been seized by Lord George Paulet on behalf of England, and at this time all Hawaiian flags were ordered to be destroyed. Later the British Government disavowed the seizure and the flag was restored by Admiral Thomas. There is a tradition that prior to this time the stripes ran in the more natural order of red, white, blue, red, white blue, red, white, and that upon the restoration King Kamehameha III de-

(1) Coast Defenses of Pearl Harbor, Coast Defenses of Honolulu, 41st Artillery, 64th Artillery.

creed an exact reversal, which would result in the present arrangement, to symbolize the recent overturn of the government and the beginning of a new era. This tradition, however, cannot be verified by any contemporaneous literature. There is no lack of descriptions of early Hawaii, but a careful compilation of all references to the flag shows a most extraordinary diversity of description. Not a single observer, prior to 1845, gives the number of stripes as eight, but descriptions alternate between seven and nine. Some describe the stripes as alternate red and white, some as red, white and blue. Choris (1861), Golovin (1818) and Jarves (1843) put the red stripe uppermost, Bennett (1834) the blue stripe, and Freycinet (1819) the white stripe. The British Union or Jack is commonly noted, though occasionally omitted, as in the portrait of Kamehameha III (1847), hanging in the Executive Building (Iolani Palace) in Honolulu. Such diversity of description warrants the suspicion that more than one variety of the flag may have existed.

All we know certainly of the early history of the flag is that Vancouver gave Kamehameha I a British flag, which the King flew proudly for some time. Later, learning its significance as admission of the sovereignty of Great Britain he altered it to make it his own, retaining the British Union to signify his friendship for England and adopting American colors in the stripes, out of compliment to the United States. Through the mutations of time, therefore, the British Union has become part of the flag of an American territory, greatly to the wonder of young British naval officers when they see it for the first time.

When the Hawaiian Monarchy was overthrown in 1893, the Provisional Government hoisted the American flag, but when this was hauled down by order of President Cleveland, that government, followed by the Republic, went back to the monarchical flag without alteration. This procedure, which is rather unusual on the part of a revolutionary government, was dictated by a desire to conciliate the native Hawaiians and to make as little change in the outward symbols of their government as possible.

The Hawaiian flag ended its career as a national emblem in August, 1898, when with elaborate ceremonies it was hauled down from the Executive Building and replaced by the Stars and Stripes. It is still the official territorial flag, as well as an object of affection to all kamaainas, native and white alike. The eight inhabited islands represented by the stripes are Hawaii, Maui, Oahu, Kauai, Molokai, Lanai, Kahoolawe and Ni'ihau.

Work of the 3rd Battalion, 55th Artillery

The following notes on the training of the 3rd Battalion, 55th Artillery, are extracted from a copy of the Report of the Battalion Commander, Captain W. J. Gilbert, C. A. C.

The organizations now composing the 3rd Battalion, 55th Artillery were originally fixed defense companies in Oahu. They were assigned to auxiliary service with 155 G. P. F. equipment in addition to their fixed armament, and were not equipped with tractors until October, 1921, becoming a part of the Regiment on January 1, 1922. In October 1921 the organizations now Batteries G and H were ordered into the field for service firing. This firing was conducted at water targets, first at a fixed target, and then at a drifting target. This firing is believed to have been the first practice at anything approximating naval targets by G. P. F. guns, and was conducted at all ranges from 8000 yards to 17,600 yards. Only two officers then with the Battalion had had any experience with G. P. F's. To these two officers, Major C. A. French and Captain G. B. Blaney,

great credit is due for the improvisation of fire control material and for the general excellence of the results obtained.

Shortly following the organization of the 55th Artillery, the 2nd Battalion (Batteries D, E and F) and the new 3rd Battalion (Batteries G, H and I) were ordered to exchange stations. Battery I was already stationed at Fort Kamehameha. In the ensuing road march of Batteries G and H from Fort Ruger to Fort Kamehameha, all sorts of mechanical difficulties with the tractors and other motor transportation were developed. These organizations took approximately six hours more to cover the same distance than the veteran 2nd Battalion, which had moved from Fort Kamehameha to Fort Ruger. As a result of this experience, the gun commanders, tractor drivers and mechanics determined that never again would the 3rd Battalion come out second on a road march. According to the report of the Battalion Commander, their determination has been fulfilled.

During the first four months of 1922, the 3rd Battalion profited by serving along side the veteran 1st Battalion at Fort Kamehameha, from them learning the necessary kinks in the handling and up keep of tractor artillery equipment.

The first target practice of 1922 occurred in May, firing at drifting targets. Position finding was by a detail from Battalion Headquarters, the necessary relocation of data being made by Battery Commanders, using a chart on which was plotted the data received from the Battalion station, these data being relocated for the Battery by two celluloid T-squares super-imposed on the chart. A time interval system was improvised, using a bell rung with a strap key by means of which all phones terminating or plugged into the battalion switch board could hear the buzzing of the bell. The problems included both battalion and battery salvos and volley, first with parallel and then with conversion fire.

A satisfactory test of the Battalion's mobility came in June, 1922, when the 3rd Battalion was ordered to Puena Point to fire day and night practices. By the attachment of sufficient personnel to units of the 3rd Battalion from corresponding units of the 1st Battalion in order to bring the 3rd Battalion to full strength, the 3rd Battalion was able to move a distance of 34 miles in the rain and was dug in ready to fire between 8:00 P. M. on the night of starting and 1:00 P. M. the next day. From this position, night firing was conducted through the use of four searchlights from the 64th Artillery, the gun pointers illuminating the sights on the gun by a flash light held in the hand. The return march to Fort Kamehameha was made under conditions which showed the remarkable improvement which the Battalion had accomplished in about six months of training.

During 1922 the training of communications details was carried on consistently both in garrison and in the field.

The training for 1922 concluded with a Regimental Maneuver, which involved the concentration of all three Battalions at Puena Point, the first marching from Fort Shafter, the second from Fort Ruger and the third from Fort Kamehameha. This Maneuver involved an unusual series of difficulties in negotiating heavy grades, narrow roads, rocks, sand and marshes, and as well, included thorough training in camouflage and camouflage discipline, and the execution of a series of firing problems involving the whole Regiment.

As a result of the combined training of the three Battalions in the 55th Artillery, a valuable degree of experience was attained by all officers and men, the new ideas developed in each organization were disseminated through the Regiment, and through conferences and cooperation the firing and marching methods have been subjected to test and improvement, which have put the 55th Artillery far along the road to complete efficiency in its particular share of the mission of the defense of Oahu.

BOOK REVIEWS

Brief Drawing. By Ralph C. Ringwalt. Longmans, Green and Co. New York. 1923. 5" x 7½". 214 pp. Price, \$1.50.

Although this book on brief drawing is essentially the same as others as far as the material is concerned, the author has made all the chapters so clear and concise, that he has successfully carried out his plan, namely, to tell: (1) how to collect facts, (2) how to reason about them logically, and (3) how to organize them systematically.

The little volume is divided into three parts: Part I—Introductory, Part II—The Elements of Argumentation, and Part III—Brief Drawing. Of the two important kinds of briefs, argumentative and expository, the author considers only the first, his attitude being that, one who had prepared a brief on *The Results of Arctic Exploration*, could not without special training turn the brief into an argument. But one who had drawn a brief on the topic, *Arctic Exploration has been Justified by its Results*, could without further knowledge of principles, recast the material into the form of an exposition.

Part I contains chapters on, the brief and its importance, library research, and reading and note-taking. Part II is devoted to a consideration of, the topic, the audience, what must be proved, method of proof, proof-reasoning, and proof-evidence. The last part is given over to discussions on, the elements of the brief form, the explanatory paragraph, the argumentative paragraph, the introduction, the argument, the conclusion, the last chapter being devoted to the brief as a whole.

The author has designed his text for class-room use, for he maintains that the utmost progress in brief-drawing is not likely to be made by the student by examining briefs, and studying principles. The student requires the criticism of an instructor. Nevertheless the book will prove helpful to those who cannot have the benefit of this kind of training.

English Manual for Business. By Robert Winternitz, Planning Department, William Filene's Sons Company, in collaboration with Paul T. Cheringon, Marketing Advisor, J. Walter Thompson Company. Chicago. A. W. Shaw Company. 1923. 4¾" x 7¾". 96 pp. Cloth. Price, \$1.00.

A large part of this book is devoted to a subject which will be found of unusual importance to members of the service at the present time, namely, usage of good English and application of the fundamentals of sentence structure, punctuation, grammar, spelling, and connectives. The chapter on connectives will, of itself, furnish food for serious reflection on the part of all who have occasion to handle any amount of correspondence. It offers a multitude of words replacing "and" and "but," which so often seem to repeat themselves, as well as other connectives for comparison, conviction, transition, etc.

The appendix contains much information which will be found useful to anyone who wishes an elementary knowledge of the planning of any printed matter, such as rules for choosing suitable type; rules for layout of copy; proof-readers' marks; how to determine the dimensions of a cut; estimating quantity of work; how to find weights of paper; type measurement, etc.

The Outline of Science. (Volumes I and II). Edited by Professor J. Arthur Thomson. G. W. Putnam's Sons, New York and London. 1922. 7½" x 10½". 296 and 564 pp. Ill. Cloth.

The purpose of this set of books is best stated by the editor himself in his prefatory remarks. "Its purpose is to give the intelligent student-citizen, otherwise called the 'man in the street,' a bunch of intellectual keys by which to open the doors which have been hitherto shut to him," That Professor Thompson has succeeded in his object, there is no question of a doubt. The purpose and its accomplishment are splendid. Difficult and abstruse theory is presented to the reader in such a manner as to appear almost childishly simple.

Volume I begins with "The Romance of the Heavens and the Evolution of Man" and takes the reader thru the various steps of evolution up to what Professor Thompson terms, "The Foundation of the Universe." Volume II takes up and classifies the different sciences under separate subheads or chapters such as; The Wonders of Microscopy, The Body-Machine and its Works, The Darwinian Theory, Natural History—Birds—Mammals and Insects. Each subject is dealt with in a remarkably interesting manner, thereby substantiating the old adage that "truth is stranger than fiction."

These volumes are beautifully and abundantly illustrated and would be an excellent addition to any officer's professional library.

Sparkling Plugs. By A. P. Young and H. Warren. Isaac Pitman and Sons. New York. 1922. 4" x 6½". 106 pp. Profusely Illustrated.

According to the title page, this volume in the series of "Pitman's Technical Primers," is an original treatment of theory and practice for students, designers and users of ignition devices.

The authors discuss the ideal plug from the view points of gas-tightness, durability, adequate reach and length of barrel, resistance to rust and corrosion, freedom from pre-igniting and possession of suitable electrodes, resistance to current leakage and electrical puncture, freedom from short circuiting or cutting out, and the possession of a spark gap having suitable electrical characteristics. The question of sparking electrodes is also discussed, the factors that determine sparking voltage being duly considered. The three materials in general use as plug insulators, viz.—porcelain, steatite and mica, are also dealt with. The concluding chapter is devoted to a description of standard plugs.

The aim of the publishers of this series is to treat the fundamental principles of some subdivision of technology in a practical manner, thus providing the student with a handy survey of the particular branch of technology with which he is concerned.

In this little volume of 106 pages the authors, in addition to the design and construction of plugs, also treat the general principles of electric ignition, clearly and concisely, making the primer truly valuable to the busy practical man who has not the time for more elaborate treatises.

Foundations of Formal Logic. By Henry B. Smith. Univ. of Pa. Press. Philadelphia. 1922. 6½" x 9½". 56 pp.

This pamphlet is a revision of the author's *Primer of Logic*, an outline for classroom use. Only parts of the original text have been retained and these have received a methodical rearrangement and expansion. Two chapters of the original outline, Non-Aristotelian Logic, appear again but modified in detail. To these the author has added historical notes and citations and three new final chapters and has illustrated the text with a number of diagrams.

The author makes no pretense to finality. His work is concerned with the foundations upon which a theory may be built. Professor Smith, it might be mentioned, recently produced a more comprehensive text, *A First Book in Logic*.

General Astronomy. By H. Spencer Jones. Longmans, Green and Co. New York. 1922. 6" x 8 $\frac{3}{4}$ ". 392 pp. Profusely Ill. Price \$6.00.

It would seem that a certain school of present-day scientists takes precious delight in showing how appallingly ignorant the average man is. Some have gone so far as to marshal their theories in such a manner that not more than a half dozen of their own cult can really fathom their forbidding tones.

It is a hopeful sign from the average reader's viewpoint, that the author of the volume before us, notwithstanding the highly scientific work upon which he is engaged (he is chief assistant of the Royal Observatory, Greenwich, and was a member of the expedition to Christmas Island to observe the total eclipse of September 21, 1922) did not see fit to produce a work on *Mathematical Astronomy*. In endeavoring to cover as wide a field as possible in a popular treatise, and at the same time include the most recent developments, he chose the harder role. But it may be truly said that he has succeeded in giving the average reader a sufficiently complete view of the present state of *Astronomy*.

In a work of this kind it is impossible to exclude mathematics entirely, but the author has almost succeeded, so that his book appeals to the amateur as well as to the student. It is a credit to the publishers as well as to the author, his well considered chapters on the celestial sphere, the earth, the moon, the sun, the planets, the stars, the stellar universe, astronomical instruments and observations, and planetary motions, being characterized not only by painstaking attention, but by the astronomical photographs, perhaps the most complete group ever assembled in a popular work.

Machine Drawing. By Carl L. Svensen. D. Van Nostrand Co. New York. 1922. 6" x 9 $\frac{1}{4}$ ". 214 pp. 338 Ill. Price, \$2.25.

This is the second printing, corrected, of Professor Svensen's text and problem book for technical students and draftsmen. The book was planned as a guide for the development of an understanding of the relation of machine drawing to engineering. It is designed for advanced courses for students who have had previous instruction in mechanical drawing, although a brief chapter on elementary principles is given, mainly as an introduction to the course and for review purposes or reference.

Not only is there a complete treatment of the subject of working drawings, drafting room practice, idiomatic expressions of the engineering language, a chapter on the principles and practices of dimensioning, a study of the common machine details, empirical machine design,—all properly belonging to an advanced course, in machine drawing, but a collection of nearly two hundred problems, of great value, because of their number, variety and character, as well as for their arrangement under headings in a single chapter.

Telephony. By Samuel G. McMeen and K. B. Miller. American Technical Society. Chicago. 1923. 5 $\frac{1}{2}$ " x 8 $\frac{1}{2}$ ". 960 pp. Ill. Price \$6.00.

This book is a compendium of valuable information concerning all the branches of modern telephone practice and covers the theory of telephony so far as that theory is needed by the average telephone workman or engineer. It is well illustrated with photographs and drawings of standard equipment and diagrams of all standard circuits.

More specifically the book treats rather fully in simple language of central office equipment, plants and buildings, toll lines, conduits, time saving methods and office systems. Several chapters are devoted to automatic systems.

A text Book of Practical Physics. By W. Watson. Revised by H. Moss. Longmans, Green and Co. New York. 1923. $5\frac{1}{2}$ " x 8". 633 pp. Profusely Illustrated. Price, \$3.50.

Although this revised edition is the work of a fellow physicist, it certainly sustains the late Doctor Watson's recognized position among the leaders in the field of physics, just as does his noteworthy work as director of the Central Laboratory, B.E.F., from its establishment in June 1915, soon after the first gas attack, to the conclusion of 1918. Colonel Watson died in March 1919, the extremely hazardous and exacting nature of his work with gases no doubt contributing largely to his death.

This text is intended to serve as a manual of reference to the student working in a physical laboratory, the experiments described not being intended for a beginner, but rather for the student who has already pursued an elementary course in physics and has had some elementary laboratory work.

In the present edition some new experiments have been added, particularly those on the continuous flow calorimeter and on the viscosity of gases. Changes have been made in the tables to bring them up to date, and certain sections have been rewritten, but the general character of the book remains unchanged.

A Treatise on Bessel Functions and their Application to Physics. By A. Gray and T. M. MacRobert. The Macmillan Co. New York. 1922. $5\frac{1}{2}$ " x 9". 327 pp. Price, \$12.00.

This new edition of transcendental functions, discovered by Bessel while investigating a problem connected with elliptic motion, follows the plan of the first edition, although the whole of the earlier and more analytical chapters have been in great part rewritten.

When this reference work appeared originally in 1895, it was the author's aim to supply in a convenient form so much of the theory of the functions necessary for their practical application to mathematical physics, and to illustrate their use by physical problems.

Many minor changes have been made, including the addition of collections of examples. Not the least important part of the work is the series of numerical tables of great value to those who have to use Bessel Functions in computations.

Metric Systems for Engineers. By Charles B. Clapham. E. P. Dutton and Co. New York. 1922. $5\frac{1}{2}$ " x $8\frac{3}{4}$ ". 181 pp. Price, \$6.00.

The author's object in preparing this book is to explain the Metric System from the technical point of view, without intending to advocate its compulsory adoption. The author reminds us that although this "subject is regularly taught in the schools its is doubtful whether it is regarded as anything but an alien subject, to which a minimum of attention need be given, with the result that there are few (other than those with subsequent scientific training) who can visualize dimensions and data in its units."

After devoting the first chapter to the basic principles of the system, the simple measures of length, area, volume, capacity and weight are next considered, special attention being given the so-called practical units (the few in common use) and examples worked out involving them.

The usual tools for measuring length, found in the draughting room and work shop, such as verniers, micrometers, and planimeters, are considered, numerous examples in reading being given by means of illustrations. Calculations involved in screw cutting and gear wheels are also considered at length.

At the end of the book the various equivalents worked out have been tabulated for reference. Charts for the conversion of the compound measures usually met with are provided suitable for mounting on cards for office or shop use.

This volume is up to the standard set by the publishers of the Directly useful Technical Series, in that "the information, the problems, and the exercises are of a directly useful character" and "at the same time are wedded to that proper amount of scientific explanation which alone will satisfy the inquiring mind."

The Operating Engineer's Catechism of Steam Engineering. By M. H. Gornston. D. Van Nostrand Co. New York. 1922. $4\frac{1}{4}" \times 7\frac{3}{4}"$. 428 pp. Profusely illustrated. Price, \$4.00.

This book of questions and answers for steam plant engineers was actuated by the need for a book that would furnish the engineer and prospective engineer, clear and easily understood answers to questions that arise in the course of a day's work in the steam plant.

The topics treated embrace heat and steam, engines, boilers, feed water apparatus, valves, condensers, compound engines, steam turbines, pumping machinery, heating, mechanical stokers, pulleys and belting. There are 1300 questions and answers, each subject being developed in turn. The answer to each question is made as short and direct as possible, giving only the information demanded by the question. When technical terms are used, they are either defined or made clear by the wording of the answer.

The volume is well illustrated and carefully and fully indexed, making it a ready reference for the engineer as well as a catechism for the prospective engineer.

A Beginner's Star-Book. By Kelvin McKready. G. P. Putnam's Sons. New York. 1912. $7\frac{1}{2}" \times 10\frac{1}{2}"$. 148 pp.

The subtitle gives an excellent idea of the content of this volume—An easy guide to the stars and to the astronomical uses of the opera glass, the field glass, and the telescope. While it is intended to help those who are without technical equipment to claim through the unaided eyes, or through simple optical instruments, their heritage in the things of the sky, it should prove a valuable observational manual to be used in educational institutions, concurrently with the modern volumes on astronomy.

As to the form, seldom has the general reader been given an opportunity to possess a volume, so elementary and yet so comprehensive. No finer illustrations of the stellar world and the solar system have appeared in a popular volume. There are charts of the moon, star maps for any year on a new plan and tables of the planets indicating their positions in their course through the stars, month by month till the year 1931.

Besides a chapter on some instruments of observation, including the opera-glass, the field glass, the hand telescope, or spy glass, and the astronomical telescope, there is an observers catalogue of telescopic objects, and groupings of these telescopic objects under key-maps in three different classes—(a) those of the opera glass and field glass, (b) those for telescopes of 2 inches, and (c) those for telescopes of 3 inches, in aperture.

To those who wish to add to their knowledge of the skies without optical aid of any kind this volume is also extremely valuable. The work was first published in 1912 and has been recently reprinted.

The Art and Science of War Versus the Art of Fighting. By Captain Robert G. Carter, U. S. Army, retired. National Publishing Co. Washington, 1922. 6" x 9". 97 pp.

After fighting through four years of the Civil War, Captain Carter went to West Point. Upon graduation he was assigned to the 4th Cavalry and took part in the Campaigns against the Indians, winning a Congressional Medal of Honor and two Brevets for bravery in action, before being retired on account of wounds received in action.

He has had a lot of experience in the Art of Fighting, and has received some instruction in the Art and Science of War, as it is taught. It is his opinion that there is a real difference between plain "Scrapping" and the Science of War, and he does not hesitate to express his belief that the former is the more important. He believes that men and officers should be taught to fight, first, last and all the time, and that Saluting, the Art of Manoeuvre and Sham Battles are of secondary importance. He has no patience with our highly developed rifle matches, where spectators at the Firing Line are requested not to talk, lest they disturb the contestants. He discusses various battles of the Civil War and shows that it was won not by the highly trained Military Scientists which the North had at the beginning, but by Generals who were willing to fight the enemy wherever and whenever he could be found. He depreciates the study of German Army Tactics by our officers, because the Germans, individually, are inferior to our men as fighters and have quite different characteristics.

The book is very forcefully written and will be enjoyed by all, particularly those whose brains are a little weary of the ceaseless study required of the Modern Army Officer.

The Idea of Einstein's Theory. By J. H. Thirring, Translated by Rhoda A. B. Russel. Robert M. McBride and Co. New York. 1922. 5" x 7½". 165 pp. 8 Ill. Price, \$2.00.

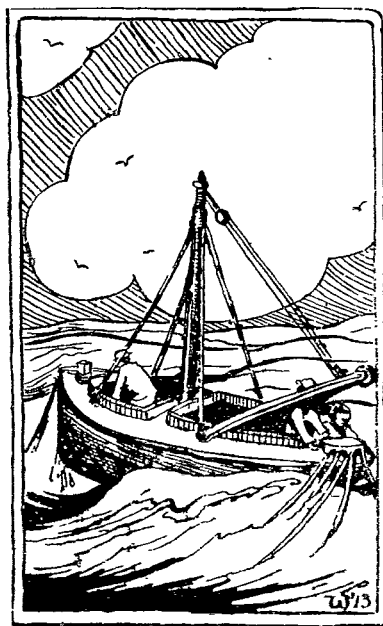
Relativity and The Universe. By Harry Schmidt, Translated by K. Wishman. Robert M. McBride and Co. New York. 1922. 5" x 7½". 136 pp. Price, \$2.00

If it be possible to put Einstein's Theory of Relativity into the movies, surely the average reader if he will take thought, may learn something of the connections between the fundamental ideas of this theory. Of the two books before us Dr. Schmidt's is the more popular although neither are in the least academic.

Dr. Schmidt's little book is the outcome of a series of lectures delivered in connection with free extension courses. The interest shown in the subject by an audience, drawn from all sorts of professions and callings, induced the author to write them out. He treats his subject-matter in a colloquial manner, using simple analogies, as he puts before the reader's mind, step by step, and in leisurely fashion, the difficulties which are connected with the theory of relativity. The author's idea is to explain in simple, non-technical language how Einstein arrived at his conclusions, and how if we accept them, they are likely to modify our view of the universe.

Professor Thirring's purpose in presenting his book is not to give an account of mere details appertaining to the theory, but rather to give a complete and coherent exposition of the whole, at the same time avoiding all mathematical accessories. The author's aim is not only to enable the reader to understand what is meant when we maintain that the space surrounding gravitational masses suffers curvature, but he must be made to see how Einstein was bound to arrive at such a conclusion. His plan then is to follow up the logical connection of the whole theory commencing with the special theory of relativity in its most simple form.

Professor Thirring's work should prove a valuable companion volume to Dr. Schmidt's more elementary, and less comprehensive introduction to the theory of relativity.



THE COAST ARTILLERY JOURNAL

(PUBLISHED AS THE JOURNAL UNITED STATES ARTILLERY FROM 1892 TO JUNE, 1922)

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Published monthly under supervision of the Commandant, Coast Artillery School, by direction of the Chief of Coast Artillery, for the instruction of the Coast Artillery Corps, Reserve Officers and the National Guard.

Entered at the Post Office at Fortress Monroe, Va., as second class matter. Acceptance for mailing at special rate of postage provided for in section 1103, Act of October 3, 1917, authorized May 8, 1920. All subscriptions payable in advance.

Subscription rates:		
Yearly Domestic		\$3.00
Canada		3.25
Countries in the postal union		3.50
Single numbers		
Domestic		0.50
Foreign		0.60

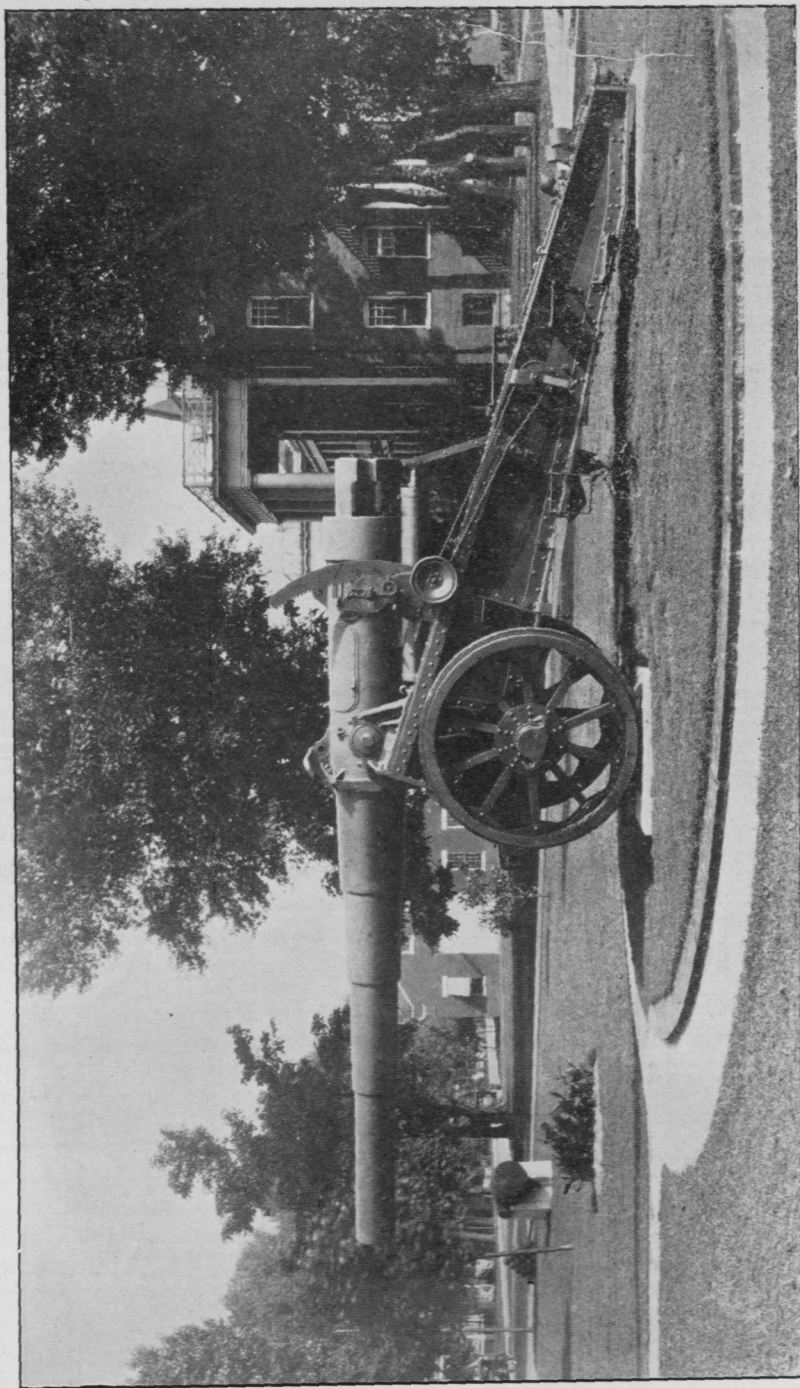
Remittances, articles intended for publication, and communications relating to the management should be addressed COAST ARTILLERY JOURNAL, Fort Monroe, Virginia.

Authors alone are responsible for statements in contributed articles.

It is earnestly requested that prompt information be given of changes of address, or failure to receive the JOURNAL. Both old and new addresses should be given.

MAJOR J. A. GREEN, C. A. C., Manager and Editor.
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PRINTED BY THE HOUSTON PRINTING AND PUBLISHING HOUSE, HAMPTON, VIRGINIA



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