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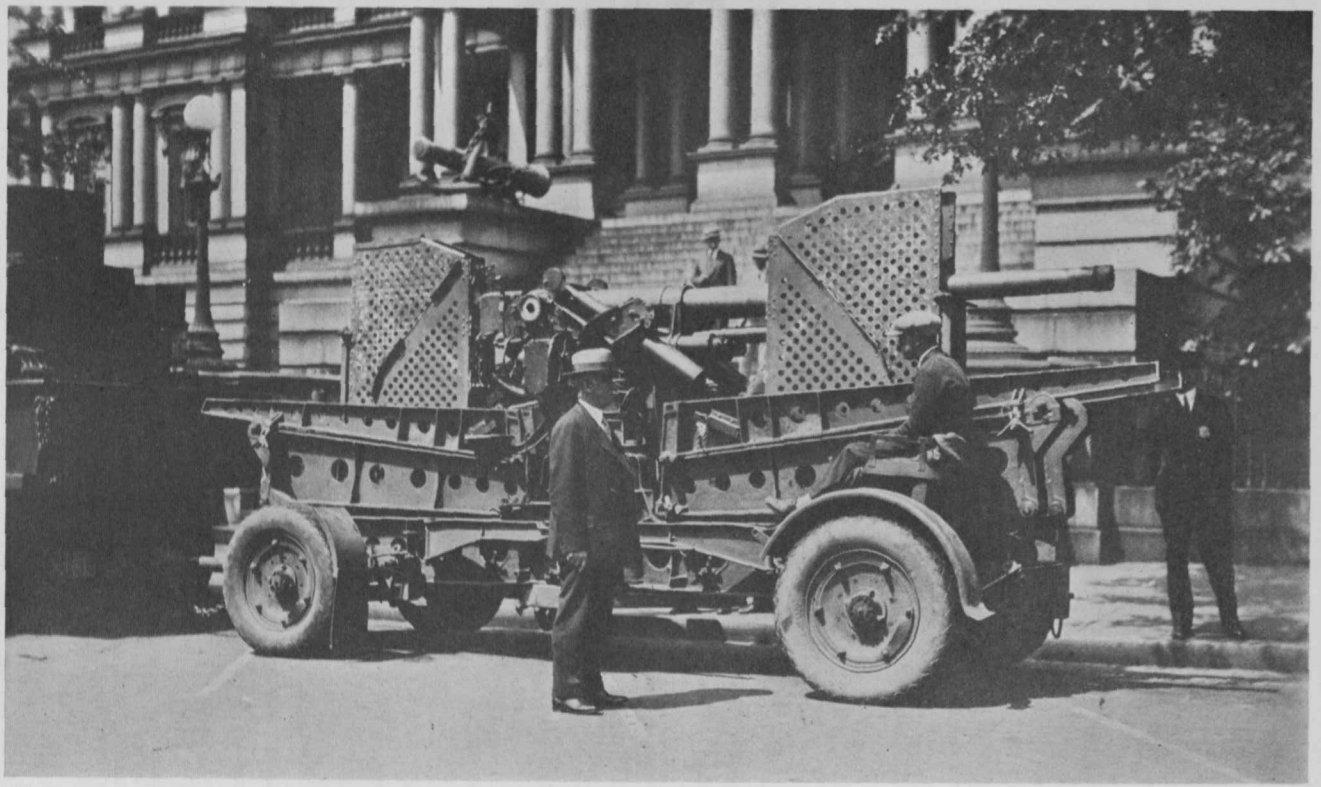

SECRETARY OF WAR EXAMINES NEWEST TYPE ANTIAIRCRAFT GUN

Hon. James W. Good, Secretary of War, Looking Over the Latest Type Mobile 3-Inch Antiaircraft Gun in Front of State, War, and Navy Building

THE COAST ARTILLERY JOURNAL

Volume 71 August, 1929 Number 2

Progress

Antiaircraft Materiel Leads the Way

By CAPT. GORDON B. WELCH, C. A. C. (NOW O. D.)

EIGHTY THOUSAND foot-tons of energy per minute, equivalent to nearly five thousand horsepower, are imparted to its projectiles by a modern three-inch antiaircraft gun battery during a burst of fire. These projectiles, at the rate of one hundred per minute, carry with them to the target potential energy in the form of high-explosive bursting charges equal to about the same amount. This potential energy, when released by properly timed fuzes, fills the space in the vicinity of the target with irregularly-shaped steel shell fragments which travel at high velocities and which are highly inimical to the safety of the airplane under fire and of its passengers.

To visualize still more clearly the development in the fire power of antiaircraft artillery since the World War, a comparison of the muzzle energy per minute of the modern battery with that of the best of our wartime mobile batteries shows that the modern battery delivers twice as much as the older materiel although firing the same ammunition. A comparison with major-caliber seacoast armament shows that the modern antiaircraft gun battery delivers about sixty per cent more muzzle energy per minute than a 12-inch mortar battery firing two pit salvos at a battleship every forty-five seconds.

Figure 1 shows a battery of these guns in action during the Aberdeen firings in 1928. The great power of this weapon has been made possible by its stability, high muzzle velocity, and simplicity of control. The design feature resulting in stability at all firing elevations can be readily seen in the illustration. Four long outriggers resting like a spider on the ground absorb all thrust and overturning moments with very little movement and almost no tendency to jump out of level.

Firing, as it does, entirely by Case III, the level of such a mount is important, and so provisions are made for leveling the carriage in a very simple manner, even though the outriggers may be resting on a slope. These outriggers, it should be noted, have the further purpose of serving, when folded up, as a chassis for the gun mount. Two wheel bogies are run under each end of the folded up chassis and, when clamped in position, provide the running gear for the mobile mount. The wheels are pro-

vided with large balloon tires, the rear bogie with a brakeman's seat and internal expanding brakes for the proper control of a towed vehicle, and the front bogie with a tongue, a towing lunette, and the necessary steering gear. Speeds of twenty-five to thirty miles per hour can easily be maintained with this gun over good roads, while the balloon tires and the good balance of the load make it possible to maneuver very satisfactorily off roads and across country.

The muzzle velocity of two thousand six hundred and fourteen feet per second is attained by using a gun tube fifty calibers long, thus extracting from the same ammunition which, in the model 1918, war-time gun

FIG. 1. 3-INCH ANTIAIRCRAFT BATTERY IN ACTION

gives two thousand four hundred-foot seconds, two hundred and fourteen more feet per second. High muzzle velocities of themselves are of no particular value in antiaircraft artillery except as they assure, for a given range, a minimum time of flight. If it were possible to give projectiles the speed and straight-line path of light, direct hits could always be scored on the fastest moving targets. But with definite practical velocities, appreciable time elapses from the firing of the gun to the arrival of the projectile at the target and the fast-moving airplane target may thus have had time to execute very unexpected maneuvers. Armies have therefore pushed their muzzle velocities upwards since the war and this gun represents a very satisfactory attainment.

High muzzle velocities, however, cause great erosion in the bore of a gun and this results, after the firing of a more or less limited number of rounds, in a complete loss of requisite accuracy of fire. To obviate the loss of time and the expense occasioned by sending in worn out guns for re-

tubing, these guns are provided with loose liners which, when worn out, can be easily removed and replaced with new ones by a few artillerymen.

Simplicity of Control

The most important factor in the increased fire power of these new antiaircraft guns lies, however, in the third point mentioned, simplicity of control. Not only is this important to the antiaircraft artillery but its influence is certain to be far reaching on the art and technique of other branches of artillery as well. The system used by these antiaircraft batteries is compact, requires a minimum of highly skilled men, and is instantaneous in its operation. It centers about a director, that is, an in-

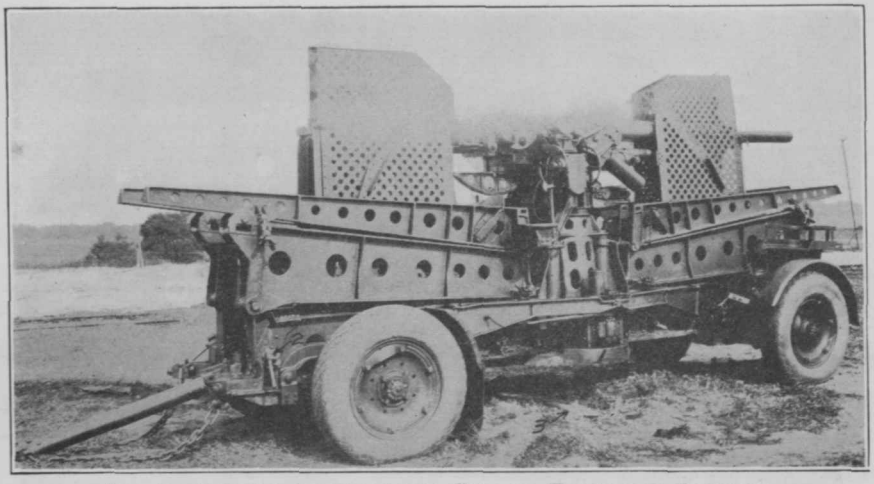

Fig. 2. 3-Inch Antiaircraft Gun in Traveling Position

strument for computing the firing data. These firing data are computed continuously and are transmitted electrically to the guns where, by turning the elevating or traversing handwheels so as to keep two pointers continuosuly matched or in coincidence, a proper laying continuously results. But two sets of data are necessary for the operation of an antiaircraft director. The first pertains to the ballistic conditions prevailing which must be properly set in before the firing. The second pertains to the range to the target which, of course, is continuously changing. A function of this range, namely altitude, which varies very slowly if at all, is, however, selected for use instead of the range itself and is determined by means of a height finder. The altitude thus measured is transmitted electrically to the director which combines it with the target's angular height, measured by pointing the telescopes of the director, to determine the range or such functions of the range as are necessary in computing the firing data.

The evolution of these directors has proceeded at a comparatively rapid rate. Their immediate progenitor is probably the seacoast artillery plot-

ting board and its allied systems but, like many of the products of evolution, they bear almost no resemblance to this remote ancestor. Although airplanes had been used in the minor Balkan Wars in the period just preceding the World War and had been tentatively fired on by improvised field artillery guns and mounts, the World War found the nations almost entirely without antiaircraft artillery or the means for firing it. But necessity forced the finding of both the artillery and the means. Plotting methods sprang up, and, in the defense of Paris, where the air attacks were mostly at night, persisted to the last. For day firings, since most artillery used sights, antiaircraft artillery also used sights and the firing

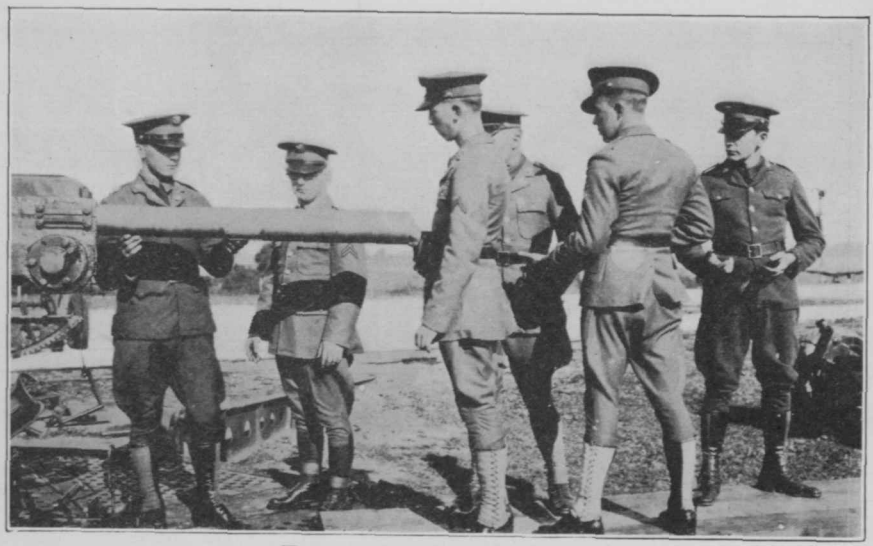

FIG. 3. REMOVING A LINER

data were designed for application to sights. At first, a modification of the plotting methods was designed, depending on a determination of the target's linear speed. Soon it was found that the rate of change of the angular coordinates of the target's position, azimuth and angular height, provided excellent bases on which to predict its future position. Various angular-travel instruments resulted, some electrical in principle and some mechanical. Of the latter, the RA Corrector has persisted till the present and is only just being superseded by more modern instruments.

The first of the really modern directors to be used in this country was the Vickers Fire Control Gear, later called the "Director M-1 (Vickers)." It appeared in the Aberdeen antiaircraft tests in 1926 and, like its immediate predecessors, is an angular-travel instrument, basing its predictions on the angular velocity of the target as measured by its telescopic sights. There are two of these sights connected by a solid shaft so that they elevate or depress together. The rate of elevating or depressing is, of course, a

direct measure of the angular rate of change of angular height or the vertical angular velocity of the target. The box containing the working parts of the instrument, including the sights and sight shaft, is mounted at a convenient height on a metal tripod and rotates, in following a target, about a vertical axis or pintle center. The rate of such rotation is a direct measure of the rate of change of the target's azimuth, that is, of its lateral or horizontal angular velocity. When the range to the target by means of the function altitude is properly applied to the director, all the elements of the problem become determinate and the instrument delivers to

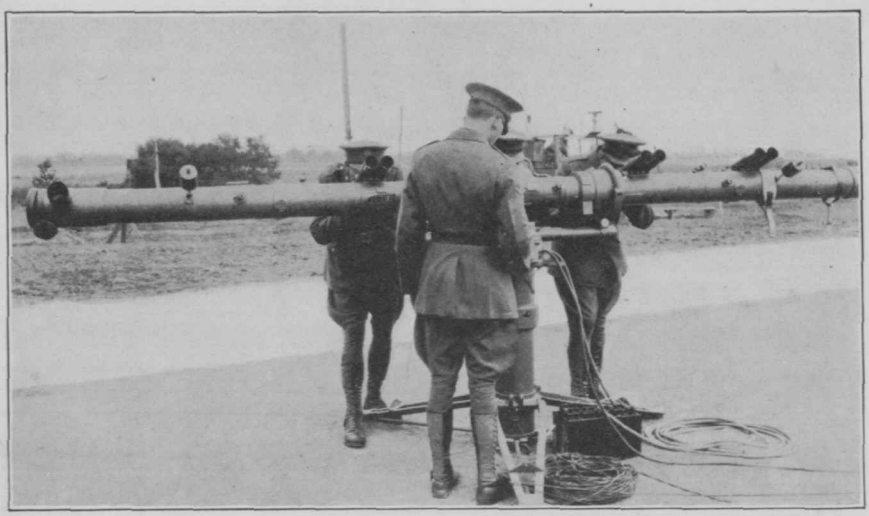

FIG. 4. STEREOSCOPIC HEIGHT FINDER T-7

its output terminals the necessary firing data in the form of predicted future azimuth, quadrant elevation, and fuze setting

The most recent of these directors is shown in Figure 5. The telescopes are large and clear, the handwheels operate easily and smoothly, a lighting system is built in for night operation, and a receiver for altitude is mounted conveniently on the top. The operators required are seven, none of whom requires any great amount of skill, although, of course, the smoothness of the flow of data improves with practice. A crew of average intelligence can be taught to operate this instrument very satisfactorily in about one-half hour. This feature alone, obviating as it does the necessity for great skill and long periods of training in the range section, makes a strong bid for the application of similar systems in other branches of artillery engaged in firing at moving targets. Then, too, since the necessity for skill and mental concentration is reduced, the probability of personnel errors under the stress of firing and being fired upon is greatly reduced.

So far only the determination of the data has been mentioned. It is highly desirable that firing data be applied on the guns instantaneously

upon its determination. Probably the fundamental development which makes for simplicity of control for guns has been the automatic electrical transmission of firing data. A comparison of director control and such a transmission system with the control exercised through a plotting room is of interest. In the latter, upon the ringing of a time-interval bell the tar-

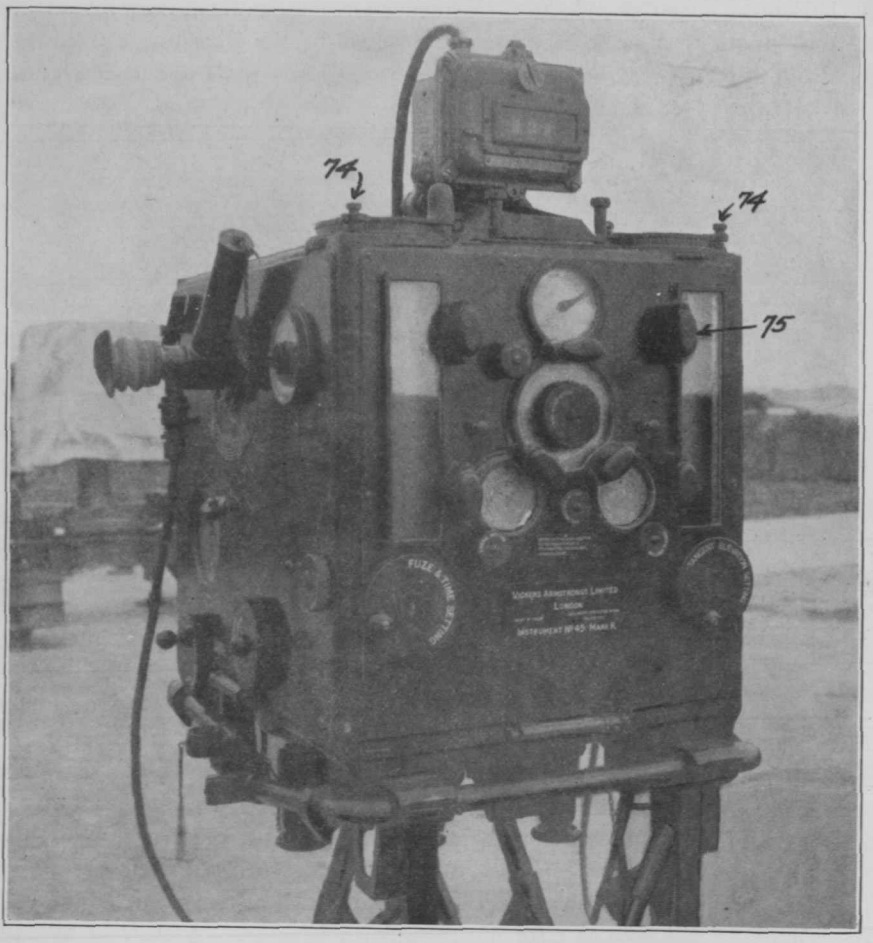

FIG. 5. DIRECTOR M-1 (VICKERS) NO. 45

get's position is plotted manually on a plotting board, and, based upon its travel during the last thirty seconds, an arithmetical computation is performed and its position predicted for a time thirty to sixty seconds plus the time of flight later. The range and azimuth to this set-forward point are then read and various operations performed thereon by instrument operators in the plotting room upon the completion of which the resulting corrected firing data are telephoned to the guns. There they are usually written with chalk on a display board. The gun crew read these data and

proceed to lay the gun accordingly and upon the ringing of an appropriate signal indicating that the predicted time has arrived, the guns are fired. With a director and electrical transmission of data, the data being computed are continuously indicated on dials at the guns. By properly matching other pointers with the indicating pointers the guns are kept continuously layed on the latest data. Thus no dead or lost time exists in the laying.

One of these indicating dials is shown in Figure 6 mounted on a fuze

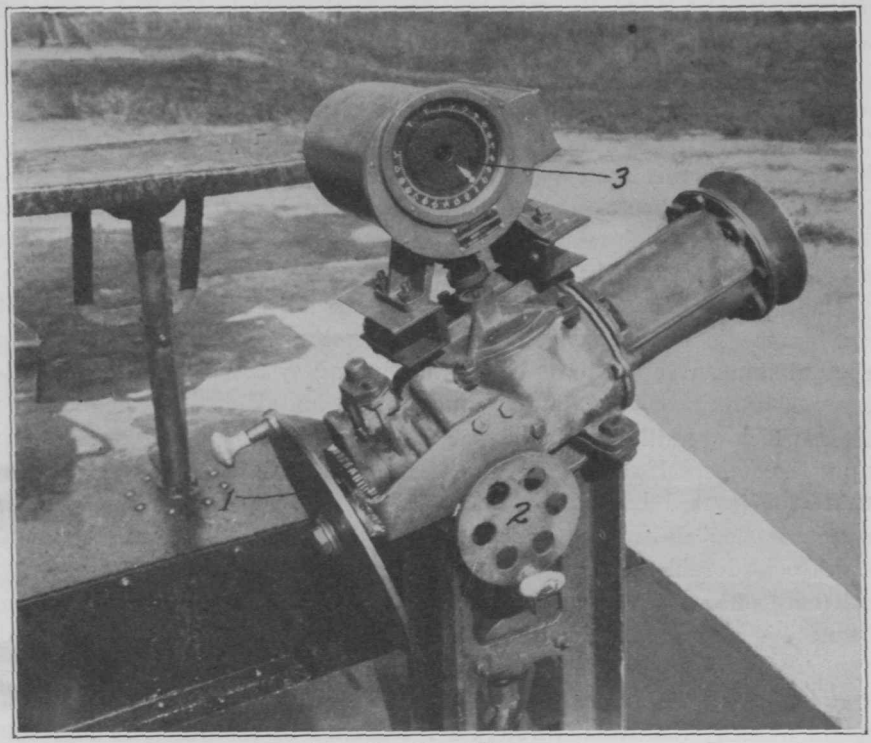

FIG. 6. FUZE SETTER

setter. The two pointers may be seen, one a small diamond, the other an elongated mark on the central card. One is actuated by the director, the other by the handwheel on the side of the fuze setter. When coincident, as they are in this illustration, the fuze setter is properly positioned to set the fuze range as predicted by the director.

These fuze setters are important adjuncts of the modern antiaircraft gun, as the antiaircraft projectile is effective only when it can be caused to burst at the proper time by means of a time fuze. This particular design is of interest also, as it is of the type known as continuous. This means that when a round is inserted and the fuze set, the setting will continue to change with the changing data until the round is removed. Thus,

when a round is removed and inserted in the gun, it is assured that the setting of the fuze is the latest computed value. The importance of this feature lies in the fact that here is the only point in the system where dead time exists for by the time a round is taken from the fuze setter, inserted in the gun, and fired, new fuze setting data have been computed. The continuous fuze setter with electrical data transmission thus enables the dead time to be kept at a minimum, usually within one second.

It will have been noted in the discussions just preceding that no mention has been made of gun pointers sights in connection with the control of this battery. Virtually, the observers on the telescopes of the director are acting as gun pointers for the whole battery. Four gun pointers are thus replaced by two whose sole duty is to follow the target smoothly, who are not bothered by the smoke and shock of discharge, and whose signal "ready" is not required before a gun is fired, since they are always ready. So reliable has this system become and so simple are the duties in connection with its operation that the modern antiaircraft gun battery does not even have gun pointers' sights at all, complete dependence being placed in the Case III follow-the-pointer control.

One more and perhaps the most important adjunct of the antiaircraft gun battery is the height finder. The ancestors of this instrument are triangulation surveys, bilateral position-finding systems of seacoast artillery, self-contained range finders, and two-station altimeter systems. The latter, which are still in use to some extent, should in theory, perhaps, be superior to the self-contained height finder, but the necessity for an accurately measured base line with a distant station requiring telephonic communication destroys the much-desired compactness of organization, causes considerable difficulty in the assignment and tracking of targets, and finally has not in fact proven its theoretical superiority in accuracy. Figure 4 is a photograph of the most successful of the height finders tested to date. Its optical base line is four meters and its principle is stereoscopic. That is, it is an extension of the human optical base line of a few millimeters whereby the brain, through a recognition of the different angles at which light enters the two eyes, is enabled to make comparisons of distance and decide whether or not two distant objects, both close to the line of sight, are at the same distance or range from the observer. In the instrument, reference symbols are provided with which to compare the range to the target and a suitable scale is available for recording the decisions of the operator. These scale readings are transformed automatically from range to altitude and as such are transmitted electrically to the director. The observer on the height finder is the only man in the fire-control system requiring a superior amount of physical and mental alertness and skill and upon whose training considerable time must be spent. However, to obtain the high rate of fire attainable with this materiel does require, outside of the fire-control section, four groups of men whose manual skill

must be high. These are the groups associated together in serving ammunition through the fuze setter and into the guns. Even here no great mental attainments are necessary and drill will perfect almost any crew of physically active men into a very satisfactory team.

A modern antiaircraft gun battery is thus seen to be a compact, easily controlled unit consisting essentially of a height finder, a director, an electrical data transmission system, and four guns. Usually the guns are emplaced roughly in a square about fifty yards on a side, with the director in the center and with the height finder a short distance outside the square so that the dirt and smoke raised by the guns will not interfere with the clear vision of the observer.

Further Developments

This system represents a very satisfactory development. In contrast to the pattern of the bursts around the target from a battery of the older guns, controlled by gunners' sights and telephoned data, which usually seems to be quite scattered both in direction and range, the pattern of the modern battery with Case III electrically transmitted data is smooth and regular, so much so that when the guns are emplaced in a square, it is sometimes possible to distinguish the same square formation in the appearance of the bursts around the target. But there are still further developments, mostly in the nature of refinements, which are in progress. With the Vickers director, non-standard atmospheric and muzzle velocity conditions can be cared for only by changing the charts on which are plotted the range and elevation relations and thus comparatively large increments of change must be used. Wind corrections are only approximated and while the vertical corrections are very accurate the approximations in the lateral corrections leave considerable to be desired. Then, too, the altitude function of the range is, in this director, as in all previous data computers, assumed to be constant during the predicting interval. It is well known that the airplane target is not restricted in its freedom to move in three dimensions and, while no doubt its altitude shows a marked tendency to remain constant during an extended purposeful flight, it will not necessarily be so at the time it is being fired upon. It is desirable therefore to provide positive altitude settings on a director with provision for predictions in altitude.

Figure 7 shows an experimental model of a director which will embody the desirable features just enumerated. It is known as the Director T-4 and is shown here mounted on an Instrument Trailer T-1. This trailer is designed to keep pace in mobility with the gun battery and to provide the necessary transportation for the fire-control instruments as well as power for the transmission system which, in this particular design, is furnished by storage batteries, themselves kept charged by a dual gasoline generator set, and a rotary converter. This power unit can just be seen at the left of the illustration. The director is particularly interesting from a struc-

tural viewpoint, first because it has abandoned the angular-travel m of data computation as such and operates by converting angular rates to linear. No mathematical discussion of this feature will be entered into here, but it should be noted that its particular advantage lies in the elimination of variable rates, substituting therefor other rates of constant values. A second structural feature of this director and its transmission system pertains particularly to the latter and is of great importance. Earlier transmission systems utilized direct current and were of a type known as step-by-step. They were fast and accurate but had the disadvantage of requiring manual synchronization of all elements of the system whenever

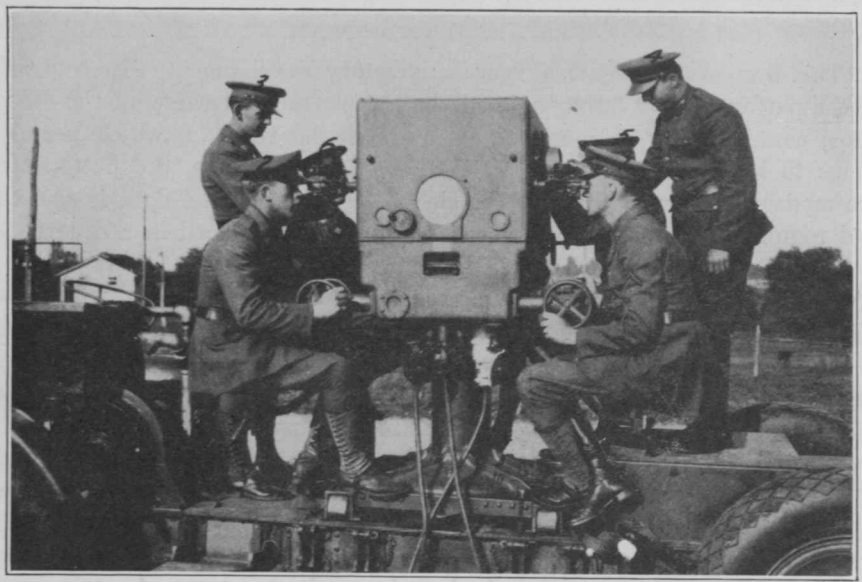

FIG. 7. DIRECTOR T-4

for any reason the current was turned off. The system used in the Director T-4 is of a type known as self-synchronization, making use of the well-known synchronous features of alternating current machinery. Thus, when using such a system, the current can be thrown off at will and the handwheels manipulated at will and at random. Immediately the power is again turned on, all the receiving dials of the system return at once to synchronism with their respective transmitters. This is a most desirable feature. The difficulty of providing alternating current in the field has been very adequately solved in the electrical installation on the trailer.

Progress can also be made in the further development of simplicity of control. For the last three years devices designed to take the indicated firing data coming to the guns over the electrical transmission system and transform or amplify them into actual mechanical movement of the guns themselves have been given considerable attention. One type of such de-

[illegible]alled torque amplifier, while not developed to an entirely satisfactory degree, holds out a great deal of promise of eliminating the necessity for human skill. Thus, a battery equipped with torque amplifiers requires only the necessary loading and firing details, traversing and elevating being done by the torque amplifiers with greater accuracy than human skill can hope to attain. They have so far been tested with very satisfactory results on 3-inch fixed and 105-millimeter fixed antiaircraft gun batteries,

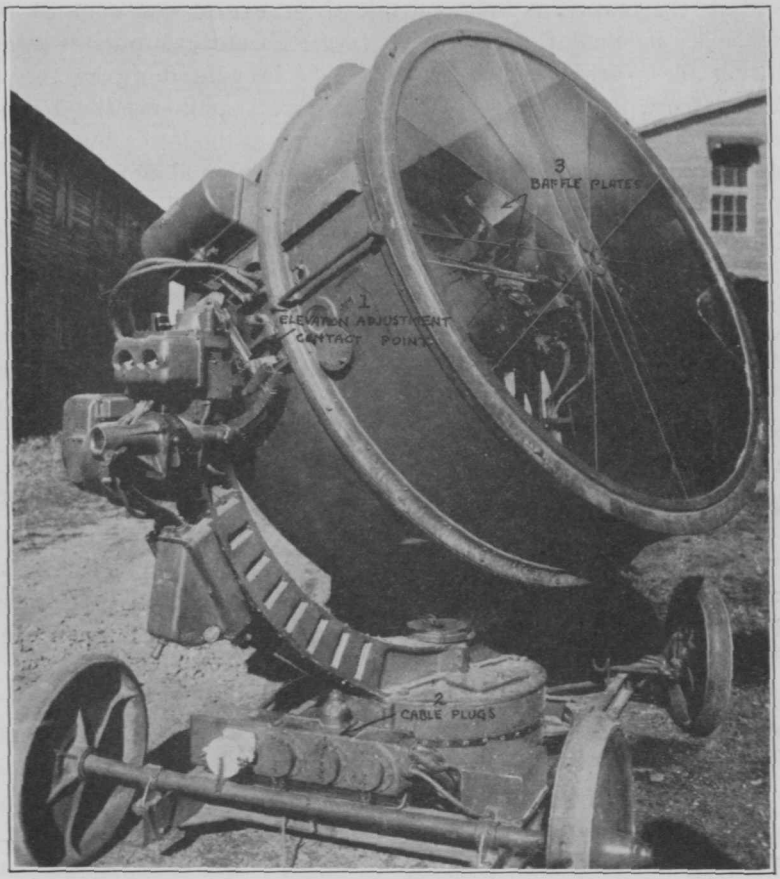

FIG. 8. SEARCHLIGHT

the latter being an experimental battery of great power and considerable promise.

NIGHT FIRING

The problem of firing an antiaircraft battery at night differs from the daytime problem only in the artificial illumination which ordinarily must be provided for the target. During the World War, however, a great amount of firing was done without such illumination and with surpris-

ingly good results, but the fire tactics of modern artillery are predicated on illuminated targets. To provide this illumination, an antiaircraft regiment is provided with a searchlight battery consisting of three platoons of five searchlights each, the three platoons corresponding to the three gun batteries of the gun battalion. In general, it is the duty of each of these searchlight platoons to work with one of the gun batteries and provide illumination for its targets. In the general scheme of antiaircraft defense, however, they may often be called upon to assist our own air forces by locating the enemy in zones outside the range of our guns in which regions he is a particularly appropriate target for our own pursuit aviation.

During the World War, of the airplanes brought down by this antiaircraft defense team, aviation and antiaircraft artillery, the former is officially credited with nearly five times as many as the latter, but in reality, the cooperation and assistance afforded by the ground defenses, such as the location and illumination of targets, often enabled the air forces to make the successful attack when without such help they would have been helpless. The searchlights thus have a very important role in the antiaircraft defense, and development of searchlight materiel has kept pace with that of the gun battery.

The basic element of the searchlight platoon is, of course, the searchlight itself, which consists of a 150-ampere arc light enclosed in an aluminum drum and backed up by a 60-inch parabolic mirror as a reflector. The drum is mounted in a yoke which allows 360 degrees of traverse and more than 90 degrees elevation. All necessary appliances such as a ventilating motor and fan, thermostatic carbon control, and a manually operated occulter are provided. But of course, the whole of space is so great that it is practically impossible to pick up a target in one of these light beams by merely searching the heavens. The means actually used for pointing the searchlight depends upon the sound given out by the airplane motors and the swishing of the air past the propeller and the struts and wires of the wings and fuselage. So far no measures have been successful in eliminating all these noises. Even the superchargers which enable the airplane to climb to still greater heights seem to add to the motor noises a peculiar note of their own. Advantage is taken of these noises to locate the enemy airplane with an accuracy sufficient to bring it in the beams of the searchlights.

The instrument used is called a sound locator, of which one is provided for each light. The most recent design is shown in Figure 9. As the height finder increased the optical base line of the human eyes, so this instrument increases the aural base line of the human ears. Two pairs of horns are mounted at right angles to each other so that one pair determines direction laterally and the other vertically. Each pair is connected by flexible tubes to the two ears of an operator, and when both of these operators recognize the sound heard through their respective pairs of horns

as coming directly toward them, the axis of the sound locator is pointed directly at the apparent sound source by operating the elevating and traversing devices. Several complications affect the accuracy of this pointing. The wind, the temperature of the air, and the condition of the surrounding terrain all have a tendency to deviate the sound waves from a direct path between airplane and listener. Then, too, the velocity of sound through the air is only a few times as fast as that of the airplane target itself, so that

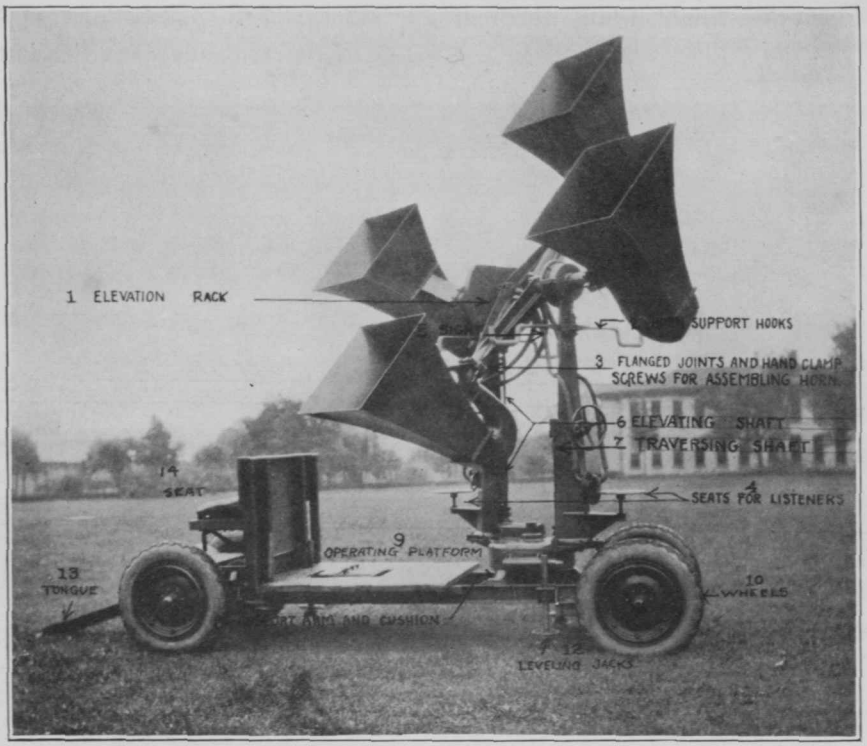

FIG. 9. SOUND LOCATOR

by the time a given sound is heard, the target is no longer in the position indicated but has moved a considerable distance, depending on the range. At the maximum carrying range of the searchlight, around ten thousand yards, this sound lag time amounts to twenty-seven seconds or more, and during this time the airplane may have traveled more than fifteen hundred yards. The sound locator is therefore equipped with a sound lag computor for determining and applying corrections for this travel and for applying corrections for the effects of wind, temperature, and density. The resulting data, if the computations are accurately performed, are the instantaneous present azimuth and elevation of the target and if the light could be made to point on these data, the target should be in the beam. This is accomplished by an electrical data transmission system similar to those

described with the gun battery. This system works through a distant controller and a comparator, however, instead of direct, because it is desirable, when the target has been picked up, to release the sound locator for further searching. Tests have shown that by no amount of diving, banking, or other maneuvering can an airplane escape once it is in the beam of a searchlight controlled by a competent operator.

Machine Guns and Automatic Cannon

The searchlight, while illuminating a target, and the gun battery, while firing, may themselves become the object of determined attacks by low-

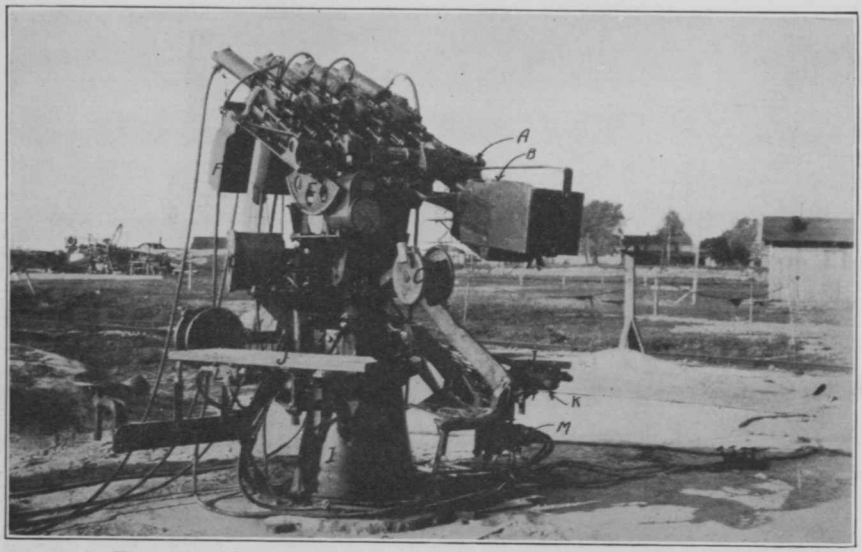

Fig. 10. Multiple Mount for 50-Caliber Machine Guns

flying enemy aircraft. It is true that the gun battery, given a sufficient time to get "on target," can protect itself by its own fire at ranges down to about one thousand seven hundred yards, but the necessary time is not always available. For the local defense of these organizations, the fifty-caliber machine gun is provided, a weapon capable of firing five hundred rounds per minute of hard-hitting armor-piercing projectiles.

In certain situations, the antiaircraft service may also be used for the protection of troops, bivouacs, camps, trains, etc., against low-flying bombardment and attack aviation. To accomplish these missions, two new types of weapons are being developed. The first is the multiple machine gun mount capable of carrying four of the fifty-caliber machine guns firing simultaneously. Such a mount, of which one of the experimental models is shown in Figure 10, can thus deliver fire at the rate of two thousand rounds per minute at a single target. In the older technique of machine-gun fire control, machine guns were usually fired more or less "from the

hip'' with either estimated leads or by aid of special sights. The great fire power of the multiple mount calls for considerably more accurate control, and development is proceeding in the direction of great mobility for the mount and the computation and transmission of firing data by systems as accurate and probably more compact than those employed by the gun battery.

Intermediate between the gun and the machine gun is the second new type of weapon mentioned, a 37-mm. full automatic cannon firing a high explosive shell with a supersensitive fuze which will cause detonation on coming in contact with so light a material as airplane wing fabric. It is

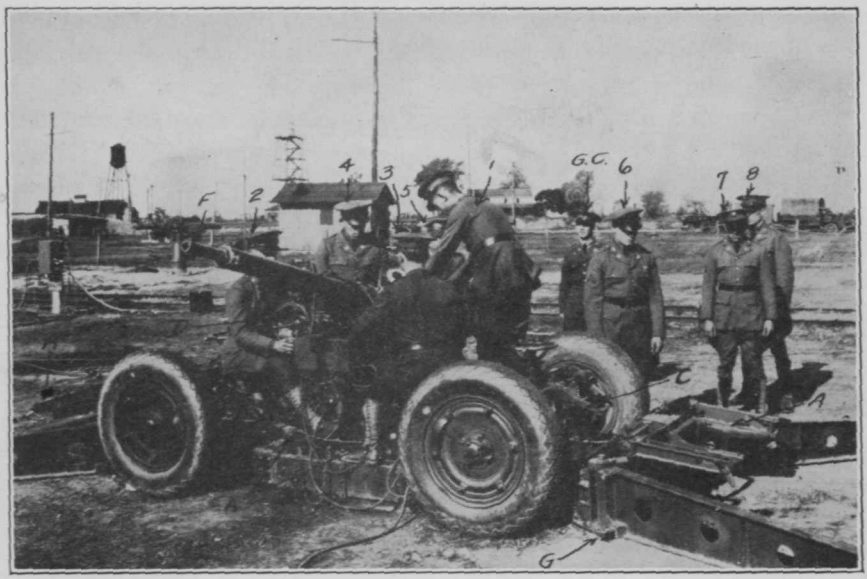

FIG. 11. 37-MM. GUN. M-1 ON T-2 CARRIAGE

shown in firing position in Figure 11, which also illustrates the manner of its emplacement and indicates by the wheels and large balloon tires the manner of its transport as a trailer. It fires one and one-quarter pound projectiles with a muzzle velocity of three thousand feet per second at a rate of eighty to ninety rounds per minute and has an effective range of over two miles. Here, too, accuracy and rapidity of control are demanded and the same general scheme of data computation and transmission as in the three-inch gun battery has been employed.

PROGRESS

In the annual report of the Chief of Staff in 1925, he stated that ''it is regarded as of the greatest importance that the subject of the employment of the means of antiaircraft defense be fully investigated and the result brought to a definite conclusion.'' In the carrying out of this mis-

sion during the past three years, not only has the employment of the means of antiaircraft defense been investigated but the means themselves have taken on a new character, much more powerful and inspiring of much more confidence than those heretofore available. It cannot, however, be said that the result has been brought to a definite conclusion except insofar as assurance is contained in modern materiel and methods that the enemy aviation cannot with impunity bomb our cities or destroy our ships. We are still progressing and with each step in the development of materiel, new problems in gunnery, tactics, ammunition supply, and transportation present themselves for solution. These problems have arrested the attention and aroused the interest of a great many officers and their solutions of these problems are certain to point the way to appropriate applications of modern methods to all branches of the artillery.

*A pacifist * * * thinks that a nation with which we were at war would not take advantage of the canal, if it were not fortified. This is the pacifist theory. If you are armed, some one is certain to attack you. If you want to be safe, make yourself helpless to resist attack. * * * A scramble mentality, but, unfortunately, not unique. The currency of these familiar pacifist fallacies is the result of a pretty general tendency to feel about war, not think. The program which alarms this writer is entirely defensive. It is founded on the experience of mankind, past and present, that weakness invites attack, not strength.*—Chicago Tribune.

Modern Antiaircraft

By CAPT. G. M. WELLS, O. D.*

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THE 3-inch gun is generally regarded by our services as the backbone of our antiaircraft defense against bombing planes. This feeling is shared by the principal European countries where guns of approximately the same caliber have received the greatest attention in post-war development. It is not intended to convey the impression that the 3-inch weapon is all that is needed; on the contrary a very real field exists for cannon of greater caliber for use at ranges beyond the reach of the lighter weapon. The weight of the larger caliber guns restricts their use to fixed defenses, and the lower rate of fire and greater difficulty in handling make them unsuitable for use against rapidly moving close-in targets. The 3-inch gun may be mounted on a fixed carriage for use in defense of permanent fortifications, or on a carriage possessing a high degree of mobility for use in the field.

During a war great impetus is given to the development and improvement of all matériel of warfare, and in this respect the World War was a conspicuous example. No antiaircraft artillery of any consequence had been built prior to that time. The advent and rapid development of the airplane made imperative the development of defensive ground weapons. During the first part of the war field guns were blocked up to give high-angle fire and improvised mountings were used by both sides. In almost every case divisional weapons were used for this purpose. Thus we see the 3-inch caliber first adopted as a matter of expediency, to prove itself later a most satisfactory all-purpose weapon. New antiaircraft artillery was designed and put into production as rapidly as possible so that toward the end of the war better types were available.

It was at once apparent that the difficulties in the way of providing suitable antiaircraft guns and carriages were to be encountered to a still greater degree in the production of adequate fire-control matériel. There was no background of experience to help in this emergency. A target moving at 100 miles per hour in three dimensions was a problem entirely beyond the possibility of adapting existing matériel and methods. Great efforts were made to devise a suitable fire-control system but the early systems were so complicated and so slow in operation that the data were more or less useless when received at the guns. Most of the early schemes depended on the use of manual plotting systems, reference charts and other methods derived from the field artillery and totally inadequate for this new purpose. During the latter part of the war semiautomatic computing machines were developed which considerably increased the efficiency of

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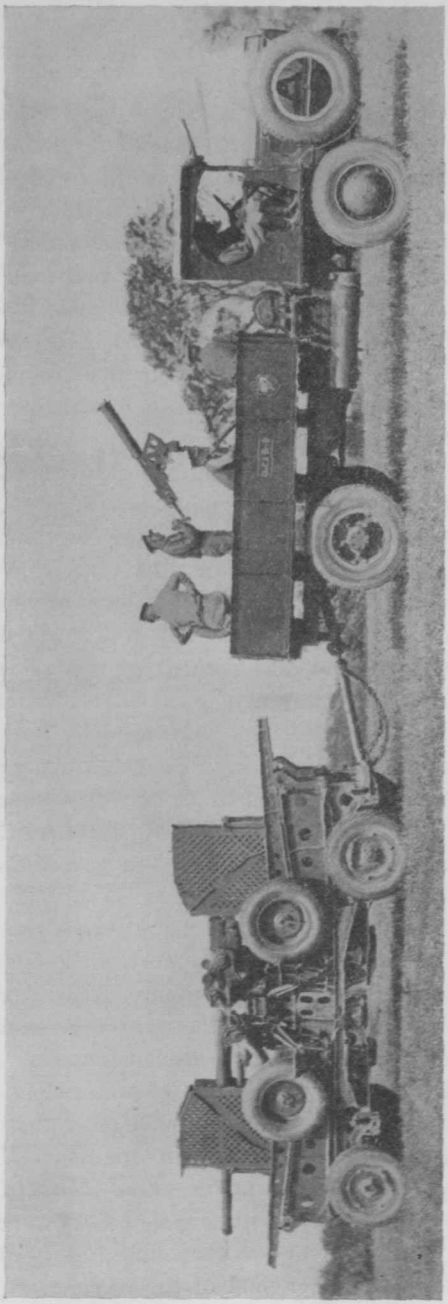


THE 3-INCH MOUNT IN TOWING POSITION BEHIND 4-WHEEL DRIVE TRUCK

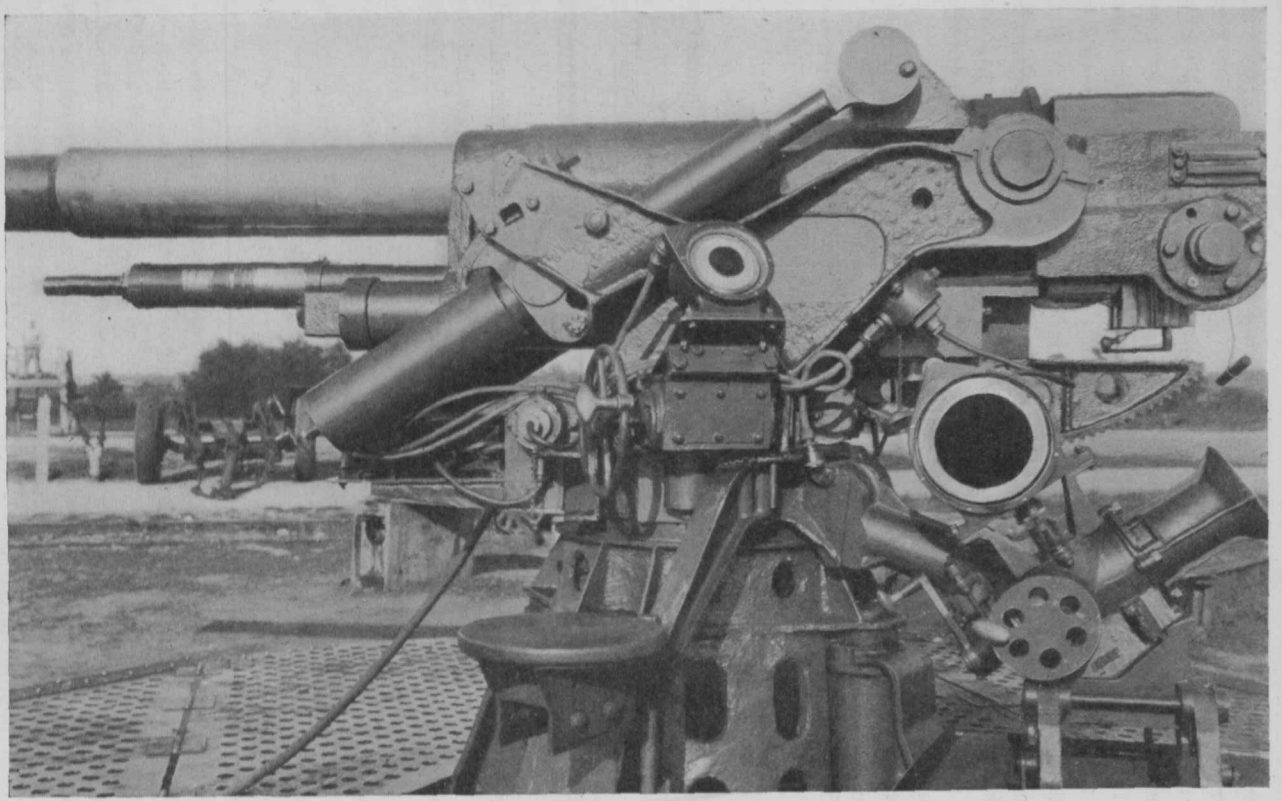
antiaircraft fire. These machines computed the vertical and lateral deflections, the amount the gun must be laid in advance of the target's present position in order to allow for its travel during the time of flight, and the fuze range or time of fuze burning.

During the period of the war the Ordnance Department was hastening the construction of a large number of 3-inch antiaircraft guns of more powerful type than had ever been used before. When the Armistice came many units had been completed and they still form the principal antiaircraft weapons in the hands of our troops. The guns were mounted on both fixed and mobile carriages. We may dismiss the fixed carriage with the statement that it is still regarded as basically satisfactory for the purpose. Minor changes have been made to improve the functioning and, as modified, this weapon is the present standard for manufacture.

The war-time mobile weapon, the 3-inch auto trailer mount, M 1918, is inherently unsatisfactory in the light of our present requirements in the following respects: It is unstable and therefore unsuitable for director firing; the muzzle velocity of two thousand four hundred feet per second is insufficient for fire against a modern high speed airplane; it has very poor cross-country mobility and its speed on improved roads is strictly limited. It is easy to appreciate that the defects enumerated cannot be corrected by modifying the present carriage.

The defects and limitations just enumerated were recognized soon after the war and a development program inaugurated. Early efforts were devoted to attempts at modification of the 1918 carriages. Thus, the M 1923 E mobile carriage consisted of the M 1918 auto trailer chassis with certain improvements in levelling and in the recoil system and an improved outrigger arrangement giving greater stability. Several of the new features were quite successful but the carriage was still sadly wanting in mobility.

In 1925 and each succeeding year thereafter antiaircraft firing tests have been conducted under a joint Coast Artillery, Air Corps and Ordnance program. In the first test, which was held at Fort Tilden in 1925, the war-time antiaircraft artillery and fire control then in the hands of the service were used. A sufficiently large number of rounds was fired to demonstrate conclusively how inadepuate this war-time matériel was in combatting modern high speed aircraft. In the short period since 1925 new and radically different guns, carriages and fire-control instruments have been designed and constructed, and have demonstrated in three years of firing at Aberdeen Proving Ground their almost infinite superiority when compared with the war-time weapons. This new matériel has been standardized and a limited rearmament program for the Regular Army inaugurated. The new 3-inch mobile matériel is probably the most important of the new developments because of its all-round utility. It may be used in fixed defenses where its stability and rate of fire are equal to the best type of fixed mount, or in the field where a high degree of mobility is added to the

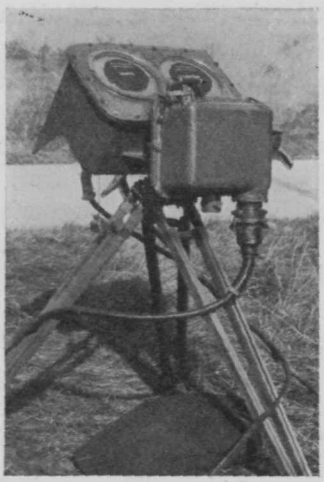


LEFT-SIDE VIEW OF 3-INCH ANTIAIRCRAFT CARRIAGE SHOWING AUTOMATIC FUZE SETTER AND AZIMUTH AND FUZE DATA RECEIVERS

desirable characteristics just mentioned. The succeeding paragraphs will be devoted to a description of the several units included in a complete battery installation of this new and important matériel.

From a study of the gun and mount in firing and traveling positions several radical departures from previous ordnance design practice are at once apparent. Wheels of the disk type mounting low pressure pneumatic

THE STANDARD ANTIAIRCRAFT DIRECTOR



THE COMPARATOR AND DISTANT CONTROLLER

The operator at this instrument maneuvers the searchlight to follow the sound locator and detect the target.

tires of the largest size available commercially are provided. The wheel bearings are of the antifriction type and follow as closely as possible in this respect standard automotive practice. Each axle is spring-mounted in an independnt bogie which is in turn clamped to the frame members. Rear wheel brakes designed and produced by a company specializing in this kind of work are used. The center of gravity has been held as near the ground as possible consistent with adequate road clearance. These features unite in giving the vehicle road performance in a high degree.

A battery of four of these mounts was tested exhaustively last fall at Aberdeen Proving Ground in an effort to determine the performance of the chassis under the most severe road conditions. One series of runs was

conducted over hard-surfaced roads in hilly country to determine the limiting speed of towing, the performance of the brakes, etc., under the conditions of high speed travel. Here, unfortunately, the speed of the only trucks available proved entirely inadequate to develop the full possibilities of the gun trailer. However, on moderate down grades speeds of 40 miles per hour were attained and no serious difficulty of any description was experienced. In another series of tests the mount performed admirably when towed at high speeds over the roughest unimproved roads in the proving ground area. In the latter case, although the truck was equipped with pneumatic tires, the speed was limited to what the driver could endure, while the brakeman on the trailer experienced no serious discomfort. It is safe to conclude that the mobility of the mount has been proved conclusively from the exhaustive tests conducted and that it is infinitely superior in this respect to its war-time predecessor.

The importance of stability has already been mentioned and should be emphasized here as a feature of primary importance in connection with the new system of *director* firing. The following factors unite in determining the stability characteristics of a carriage: long recoil, low center of gravity and long outriggers. These are the essentials although they might very properly be expressed in another way in the language of an ordnance designer. Perhaps the most striking feature of the new carriage when viewed in the firing position is the extreme length of the outriggers. To forestall any possible criticism in this respect it should be stated at the outset that this length is based on a well known principle of mechanics and is in no way disproportionate. Each outrigger is hinged in two places and pivoted in the main carriage pedestal. In travelling position the intermediate and outer sections are folded over and rest on the main sections which are in turn clamped to the wheel bogies forming the main longitudinal members of the chassis. The handling of the outriggers is greatly facilitated by use of aluminum alloy construction throughout. Two jacks, located on the transverse axis of the chassis, are used for raising and lowering the mount in going in or out of firing position. The recoil mechanism is of the hydropneumatic type giving long recoil with minimum weight. Rustless alloys are used to the maximum extent in its construction with a view to eliminating, in so far as possible, deterioration in storage. The same type of construction is employed in the two pneumatic equilibrators used to balance the muzzle preponderance of the gun. To appreciate the full effect of these features let us turn again to the war-time model 1918 carriage which is so unstable that it must be bolted to permanently emplaced concrete blocks for use in director firing.

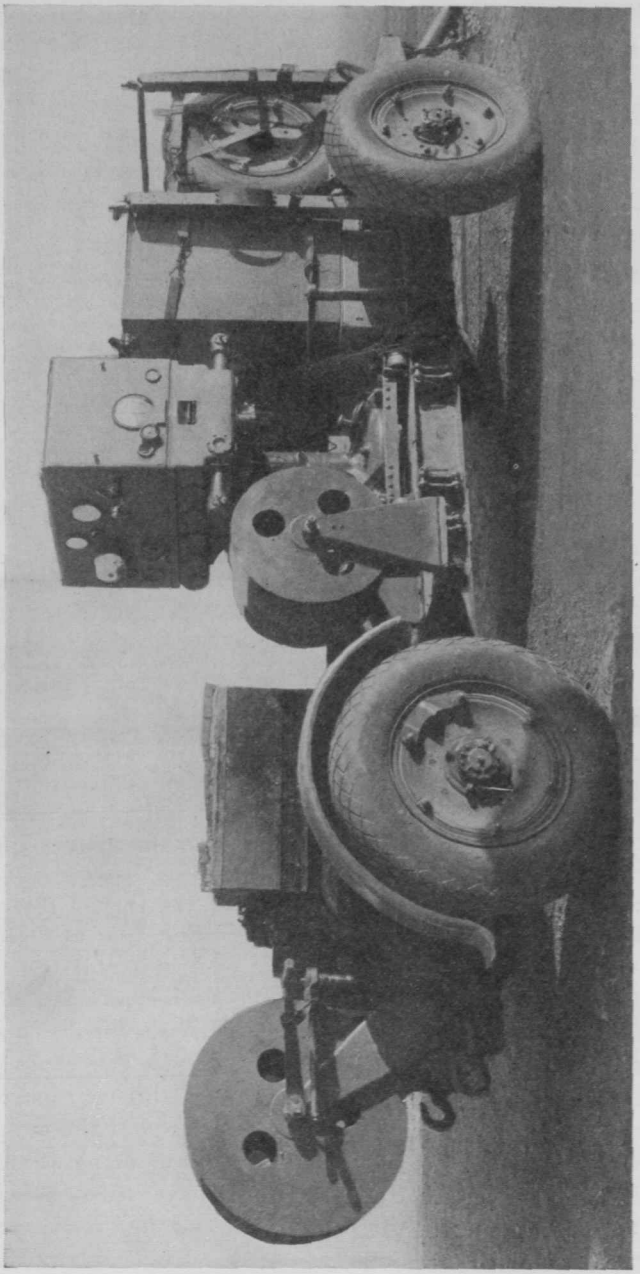
Other features of the carriage which might be mentioned in passing are a leveling mechanism by means of which the top carriage can be accurately leveled in two dimensions simultaneously; a folding platform supported by the outriggers and of sufficient area to provide ample work-

ing space for the gun crew; and elevating and traversing gears employing antifriction bearings throughout. Experience has demonstrated that hand tools are decidedly perishable articles of battery equipment, and when most needed are generally found missing. With this fact in mind the carriage was designed with a view to the minimum use of hand tools in the recurring maneuvering operations. Thus the carriage can be emplaced, or the reverse, wheels can be changed, etc., with the use of no hand implements other than a stone for tightening or loosening wind nuts, wedges or pins. Incidentally all loose pieces are fastened to the carriage with chains.

A target moving at the speed of an airplane has a wide range of possible maneuver during the time of flight of the projectile. An airplane moving

BATTERY COMMANDER'S OBSERVATION INSTRUMENT

at 100 miles per hour, for example, will travel nearly one thousand five hundred feet during the interval corresponding to the time of flight at mid-range of the 3-inch antiaircraft gun. It is at once apparent from this fact that any reduction made in the time of flight will be reflected in a corresponding increase in the efficiency of the antiaircraft fire. This has led to the adoption of a gun of high muzzle velocity. The rapid firing of these high velocity guns has given rise to a very serious problem in the rapid erosion of the gun tubes. When we consider that the accuracy life of the gun is limited at most to a very few hours of firing at the conclusion of which it would, under previous practice, have had to be withdrawn from action and returned to an arsenal for retubing, the seriousness of the problem is readily apparent. To take care of this rapid wear and to obviate the necessity for withdrawing the guns from action for an extended period, the loose, or removable liner has been developed, and adopted as standard for this matériel. The liner is, as the name suggests, an inner tube of thin



INSTRUMENT TRAILER WITH NEW ORDNANCE DEPARTMENT DIRECTOR IN POSITION

section and moderate weight which can be replaced by battery personnel *in the field*. This peration can be accomplished and the gun restored to its former effectiveness in about fifteen minutes without the use of any special tools or equipment whatever. *The cost of the liner is a fraction of the cost of a new gun.*

Another interesting feature of the gun is the semiautomatic breech mechanism which opens the block automatically after the round is fired and ejects the empty shell case. When the new round is inserted in the chamber the block closes, locks in position and is ready for the next shot. This mechanism makes it possible to attain a sustained rate of fire of about twenty-five shots per minute as compared with twelve or fifteen shots per minute using the hand-operated block of the war-time gun.

The mount is equipped with the recently perfected continuous-type fuze setter, generally regarded as one of the greatest improvements in antiaircraft fire-control devices yet devised. It permits the setting of a maximum of twenty-seven fuzes per minute in accordance with data being continuously received from the fire-control director. In operation the instrument is practically foolproof; one operator inserts a projectile into the bellmouth opening where it is automatically locked in position and cannot be withdrawn before the fuze is properly set; a second operator by means of a handwheel continuously matches two pointers and in so doing maintains the proper fuze range in the fuze setter, while a third turns a crank through two complete revolutions and the fuze is set. It continues to be cut to the proper figure, as that figure changes, as long as it remains in the instrument. This type of fuze setter decreases the dead time—by that I mean the time interval between the computation of data and the firing of the gun on those data—and reduces the percentage of erratic settings to a fraction of one per cent. The continuous type fuze setter is strictly a post-war development.

The following items of Ordnance issue, in addition to the gun and mount, are included in the equipment of an antiaircraft battery: instrument trailer, fire-control director, height finder, antiaircraft battery commander's observation instrument, continuous fuze setter, sound locator and acoustic corrector.

The annual antiaircraft exercises held during the past four years have demonstrated quite convincingly the superiority of the indirect, or so-called Case III method, of fire control. The Coast Artillery has recommended the general adoption of this system, which carries with it the elimination of all sighting apparatus from the gun carriage. Before describing this new method it will be of interest, by way of contrast, to mention briefly the principal features of the Case I system which it replaces, and which will continue to be used until the new types of fire-control equipment are available in sufficient quantity for the rearming of our forces.

In the Case I, or war-time system, the gun was equipped with a sighting system embodying a telescope by means of which the gun pointer observed and tracked the target, and a mechanism for setting the gun in advance of the line of collimation of the telescope by the amount of the lateral and vertical deflections corresponding to the travel of the airplane during the time of flight. These data were computed through the agency of several independent instruments, including a two-station altimeter system, an R. A. corrector and a wind and parallax computer. The several instruments performed related and dependent functions, and involved in their operation the reading of scales, reference to graphical charts, and the telephoning of data between instruments. They were altogether slow, inaccurate and highly unsatisfactory. No provision was made for any of the very necessary ballistic corrections, except wind.

In the Case III system of fire control the gun carriage sighting is replaced by three data receivers which record continuously the future azimuth, elevation and fuze range of the target, received over an automatic electric transmission system from the director. Each receiver is provided with two pointers moving over concentric scales, one of which displays the data from the director and the other the corresponding position of the gun. The gunners have only to keep the gun continuously laid on the future predicted position of the target by matching pointers. The altitude of the target is read intermittently by a self-contained height finder and transmitted automatically to the director which computes the future position of the target in space. Thus, in our system the functions of several instruments have been consolidated, automatic transmission systems have replaced the many telephone lines, the difficult operation of keeping the sight of a firing gun on the target has given way to the purely mechanical operation of matching pointers, and the accuracy of the several instruments has been very materially increased. To sum up, the principal advantages of the new system are as follows:

1. Reduction of the dead time (time interval between computation of data and laying of gun on those data);
2. No scales to read; hence no errors in setting or reading scales;
3. Data is continuous and not intermittent, therefore, each shot is fired on more accurate data;
4. The rate of fire is increased;
5. Less training of personnel required.

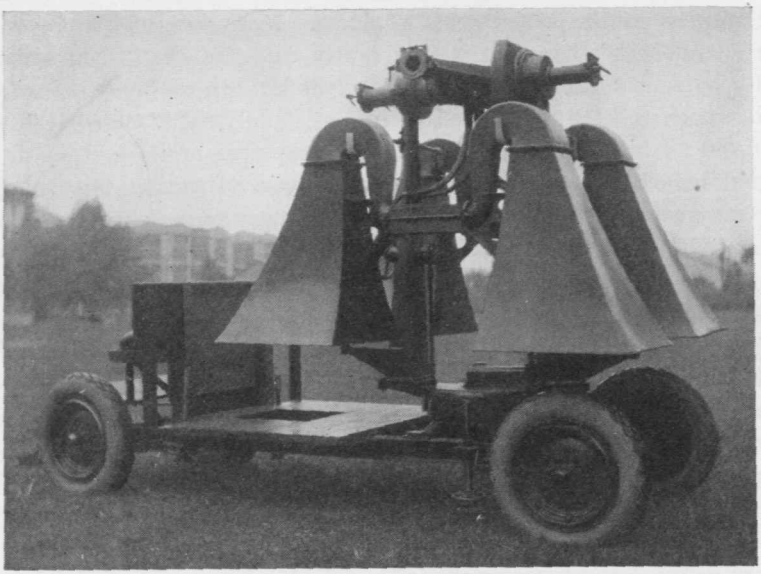
The antiaircraft director may be regarded as the heart of the antiaircraft fire-control system. It is essentially a supercomputing machine which automatically and continuously observes the target and computes its future position in space. All factors which in any way influence the flight of the projectile, such as wind, atmospheric temperature and pressure, variations in the muzzle velocity from normal, and drift are corrected for automatically within the instrument. Effort has been made in the design of

this instrument to eliminate to the greatest possible extent the personnel factor, and to make the various operations as nearly mechanical as possible. Thus, in the latest directors it is unnecessary to read on one scale and set on another, there are no charts to refer to and the essential operations are confined to the simple act of matching pointers moving over concentric dials.

The Ordnance Department has tested the most promising types of directors procurable abroad and in addition has been engaged in the development of a director differing radically from these other instruments. In the latter instrument effort has been made to accomplish a theoretically exact solution of the antiaircraft problem. Many original and desirable features are included, and it is confidently expected that when completed it will be the most valuable instrument of its kind in existence. Two pilots have been constructed and tested with increasingly satisfactory results. It is believed that the development will be completed and the director standardized before the end of this calendar year. Pending the completion of this program we have adopted a very satisfactory instrument of foreign design as standard for manufacture.

Two general classes of height finders have been tested; the stereoscopic and the coincidence type. The stereoscopic instrument operates on the principle of stereoscopic vision, in other words, the organic faculty possessed by the normal individual which permits him to see in depth. This faculty is derived from the spacing of the two eyes and is in a way equivalent to range-finding systems employing two observing stations at the ends of a measured base line, the intersection of whose plotted lines of observation determines the range of the objective. In the stereoscopic instrument, the normal base line between the eyes is in effect increased to the distance between the two objectives thus enabling the operator to locate an actual object at a considerable distance with respect to a known distance within the optical system of the instrument. The coincidence type height finder makes use of the familiar split image principle. Both types measure slant range and angular height and by means of a mechanical and optical mechanism solve the right-angled triangle for altitude. The stereoscopic instrument possesses the unique advantage of being able to permit of sensing the bursts as over or short of the target, and in addition appears to give greater accuracy for the same length of base. For these reasons the Coast Artillery has recommended adoption of the stereoscopic principle. An automatic electrical system is provided for transmitting the altitudes read by the height finder to the director. Let us again turn to the wartime matériel for purposes of comparison. Here we find the two station altimeter system employing two instruments at the end of a base line, each observing the target (let us hope the same target) and telephoning an angular height reading to a central station for computation of the resulting altitude. This system is cumbersome, inaccurate and utterly inadequate to meet the conditions of modern warfare.

It is very necessary that the battery commander be provided with a satisfactory instrument for observing the effect of the fire on the target. It is equally necessary that he be able to leave the instrument at intervals to supervise the work of the fire-control section and the gun crews. The importance of the time factor will be appreciated when we consider that the duration of the firing will be measured by seconds, that the battery is firing at a rate of 100 rounds per minute, and that constant adjustment of fire will be required to meet the probable maneuvers of the airplane. The new battery commander's observation instrument has been designed with a



SOUND LOCATOR TRAILER WITH HORNS DISMOUNTED AND LOCKED IN TRAVELING POSITION

view to providing that officer with a means for observing, at any instant, the effect of the fire on the target. It consists, essentially, of two telescopes permanently joined with optical axes parallel; the first, a small finding instrument used by the tracker, and the second, a larger, dual power instrument of wide field for the battery commander. By this arrangement no time is lost in getting on the target, and the dual power feature permits a clear view of the target under changing range and atmospheric conditions. The advantages of this telescope as compared with the old style azimuth instrument are apparent. It is considered an essential part of the modern antiaircraft fire-control system.

Alternating current power is required for operation of the automatic transmission systems, instrument lighting, etc. It is important that the source of power be unfailing and not dependent on any possible commercial installations. To fill this need a portable generating unit has been

provided consisting of two gas-electric generators supplying direct current to a large capacity storage battery which in turn furnishes power for the operation of a small rotary converter delivering alternating current at the desired voltage. This equipment is permanently mounted on a special vehicle called the instrument trailer. This trailer transports all the fire-control equipment of the battery and certain special matériel pertaining to the office of the battery commander. This vehicle has been designed with a view to maximum interchangeability with the chassis of the mobile gun carriage. Thus, the wheels, tires, brakes and many other parts of the running gear are identical in the two vehicles and the problem of spare part supply is correspondingly simplified. Water-tight and dust-proof boxes are provided for each of the instruments comprising the load. These with the pneumatic tires should eliminate the transportation difficulties experienced under the old system where the instrument containers were piled haphazard in the body of a solid-tired truck or transport wagon.

The detection of airplanes from the ground at night presents new problems and requires additional apparatus. To locate airplanes flying at high speeds in the dark appears at the first thought to be a problem incapable of solution. Indeed experience has demonstrated that it is practically impossible to locate an airplane with a searchlight unaided by direction-finding equipment superior to the human ear. The sound locator has been developed to fill this need. Crude listening devices were used during the war in the antiaircraft defense of Paris and other important localities, but this war-time development did not progress to the point where equipment of any particular value was produced. The present type sound locator may be considered to be strictly a post-war development.

A brief description of the principles underlying the construction of the sound locator will be of interest. Sound is a vibratory disturbance in the atmosphere, or other medium, wherein a pressure wave is set up traveling from the sound source in all directions at the rate of about eleven hundred feet per second. This sound wave arrives at a listener's head and unless he is looking in the direction of emission, it will impinge upon the diaphragm of one ear a fraction of a second sooner than upon that of the other ear. The resulting sensations transmitted to the brain are there analysed by point of time with the result that the binaural instinct tells the listener that the sound source is at a certain angle to the right or left. If now the listener turns his head the proper amount, the sound wave strikes both ears simultaneously and is analyzed as coming from the front. This ability of the ears and brain to determine direction acoustically is called the binaural sense; the effect of the sound wave on the ears is called the bin· ·ıral phase effect.

It is evident that if the ears were separated by a greater distance, the difference in time of a sound wave striking one diaphragm over that of the other would be increased and the binaural sense would be sharpened. That is exactly what is accomplished by using a sound locator; two large

horns separated by a distance, perhaps twenty times that of the ears, are supported always parallel to each other with their small end terminating at the ears. The sound wave entering both horns travels through each independently until it strikes the ear diaphragms at different instants. The binaural sense immediately tells which way the pair of horns must be swung in order to compensate for the time, or "phase," difference. The listener aims to reduce the phase difference to zero when his ears will receive the sound impulse "in phase" and the horns will be pointed at the source of sound. The direction, either azimuth or elevation or both, can then be read from a scale graduated in degrees. In addition to sharpening the phase effect, the horns, by virtue of their construction act as resonators and amplify the sound.

Since sound maintains its direction after leaving the source, in this case the airplane exhaust or noise of the propellor, and since the airplane moves a considerable distance during the time required for travel of the sound to the listening horns, it is evident that the apparatus will give us a fictitious direction. To correct this difficulty an acoustic corrector is provided which computes the travel of the airplane during the time of flight of the sound and adds this value to the reading of the sound locator to give us the true present position of the target. The sound locator and acoustic corrector are mounted on a pneumatic-tired trailer designed for towing behind the searchlight truck. The development of searchlights is a function of the Corps of Engineers. This work has been carried forward very ably to give us at the present time an instrument greatly superior to its wartime predecessor. The new mobile 60-inch light will illuminate an airplane target at a range of about five miles under normal atmospheric conditions, and at a considerably greater range when conditions are perfect. A pneumatic-tired truck is provided for transporting the searchlight and towing the sound locator trailer. A generator of sufficient capacity to supply the necessary current for the searchlight and transmission lines is mounted as an integral part of the truck chassis.

The sound locator and searchlight are connected by means of automatic electric transmission systems to a central control station or comparator in such manner as to show at the comparator both the azimuth and elevation laying of the two instruments. These values are displayed by pointers moving over concentric dials. The searchlight may be traversed or elevated by means of a distant controller located at the comparator, and by matching pointers is made to follow the sound locator.

While this article has the primary object of discussing the new matériel from the antiaircraft standpoint, it will be of interest to point out that the requirements for a divisional field artillery carriage are in many respects identical, and that a 3-inch antiaircraft mount might well be used for this purpose should the need arise. This is directly in accord with the recommendations of the Caliber Board convened by the War Department

soon after the Armistice to lay down a program for post-war artillery development. This Board recommended, in effect, that all new field artillery weapons be designed with a view to possible antiaircraft use. The 3-inch antiaircraft mount is superior to the divisional gun in respect to speed on improved roads, stability and fire power. Its mobility in the field is only slightly inferior to the field carriage. The antiaircraft fire-control equipment could easily be adapted to terrestrial firing. Thus, the present director could be readily modified for this purpose, and would be extremely valuable for fire at moving objects on the ground, such as tanks; the height finder is equally suitable for use as a range finder, while the sound locators are now undergoing test with a view to use in connection with terrestrial sound ranging.

I have stated that our antiaircraft forces, are for the most part equipped with war-time guns and fire control. Included in our forces, and forming a very important part thereof, are a number of active National Guard organizations. The conditions under which the training of these units is carried on are peculiar and worthy of special note in connection with the new types of matériel. The personnel of these organizations are, of course, engaged in civil pursuits during the day, and with the exception of a few days of field duty each year, must receive their military training indoors and at night. It would seem at first thought difficult, if not entirely impracticable, to conduct a satisfactory drill under these conditions, and such is indeed the case with the present equipment. The new materiél, on the other hand, is very well adapted to indoor training. The essential maneuvering operations, in connection with the mount, such as going from traveling to firing position and the reverse, leveling, elevating and traversing in accordance with data displayed on the gun receivers and simulated loading and firing can be accomplished as well indoors as out. The new director is so arranged that it is possible through the agency of special indicator dials, to elevate the telescopes and traverse the director at a predetermined rate corresponding to the travel of an airplane at the desired distance from the battery. The other operators at the director perform purely mechanical functions, such as matching pointers. The height finder and sound locator may be set up and maneuvered indoors, while special indoor training instruments are provided for the stereoscopic observer and the sound locator listeners. In other words, it is perfectly possible to train an organization to a high state of proficiency in an armory, or under any conditions where an airplane target is not available.

I have endeavored to point out in the foregoing paragraphs the importance of stability, mobility, maneuverability and fire power in the mobile antiaircraft gun carriage. I am convinced that the efficiency of the new equipment measured by the old may be expressed conservatively in the ratio of five to one, and that it is at least the equal of that known to be possessed by any foreign power.

The Railway Artillery Reserve, American E. F.

By COL. H. C. BARNES, C. A. C.

(*Concluded*)

HEADQUARTERS DETACHMENT, 43D ARTILLERY (C. A. C.)

THIS detachment joined the 1st Army, American Expeditionary Force, on September 1, 1918, at Dieue (Meuse), where it remained until September 16, 1918, as Headquarters Detachment, West Railway Grouping, taking part in the St. Mihiel operation of the 1st Army, American Expeditionary Force. On September 17, 1918, the detachment moved to St. Barthelemy (Meuse), where it remained until November 19, 1918, as Headquarters Detachment, 1st Railway Sub-Grouping, taking part in the Argonne-Meuse operation of the 1st Army, American Expeditionary Force. The detachment returned to Haussimont (Marne) on November 20, 1918, where it remained until November 30, 1918, when the 43d Artillery (C. A. C.) left en route to the United States.

HEADQUARTERS, 1ST BATTALION, 43D ARTILLERY (C. A. C.)

This detachment joined the 1st Army, American Expeditionary Force, on September 9, 1918, at Lerouville, where it remained until September 21, 1918, as Headquarters Detachment, Central Railway Grouping, taking part in the St. Mihiel operation of the 1st Army, American Expeditionary Force. On September 22, 1918, the detachment moved to Aubreville, where it remained until September 30, 1918. Between October 1 and 4, 1918, the detachment moved to Charny (Meuse), and thence on October 19, 1918, to the vicinity of Règneville. In each of the last three positions the detachment operated as Headquarters Detachment, Groupe Pirie, in the 2nd Railway Sub-Grouping, taking part in the Argonne-Meuse operation of the 1st Army, American Expeditionary Force. The detachment returned to Haussimont (Marne) on November 20, 1918, where it remained until November 30, 1918, when the 43d Artillery (C. A. C.) left en route to the United States.

BATTERY "A," 43D ARTILLERY (C. A. C.)

This battery manned four 19-G (French) guns, Railway Mount, Model 1875/76.

The battery joined the 1st Army, American Expeditionary Force, on September 10, 1918, where, until September 21, 1918, it occupied a position near Dieue-sur-Meuse and formed a part of the West Railway Grouping. Because of the late arrival in position, the battery was unable to complete the installation of its guns in time to participate in the St. Mihiel operation of the 1st Army, American Expeditionary Force. From September

22, 1918, to November 11, 1918, the battery occupied positions near Aubreville, Charny, and Règneville, and formed a part of Groupe Pirie in the 2nd Railway Sub-Grouping, taking part in the Argonne-Meuse operation of the 1st Army, American Expeditionary Force. During this operation the battery executed firings on many enemy targets. Total number of rounds fired: one thousand six hundred and ninety-five. The battery returned to Haussimont (Marne) on November 19, 1918, where it remained until November 30, 1918, when the 43d Artillery (C. A. C.) left en route to the United States.

While occupying the position near Règneville on October 27, 1918, this battery was commended by the regimental commander for continuing to man and operate its guns under intense enemy shell fire.

Before its assignment as Battery "A," 43d Artillery (C. A. C.), this battery was Battery "C," 57th Artillery (C. A. C.), which was organized from the 3d Company, Coast Defenses of Sandy Hook, N. G. U. S. (N. Y.). Before becoming federalized as part of the Army, the battery was known as the 21st Company, 9th Coast Defense Command, N. G. of New York.

Battery "B," 43d Artillery (C. A. C.)

This battery manned four 19-G (French) guns, Railway Mount, Model 1875/76.

The battery joined the 1st Army, American Expeditionary Force, on September 12, 1918, where, until September 21, 1918, it occupied a position near Lerouville and formed a part of the Central Railway Grouping during the St. Mihiel operation of the 1st Army, American Expeditionary Force. Because of the non-arrival of ammunition, this battery was unable to do any firing from this position. From September 22 to November 11, 1918, the battery occupied positions near Aubreville, Charny, and Règneville, forming a part of Groupe Pirie of the 2nd Railway Grouping and taking part in the Argonne-Meuse operation of the 1st Army, American Expeditionary Force. From these positions the battery executed firings on many enemy targets. Total number of rounds fired: one thousand eight hundred and twenty. The battery returned to Haussimont (Marne) on November 19, 1918, where it remained until November 30, 1918, when the 43d Artillery (C. A. C.) left en route to the United States.

This battery was commended in letters from groupe and grouping headquarters for conspicuous conduct under immediate shell fire on October 27, 1918.

Before its assignment as Battery "B," 43d Artillery (C. A. C.), this battery was Battery "D," 57th Artillery (C. A. C.), which was organized from the 21st Company, Coast Defenses of Sandy Hook, New York.

Headquarters Detachment, 2nd Battalion, 43d Artillery (C. A. C.)

This detachment was organized early in August, 1918, at Haussimont (Marne), where it remained until November 30, 1918, when the 43d Ar-

tillery (C. A. C.) left en route to the United States, the detachment never having had an opportunity for service at the front.

Battery "C," 43d Artillery (C. A. C.)

This battery manned two 240-mm. St. Chamond tractor-drawn (French) guns from October 28, 1917, to August 10, 1918. It was assigned four 19-G (French) guns, Railway Mount, Model 1875/76, on November 12, 1918.

The battery, as Battery "C," 51st Artillery (C. A. C.), joined the VIII French Army in the Toul sector on April 1, 1918, where it remained until August 13, 1918, occupying positions in La Rehanne Woods and in the vicinity of Nancy, forming a part of Groupe Niles, Groupement Bunker. During this period firings were executed on Mont Sec and railroad junctions in rear of Mont Sec. Total number of rounds fired: two hundred and ninety-five. On August 15, 1918, the battery returned to Haussimont (Marne), where, upon reorganization of the regiments of the Railway Artillery Reserve, it became Battery "C," 43d Artillery (C. A. C.), and where it remained until November 30, 1918, when the 43d Artillery (C. A. C.) left en route to the United States.

Battery "D," 43d Artillery (C. A. C.)

This battery manned four 19-G (French) guns, Railway Mount, Model 1875/76.

The battery, as Battery "D," 51st Artillery (C. A. C.) joined the VIII French Army in the Toul sector on April 2, 1918, where it remained until August 13, 1918. During this period the battery was billeted at Mênil-la-Tour, Poste de Velaine, and Manoncourt, and performed the duty of Transport section for Groupe Niles. In this capacity the battery had charge of, and was responsible for the care and operation of all transportation assigned to the 1st Battalion, 51st Artillery (C. A. C.), which formed Groupe Niles. Its duties included the moving of all guns, carriages, and impedimenta of the battalion from one position to another. On August 15, 1918, the battery returned to Haussimont (Marne), where upon the reorganization of the regiments of the Railway Artillery Reserve, it became Battery "D," 43d Artillery (C. A. C.), and where it remained until November 30, 1918, when the 43d Artillery (C. A. C.) left en route to the United States.

Headquarters Detachment, 3d Battalion, 43d Artillery (C. A. C.)

This detachment joined the 1st Army, American Expeditionary Force, on September 1, 1918, at Ambly-sur-Meuse, where it remained until September 18, 1918, as Headquarters Detachment, Groupe Noyes, in the West Railway Grouping, taking part in the St. Mihiel operation of the 1st Army, American Expeditionary Force. On September 19, 1918, the detachment moved to the vicinity of Récicourt where it remained until October 4, 1918.

The detachment remained in reserve in the 1st Army sector from October 4 to 26, 1918, when it moved to the vicinity of Régneville, where it remained until November 18, 1918. In each of the last two named positions the detachment acted as Headquarters Detachment, Groupe Noyes, in the 2nd Railway Sub-Grouping, taking part in the Argonne-Meuse operation of the 1st Army, American Expeditionary Force. On November 19, 1918, the detachment returned to Haussimont (Marne), where it remained until November 30, 1918, when the 43d Artillery (C. A. C.) left en route to the United States.

Battery "E," 43d Artillery (C. A. C.)

This battery manned four 19-G (French) guns, Railway Mount, Model 1875/76.

The battery joined the 1st Army, American Expeditionary Force, on September 6, 1918, and occupied a position near Tilly-sur-Meuse, forming a part of Group Noyes in the West Railway Grouping. Because of difficulty experienced with platforms in the mud, the guns of the battery were not emplaced in time to take part in the St. Mihiel operation of the 1st Army, American Expeditionary Force. From September 22 to November 18, 1918, the battery occupied positions near Récicourt and Régneville, and formed part of Groupe Noyes in the 2nd Railway Sub-Grouping, taking part in the Argonne-Meuse operation of the 1st Army, American Expeditionary Force. From these positions the battery executed firings on enemy targets. Total number of rounds fired: eight hundred and twenty-one. The battery returned to Haussimont (Marne) on November 19, 1918, where it remained until November 30, 1918, when the 43d Artillery (C. A. C.) left en route to the United States.

Battery "F," 43d Artillery (C. A. C.)

This battery manned four 19-G (French) guns, Railway Mount, Model 1875/76.

The Battery, as Battery "H," 51st Artillery (C. A. C.), joined the VIII French Army in the Toul sector on May 17, 1918, where it remained until August 8, 1918. During this period the battery was billeted in La Rehanne Woods and performed the duties of Transport Section of Groupe Spurgin. In this capacity the battery had charge of, and was responsible for, the care and operation of all transportation assigned to the 2nd Battalion, 51st Artillery (C. A. C.), which formed Groupe Spurgin. This duty included the moving of all guns, carriages, and impedimenta of the battalion from one position to another. On August 9, 1918, the battery returned to Haussimont (Marne), where, under the reorganization of the regiments of the Railway Artillery Reserve, it became Battery "F," 43d Artillery (C. A. C.), and where it remained until September 5, 1918. The battery joined the 1st Army, American Expeditionary Force, on September 6, 1918, occupying a position near Génicourt (Meuse), forming a

part of Groupe Noyes in the West Railway Grouping and taking part in the St. Mihiel operation of the 1st Army, American Expeditionary Force. Total number of rounds fired: sixty-two. From September 19 to November 18, 1918, the battery occupied positions near Récicourt and Régneville, forming a part of Groupe Noyes in the 2nd Railway Grouping and taking part in the Argonne-Meuse operation of the 1st Army, American Expeditionary Force. From these positions the battery executed many firings on enemy targets. Total number of rounds fired: nine hundred and seventy-five. The battery returned to Haussimont (Marne) on November 19, 1918, where it remained until November 30, 1918, when the 43d Artillery (C. A. C.) left en route to the United States.

Headquarters Detachment, 40th Artillery Brigade (C. A. C.)

The headquarters of this brigade were established at Toul (Meurthe-et-Moselle) on October 27, 1918, becoming the headquarters of the Railway Artillery Grouping of the 2nd Army, American Expeditionary Force. As such it prepared plans for the use of the Railway Artillery attached to that Army. The cessation of hostilities found the organization of the Railway Artillery of that Army completed and being emplaced. The detachment was returned to Haussimont (Marne) on November 25, 1918, where it remained until November 26, 1918, when it left en route to the United States.

U. S. Naval Battalion, 14-Inch Railway

This battalion joined the Railway Artillery Reserve, American Expeditionary Force, on September 15, 1918. It consisted of five batteries, each manning one 14-inch, 50-cal., B. L. R., Model 1, Mark IV, Railway Mount.

Battery No. 1

On the date of joining the Railway Artillery Reserve, American Expeditionary Force, this battery was serving with the X French Army and was occupying a position one kilometer west of Soissons in the Cemetery of St. Christophe, where the battery remained until October 24, 1918, firing on the railroads leading out of Laôn and the garages east and west of that city. Total number of rounds fired: one hundred and ninety-nine. The battery joined the 1st Army, American Expeditionary Force, on October 26, 1918. It did not go into a firing position, however, in this sector, but was transferred to the VIII French Army where it was to have occupied a position in the Forest of Champenoux for the purpose of participating in an offensive which was contemplated in that sector. The cessation of hostilities prevented any further activity. The battery returned to Haussimont (Marne) on November 22, 1918, where it remained until November 29, 1918, when it left en route to the United States.

Battery No. 2

On the date of joining the Railway Artillery Reserve, American Expeditionary Force, this battery was serving with the X French Army and was occupying a position at Fontenoy Ambleny between Compiègne and Soissons, where it remained until October 6, 1918, firing on an ammunition dump at Besny-Loisy. Total number of rounds fired: twenty-two. On October 6, 1918, the battery moved to a position near Flavy-le-Martel, where it remained until October 24, 1918, firing on railroad yards near Mortier. Total number of rounds fired: forty-three. On October 24, 1918, the battery proceeded to join the 1st Army, American Expeditionary Force, near Verdun (Meuse), occupying a position in the vicinity of Charny (Meuse), where it remained until Novemer 5, 1918, firing on the City of Montmédy. Total number of rounds fired: fifty-five. On November 5, 1918, the battery left the 1st Army, American Expeditionary Force, and proceeded to join the VIII French Army, occupying a position near Luneville, where it was to have participated in a contemplated offensive in that sector. The cessation of hostilities, however, prevented further activities. The battery returned to Haussimont (Marne), on November 22, 1918, where it remained until November 30, 1918, when it left en route to the United States.

Battery No. 3

On the date of joining the Railway Artillery Reserve, American Expeditionary Force, this battery was at Haussimont (Marne). The battery joined the 1st Army, American Expeditionary Force, on October 12, 1918, and occupied a position (964) near Thierville (Meuse), where it remained until November 3, 1918, firing on the cities of Longuyon and Mangiennes. Total number of rounds fired: forty-nine. On November 3, 1918, the battery was moved to a position near Charny (Meuse), where it remained until November 22, 1918, firing on the cities of Louppy, Remoiville, and upper and lower garages and bridge at Montmédy. Total number of rounds fired: one hundred and eighty-seven. On November 22, 1918, the battery returned to Haussimont (Marne), where it remained until December 1, 1918, when it left en route to the United States.

Battery No. 4

On the date of joining the Railway Artillery Reserve, American Expeditionary Force, this battery was at Haussimont (Marne). The battery joined the 1st Army, American Expeditionary Force, on October 13, 1918, occupying a position (964) near Thierville (Meuse), where it remained until October 29, 1918, firing on the railroad garage at Longuyon and the town of Mangiennes. Total number of rounds fired: eleven. On October 29, 1918, the battery was moved to a position near Charny (Meuse), where it remained until November 4, 1918, firing on the railroad tunnel near Montmédy, the railroad garage at Montmédy, crossroads at Louppy, and a garage between Louppy and Remoiville. Total number of rounds fired:

eighty-six. This firing was done under adverse conditions in that the pit foundation, or firing platform, was placed on the edge of a railroad fill on "made" ground and above an old dugout under the track. The result was that the foundation sank at the forward end, tipped to the left, and moved back a little more than sixteen inches. The entire mount and the steel framework of the platform recoiled and counterrecoiled several inches at every round and finally this movement became so great that the jacks which supported the rear of the mount were tipped to a dangerous angle. On the evening of November 3, 1918, report was made that it was considered dangerous to fire from the position and, after six more rounds were fired that night, further firing was discontinued. On November 4, 1918, the battery was returned to the position near Thierville, where it remained until November 22, 1918, firing on the railroad garage at Longuyon and the city of Mangiennes. Total number of rounds fired: twenty-five. On November 22, 1918, the battery returned to Haussimont (Marne), where it remained until December 3, 1918, when it left en route to the United States.

Battery No. 5

On the date of joining the Railway Artillery Reserve, American Expeditionary Force, this battery was at Haussimont (Marne). The battery joined the 1st Army, American Expeditionary Force, on October 13, 1918, occupying a position (964) near Thierville (Meuse) and firing on the cities of Longuyon and Mangiennes. Total number of rounds fired: one hundred and twelve. On November 22, 1918, the battery returned to Haussimont (Marne), where it remained until December 2, 1918, when it left en route to the United States.

Headquarters Detachment, 44th Artillery (C. A. C.)

The Headquarters and Supply Company was formed on March 26, 1918, by transfers from the batteries composing the Howitzer Regiment, 30th Artillery Brigade (C. A. C.-Railway). Detachments of this company formed the Headquarters Detachments of the four battalions of this regiment. The Regimental Headquarters Detachment was a part of this company and served at Auve (Marne), with no tactical duties to perform, from July 11 to August 7, 1918, on which date the 44th Artillery (C. A. C.) was detached from the Railway Artillery Reserve.

Headquarters Detachment, 1st Battalion, 44th Artillery (C. A. C.)

This detachment served on the front of the VIII French Army from April 14 to July 1, 1918, being located at St. Julien (Meuse). The detachment served with the IV French Army from July 13 to 24, 1918, being located near Laval (Marne), and with the V French Army from July 25 to August 23, 1918, being located near Bois de Pyramid (Marne). During this period it served as a tactical Groupe Headquarters and controlled the fire delivered by this battalion. On August 7, 1918, the de-

tachment, with the rest of the 44th Artillery (C. A. C.), was detached from the Railway Artillery Reserve.

Battery "A," 44th Artillery (C. A. C.)

This battery manned one 32-cm. (French) gun, Railway Mount, from October 27 to December 10, 1917; four 19-G (French) guns, Railway Mount, from December 10, 1917, to March 23, 1918; and four 8-inch Mark VI Howitzers after March 27, 1918.

This battery, as 3d Battery, Howitzer Regiment, 30th Artillery Brigade, (C. A. C.-Railway) [Battery "G," 52nd Artillery (C. A. C.)], joined the VIII French Army on April 18, 1918, occupying a position at Boncourt (Meuse) until May 25, 1918. Total number of rounds fired from this position: five hundred and sixty-three. On May 25, 1918, the battery moved to a position in the Forêt de Pouvenelle (Meurthe-et-Moselle), where it served until June 4, 1918. On June 5, 1918, the battery moved to a position at Maxeville (Meurthe-et-Moselle). On June 24, 1918, the battery moved to a position in the Forêt de Pouvenelle (Meurthe-et-Moselle), in which latter position the battery remained until July 1, 1918. No firing was done from any of the three last named positions. The period from July 1 to 13, 1918, was occupied in moving to the sector of the IV French Army, where the battery occupied a position near Hans (Marne) from July 13 to 17, 1918. No firing was done from this position. On July 17, 1918, the battery moved to a position near Laval (Marne), where it remained until July 24, 1918. Total number of rounds fired from this position: two hundred. On July 25, 1918, the battery moved to the sector of the V French Army, occupying a position in the Bois de Pyramid (Marne), where it remained until August 23, 1918. Total number of rounds fired from this position: two hundred and fifty. On August 7, 1918, this battery, with the rest of the 44th Artillery (C. A. C.), was detached from the Railway Artillery Reserve.

Battery "B," 44th Artillery (C. A. C.)

This battery manned four 8-inch Mark VI Howitzers.

As 4th Battery, Howitzer Regiment, 30th Artillery Brigade (C. A. C.-Railway) [Battery "H," 52nd Artillery (C. A. C.)], it joined the VIII French Army on April 14, 1918, occupying a position near St. Julien (Meuse) until May 23, 1918. Total number of rounds fired: six hundred and eighty. Between May 23 and July 1, 1918, the battery occupied two different positions in the Forêt de Pouvenelle (Meurthe-et-Moselle) and one on the ridge three kilometers west of Maxeville (Meurthe-et-Moselle). No firing was done from any of these positions. The period from July 1 to 13, 1918, was occupied in moving to the sector of the IV French Army where the battery occupied a position near Hans (Marne) from July 13 to 17, 1918. No firing was done from this position. The battery occupied a position near Laval (Marne) from July 17 to 24, 1918. Total number

of rounds fired from this position: four hundred and ninety. The battery moved to the sector of the V French Army, occupying a position in the Bois de Pyramid on July 25, 1918, and remained in this position until August 23, 1918. Total number of rounds fired from this position: three hundred and eighty. On August 7, 1918, the battery, with the rest of the 44th Artillery (C. A. C.), was detached from the Railway Artillery Reserve.

HEADQUARTERS DETACHMENT, 2ND BATTALION, 44TH ARTILLERY (C. A. C.)

This detachment served on the front of the VII French Army from April 16 to 23, 1918. During this period the detachment was located as follows: From April 16 to May 25, 1918, near Willer (Alsace); from May 25 to July 28, 1918, near Rammersmatt (Alsace); and from July 29 to August 23, 1918, near Hagenbach (Alsace). This detachment served as a tactical Groupe Headquarters and controlled the fire delivered by this battalion. On August 7, 1918, the detachment, with the rest of the 44th Artillery (C. A. C.), was detached from the Railway Artillery Reserve.

BATTERY "C," 44TH ARTILLERY (C. A. C.)

This battery manned two 270-mm. (French) Côte Mortars from October 20 to December 7, 1917, after which it manned four 8-inch Mark VI Howitzers.

As 5th Battery, Howitzer Regiment, 30th Artillery Brigade (C. A. C.-Railway) [Battery "I," 51st Artillery (C. A. C.)], it joined the VII French Army on April 6, 1918, serving with that Army until August 23, 1918. Positions were occupied as follows: At Willer (Alsace), from April 16 to May 25, 1918, from which position ninety-three rounds were fired; at Rammersmatt (Alsace), from May 25 to July 29, 1918, from which position one thousand six hundred and ninety-three rounds were fired; at Hagenbach (Alsace), from July 29 to August 23, 1918, from which position twenty-eight rounds were fired. On August 7, 1918, the battery, with the rest of the 44th Artillery (C. A. C.), was detached from the Railway Artillery Reserve.

BATTERY "D," 44TH ARTILLERY (C. A. C.)

This battery manned two 270-mm. (French) Côte Mortars from October 20 to December 7, 1917, after which it manned four 8-inch Mark VII Howitzers.

As 6th Battery, Howitzer Regiment, 30th Artillery Brigade (C. A. C.-Railway) [Battery "K," 51st Artillery (C. A. C.)], it joined the VII French Army on April 16, 1918, where it remained until August 23, 1918. During this period it occupied positions as follows: From April 16 to June 29, 1918, at Willer (Alsace), from which position one thousand one hundred and seventy rounds were fired; from June 29 to August 7, 1918, at Dieffmatten (Alsace), from which position seven hundred and

fifty-five rounds were fired. On August 7, 1918, the battery, with the rest of the 44th Artillery (C. A. C.), was detached from the Railway Artillery Reserve.

HEADQUARTERS DETACHMENT, 3D BATTALION, 44TH ARTILLERY (C. A. C.)

This detachment served on the front of the VIII French Army from April 13 to June 30, 1918, being located near Brunnelle (Meurthe-et-Moselle). The detachment served on the front of the IV French Army from July 4 to 24, 1918, being located near Laval (Marne), and with the V French Army from July 26 to August 13, 1918, being located at Baconnes (Marne). During this period the detachment performed the functions of a tactical Groupe Headquarters and controlled the fire of the batteries of this battalion. On August 7, 1918, the detachment, with the rest of the 44th Artillery (C. A. C.), was detached from the Railway Artillery Reserve.

BATTERY "E," 44TH ARTILLERY (C. A. C.)

This battery manned four 8-inch Mark VI Howitzers.

As 1st Battery, Howitzer Regiment, 30th Artillery Brigade (C. A. C.-Railway) [Battery "E," 52nd Artillery (C. A. C.)], it joined the VIII French Army on April 13, 1918, and served with that Army until June 30, 1918. During this period positions were occupied as follows: Positions at Reherry (Meurthe-et-Moselle) and a position in the Bois de Mênil-la-Tour (Muerthe-et-Moselle). A total of one thousand one hundred and thirty-five rounds were fired from the former position. The battery served with the IV French Army from July 4 to August 27, 1918, occupying positions as follows: Near Laval (Marne) from July 4 to 24, 1918, from which position one thousand three hundred and eighty-eight rounds were fired; near Baconnes (Marne) from July 25 to August 27, 1918, from which position four hundred and fifty rounds were fired. On August 7, 1918, the battery, with the rest of the 44th Artillery (C. A. C.), was detached from the Railway Artillery Reserve.

BATTERY "F," 44TH ARTILLERY (C. A. C.)

This battery manned two 32-cm. (French) guns, from October 3, 1917, to January 15, 1918; four 19-G (French) guns, from January 15 to March 23, 1918; thereafter four 8-inch Mark VI Howitzers.

As 2nd Battery, Howitzer Regiment, 30th Artillery Brigade (C. A. C.-Railway) [Battery "F," 52nd Artillery (C. A. C.)], it joined the VIII French Army on April 13, 1918, and served with that Army until June 30, 1918, during which period the battery occupied a position near Vaxainville (Meurthe-et-Moselle). Total number of rounds fired: seven hundred and seventy. The battery served with the IV French Army from July 4 to August 13, 1918, occupying a position near Laval (Marne) from July 4 to 24, 1918, from which position one thousand three hundred and thirty-two rounds were fired, and a position near Baconnes (Marne) from July

26 to August 13, 1918, from which position six hundred and fifty-seven rounds were fired. On August 7, 1918, the battery, with the rest of the 44th Artillery (C. A. C.), was detached from the Railway Artillery Reserve.

HEADQUARTERS DETACHMENT, 51ST ARTILLERY (C. A. C.)

This detachment was a part of the Headquarters and Supply Company, 51st Artillery (C. A. C.). The detachment joined the VIII French Army on July 18, 1918, at Tremblecourt-en-Haye (Meurthe-et-Moselle), where it remained until August 7, 1918, as Headquarters Detachment, Groupment Bunker, taking part in the operations of the VIII French Army during that period. On August 7, 1918, the detachment, with the rest of the 51st Artillery (C. A. C.), was detached from the Railway Artillery Reserve.

HEADQUARTERS DETACHMENT, 1ST BATTALION, 51ST ARTILLERY (C. A. C.)

While this detachment formed a part of the Railway Artillery Reserve, the Battalion Headquarters Detachment was drawn from the Headquarters and Supply Company, 51st Artillery (C. A. C.). The detachment joined the VIII French Army on April 3, 1918, where it remained until August 7, 1918, occupying positions at Tremblecourt-en-Haye (Meurthe-et-Moselle), near Nancy (Meurthe-et-Moselle), and Domevre-en-Haye (Meurthe-et-Moselle), and operating as Headquarters Detachment, Groupe Niles (1st Bn., 51st Artillery (C. A. C.)), Groupment Bunker. On August 7, 1918, the detachment, with the rest of the 51st Artillery (C. A. C.), was detached from the Railway Artillery Reserve.

BATTERY "A," 51ST ARTILLERY (C. A. C.)

This battery manned three 240-mm. St. Chamond Howitzers, Tractor Drawn, Model 1888.

The battery joined the VIII French Army on April 3, 1918, where it remained until August 7, 1918, occupying a position near Rogeville (Meuse) and forming a part of Groupe Niles (1st Bn., 51st Artillery (C. A. C.), Groupment Bunker. Total number of rounds fired: one hundred ninety-five. On August 7, 1918, the battery, with the rest of the 51st Artillery (C. A. C.), was detached from the Railway Artillery Reserve.

BATTERY "B," 51ST ARTILLERY (C. A. C.)

This battery manned three 240-mm. St. Chamond Howitzers, Tractor Drawn, Model 1888.

The battery joined the VIII French Army on April 4, 1918, where it remained until August 7, 1918, occupying a position in the vicinity of Martincourt (Meurthe-et-Moselle) and forming a part of Groupe Niles (1st Bn., 51st Artillery (C. A. C.)), Groupment Bunker. Total number of rounds fired: one hundred and ten. On August 7, 1918, the battery, with the rest of the 51st Artillery (C. A. C.), was detached from the Railway Artillery Reserve.

HEADQUARTERS DETACHMENT, 2ND BATTALION, 51ST ARTILLERY (C. A. C.)

While this battalion remained a part of the Railway Artillery Reserve, the Battalion Headquarters Detachment was drawn from the Headquarters and Supply Company, 51st Artillery (C. A. C.). The detachment joined the VIII French Army on April 12, 1918, where it remained until August 7, 1918, occupying positions in St. Jean Valley (Meurthe-et-Moselle), Fort de Lucey (Meurthe-et-Moselle), and the Forêt de Pouvenelle (Meurthe-et-Moselle), and operating as Headquarters Detachment, Groupe Grace (3d Bn., 51st Artillery (C. A. C.)), Groupment Bunker. On August 7, 1918, the detachment, with the rest of the 51st Artillery (C. A. C.), was detached from the Railway Artillery Reserve.

BATTERY "C," 51ST ARTILLERY (C. A. C.)

This battery manned four 270-mm. Côte Mortars (French).

As Battery "L," 51st Artillery (C. A. C.), it joined the VIII French Army on April 12, 1918, where it remained until August 7, 1918, occupying positions in St. Jean Valley (Meurthe-et-Moselle), Fort de Lucey (Meurthe-et-Moselle), and Forêt de Pouvenelle (Meurthe-et-Moselle), and forming a part of Groupe Grace (3d Bn., 51st Artillery (C. A. C.)), Groupment Bunker. Total number of rounds fired: eighty. On August 7, 1918, the battery, with the rest of the 51st Artillery (C. A. C.), was detached from the Railway Artillery Reserve.

BATTERY "D," 51ST ARTILLERY (C. A. C.)

This battery manned four 270-mm. Côte Mortars (French).

As Battery "M," 51st Artillery (C. A. C.), it joined the VIII French Army on April 12, 1918, where it remained until August 7, 1918, occupying positions in St. Jean Valley (Meurthe-et-Moselle), Fort de Lucey (Meurthe-et-Moselle), and the Forêt de Pouvenelle (Meurthe-et-Moselle), forming a part of Groupe Grace (3d Bn., 51st Artillery (C. A. C.)), Groupment Bunker. Total number of rounds fired: one hundred and eighty-nine. On August 7, 1918, the battery, with the rest of the 51st Artillery (C. A. C.), was detached from the Railway Artillery Reserve.

HEADQUARTERS DETACHMENT, 3D BATTALION, 51ST ARTILLERY (C. A. C.)

This Headquarters Detachment, as Headquarters Detachment, 4th Battalion, 30th Artillery Brigade (C. A. C-Railway), joined the II French Army on April 27, 1918, where it remained until August 7, 1918, occupying positions near Fort de Troyon (Meuse), near Fleury (Meuse), near Sononcourt (Meuse), and near Fort de Marre (Meuse), and taking part in the operations of the II French Army during that period. On August 7, 1918, the detachment became part of the 51st Artillery (C. A. C.) and was detached from the Railway Artillery Reserve.

BATTERY "E," 51ST ARTILLERY (C. A. C.)

This battery manned two 19-G (French) guns, Railway Mount, Model 1875/76, from December 13, 1917, to April 9, 1918, after which it manned four 8-inch Mark VI Howitzers.

As 7th Battery, Howitzer Regiment, 30th Artillery Brigade (C. A. C.-Railway), it joined the II French Army on April 27, 1918, where it remained until August 7, 1918, occupying positions near Fort de Troyon (Meuse), near Fleury (Meuse), near Sononcourt (Meuse), and near Fort de Marre (Meuse), taking part in the operations of the II French Army during that period as a part of Groupe Campbell, Groupe Tilghman, and Groupe Leavenworth, in turn. Total number of rounds fired: four hundred and eighteen. On August 7, 1918, the battery became a part of the 51st Artillery (C. A. C.) and was detached from the Railway Artillery Reserve.

BATTERY "F," 51ST ARTILLERY (C. A. C.)

This battery manned four 19-G (French) guns, Railway Mount, Model 1875/76, from February 20 to April 10, 1918, after which it manned four 8-inch Mark VI Howitzers.

As 8th Battery, Howitzer Regiment, 30th Artillery Brigade (C. A. C.-Railway), it joined the II French Army on May 2, 1918, where it remained until August 7, 1918, occupying positions near Fort de Troyon (Meuse) and near Lemmes (Meuse), and taking part in the operations of the II French Army during that period as a part of Groupe Campbell, Groupe Tilghman, and Groupe Leavenworth, in turn. Total number of rounds fired: 356. On August 7, 1918, the battery became part of the 51st Artillery (C. A. C.) and was detached from the Railway Artillery Reserve.

HEADQUARTERS DETACHMENT, 2ND BATTALION, 57TH ARTILLERY (C. A. C.)

This Headquarters Detachment, as Headquarters Detachment, 2d Battalion, 51st Artillery (C. A. C.), joined the VIII French Army on May 16, 1918, occupying a position in the Bois de Rehanne, where it remained until August 7, 1918, when it was reorganized into Headquarters Detachment, 2nd Battalion, 57th Artillery (C. A. C.) and was detached from the Railway Artillery Reserve. During this period the detachment operated as Headquarters Detachment, Groupe Spurgin (2nd Bn., 51st Artillery (C. A. C.)), with the 4th Corps.

BATTERY "C," 57TH ARTILLERY (C. A. C.)

This battery manned four 155-mm. G. P. F. (French) guns.

As Battery "F," 51st Artillery (C. A. C.), it joined the VIII French Army on May 16, 1918, occupying a position in the Bois de Rehanne, where it remained until August 7, 1918, when it was detached from the Railway Artillery Reserve. During this period the battery operated as a part of Groupe Spurgin (2nd Bn., 51st Artillery (C. A. C.)).

Battery "D," 57th Artillery (C. A. C.)

This battery manned four 155-mm. G. P. F. (French) guns.

As Battery "G," 51st Artillery (C. A. C.), it joined the VIII French Army on May 16, 1918, occupying a position in the Bois de Rehanne, where it remained until August 7, 1918, when it was detached from the Railway Artillery Reserve. During this period the battery operated as a part of Groupe Spurgin (2d Bn., 51st Artillery (C. A. C.)). Total number of rounds fired: two hundred and forty-seven.

*The Atlantic and Gulf Coasts already have finished defenses and their people do not specially concern themselves. But it is beginning to be realized that for the immediate future the great commercial and industrial expansion is to be on the Pacific and that, as competition for trade is quite likely to evolve bad feeling, which leads to war, to leave our coasts poorly defended is to assume too great a risk. Puget Sound, the Columbia River, San Francisco, and San Diego must all have adequate defenses. * * * We cannot live in a fool's paradise. * * * The surest way to assure that our seacoast will never be attacked is to make it very dangerous to an enemy.*—San Francisco Chronicle.

Fort Sumter

*Taken from the Official War Department Records of the Union and Confederate Armies**

By Lieut. Robert Rossiter Raymond, Jr., 4th F. A.

IT is the twentieth of December, 1860. The Ordinance of Secession has just passed the Convention of the People of South Carolina and all Charleston is a seething anthill of resultant excitement. The masses of the citizenry are asserting their sovereignty with jubilant nose-thumbings in the direction of Washington. To them all that remains to be done is to eject every representative of the Federal Government, raise the Palmetto Flag over all Federal property, and live happily ever after. The aristocratic ruling class, however, has tempered its exultation with an attitude of defensive self-justification. It is trying by sheer weight of its own unquestioned belief in the right to secession to paralyze opposition in the North. Unconsciously, it senses the dubiety of its act and only hopes that it may "get away with it" before Northern opinion crystalizes. Above all must a final settlement be concluded before March fourth when Lincoln will take over the presidency from the sympathetic Buchanan.

But among a little band of soldiers at Fort Moultrie on an island in Charleston harbor there is only black uncertainty. Theirs the duty to garrison and hold the harbor defenses until relieved by the only government they recognize, the Federal Government. And theirs, too, the more trying duty of so conducting themselves as to offer no provocation. It is a difficult task, theirs, that has often been put up to the American soldier, often solved and as often left unsung.

The leader of this little band is a Robert Anderson, Major of Artillery, who has been especially selected for the work in hand. Only a month ago he was relieved from duty in New York and, after receiving personal instructions from the Secretary of War, ordered to take over the command at Charleston, a command which he himself describes as "politico-military," while his predecessor is hustled off to a regiment in Texas.

Although the garrison of the harbor defenses is quartered at Moultrie, the key to the system is Fort Sumter, which rears its bulk from the waters of the harbor entrance. Standing upon the parapet of Sumter the whole harbor and its forts lie before us. To the northeast is Moultrie nestling near the western end of Sullivan's Island; to the west on another large island is old, abandoned Fort Johnson; and to the northwest and beyond Johnson is the city itself, with a small fort, Castle Pinkney, lying on an island off the wharves. To the south is Morris Island, at present unfortified but, in Cummings Point, thrusting a threatening finger to within thirteen hundred yards of Sumter's walls.

* In going over the old records on the operations leading up to the bombardment of Fort Sumter, the writer felt himself an eyewitness of the events described. An attempt has therefore been made to create the same atmosphere in this article by writing in the present tense. —R. R. R.

All the forts have been permitted to run down and until four months ago were practically defenseless. But since August, work has been going on in Moultrie and Sumter to put them in condition for vigorous defense. Gangs of civilian laborers are even now toiling under Army engineers filling in embrasures not needed for guns, strengthening masonry, repairing water systems, throwing up earthworks to protect cannoneers at guns on the parapets, and all the thousand and one other things whose value can be foreseen or remotely imagined. At Sumter no outworks are needed or possible as an assault would have to be carried to the walls in boats. But at Moultrie, open to attack from the land, such works are being constructed. There has been no time or money to recondition Fort Johnson and very little for Castle Pinkney. Work is being pressed with feverish haste in order that the most may be accomplished before the obviously disaffected laborers decide on a walk-out. The force has been dwindling rapidly and will continue to do so until but a scant forty remain. If we could look ahead we would find those forty on the job as long as the United States flag remains above the ramparts, even assisting at the guns during the bombardment.

The garrison at Moultrie, a bare sixty men with half a dozen officers, consists of two badly depleted companies of artillery. Besides being under strength, the companies are sadly undertrained. Until the arrival of Major Anderson there had been no drill for months. Now the Major is whipping his command into shape by constant drills and practice in the use of their arms.

Six days pass, full of dark foreboding for Anderson and his men. At last the Major decides that the Charlestonians are determined to have possession of the forts. Especially are they obsessed with a romantic desire to possess Fort Moultrie, which their ancestors so gallantly defended in 1776. Unable to hold more than one fort, it is obviously the part of wisdom to transfer the garrison to Sumter, whose position renders it more difficult to attack. On the day after Christmas the transfer is effected swiftly and skillfully and Fort Moultrie is left with its cannon spiked and its gun carriages burned. Chagrined at finding the Federal position so much strengthened, Governor Pickens demands that the troops be returned to Moultrie but meets only with a refusal. That night the South Carolinians seize Moultrie and Castle Pinkney and three days later the Charleston Arsenal, leaving Sumter the only Federal military possession in Charleston.

Now begins a four months' wait, during which the garrison of Sumter uses every means at hand to render the fort impregnable, while their opponents are organizing for the defense of the harbor and a prospective attack on the fort. Both sides are hoping that a conflict may be avoided but none-the-less preparations go on. Throughout the period, courteous, if strained, relations exist between the two forces. The beleaguered garrison is permitted to send and receive mail and even to secure fresh meat and vegetables from the city markets. However, the Union soldiers are cooped

up within the fort ostensibly to avoid any unpleasantness with the civil population. Major Anderson's position becomes more and more precarious. Almost daily as he inspects the shores of the harbor he sees increasing evidences of Southern determination—Forts Moultrie and Johnson repaired and armed; here a new battery; there a pile of sand that will soon be another battery; and in many places on the beaches companies of men being trained and drilled. Trapped, he sees the encircling pack of grim cannon ever swelling and ever thrusting their hungry muzzles toward Sumter in ominous expectancy. He knows, too, that all these preparations are under the skilled guidance of General Beauregard, until recently an officer of the United States Army, who is busy organizing the Army of South Carolina, which will later merge with the Army of the Confederacy as the wave of secession sweeps on to engulf all the Southern States.

Early in January of 1861, the first attempt is made to relieve Fort Sumter. The steamer *Star of the West* is secretly chartered in New York and, with two hundred men and three months' supplies steals out of that port. Unfortunately for Major Anderson, the arrangements to notify him of the attempt and to keep General Beauregard in the dark go awry. An alert youth at one of the Southern batteries off Charleston sees the ship creeping into the harbor. In an instant he touches a match to the fuze of a gun and the first shot of the Civil War hurtles out over the water to rouse the rest of the battery, which has been lying in wait. This youth is one William Stewart Simkins. He will fight all through the War he has begun and will die on February 27, 1929, an honored professor of law at Texas University. In Fort Sumter its commander sees only a merchant vessel flying the flag of his country and decides it would be unwise to come to her assistance with his batteries. Receiving no support from the fort, the *Star of the West* puts about and returns to New York. It is only in Beauregard's reply to Anderson's protest at the insult to the United States flag that the latter learns how narrowly relief has been snatched from his grasp.

Late in January, arrangements are completed for the removal of all women and children from the fort. On February first they are taken off and placed on a steamer bound for New York. In the long period of waiting, this is the only event tending to lighten the anxieties of the garrison.

January passes into February, February into March, and March into April, with ever-increasing certainty of a conflict. During this time the stores and supplies in the fort are reaching the vanishing point. There are no candles, no soap, little oil, and only a few days' rations left. Once the supply of food from Charleston is cut off the garrison will be starved out. No hope of relief remains as the Government in Washington fears that any strengthening of Anderson's position will only serve as an excuse for attack. The Southern preparations have reached completion. Several

thousand troops have been placed on the islands closing in the harbor. There are batteries to command the fort, batteries to protect the harbor entrance, works and field pieces to repel landing parties from a possible naval expedition. The troops, while mostly raw, have been rushed in their training. Frequent practice in firing the guns has been carried on. When the shots have fallen too close to Sumter, Major Anderson has remonstrated with General Beauregard, who has courteosuly ordered that the offending batteries shift their fire away from the fort.

The beginning of the end comes on April seventh with notice to Major Anderson that he may no longer secure supplies in the city. The following day all mail to or from Sumter is cut off. With the food supply prohibited, the situation is critical. Only half rations are permitted, but in two days the stock of bread is exhausted. However, its place is filled with damaged rice, which while spread out to dry had been filled with glass from windows shattered by the concussion of guns fired in practice. By picking over the rice sufficient is obtained to help feed the hungry men, who would otherwise have been reduced to a diet of pork alone.

As serious as the shortage of food is the lack of powder bags, without which charges for the guns cannot be prepared. All extra clothing and blankets are collected and a detail put to work sewing them into bags. Progress is slow, as only six needles can be found in the fort.

On the tenth, all officers and men are moved out of the barracks and quartered within the gun casemates where they will be better protected and ready for instant action.

At last at 4:00 p. m. on the eleventh come three aides from General Beauregard with a formal demand for the evacuation of the fort. After a short conference they are sent back with Anderson's refusal to surrender. During the negotiations Major Anderson has remarked that in a few days he will be starved out if not shelled out. Seizing on this remark as a last hope of avoiding a bombardment, Beauregard sends to urge that Anderson set a date beyond which he will not attempt to hold the fort. The Major returns word that desiring "to avoid the effusion of blood" he will evacuate by noon of the fifteenth "should I not receive prior to that time controlling instructions from my government or additional supplies" and agrees not to open fire with his guns unless attacked. Anderson's qualification of his agreement to evacuate is not acceptable to the Southern commander, who accordingly sends the following message:

Fort Sumter, S. C., April 12, 1861, 3:20 a. m.

SIR: By authority of Brigadier General Beauregard commanding the Provisional Forces of the Confederate States, we have the honor to notify you that he will open the fire of his batteries on Fort Sumter in one hour from this time.

We have the honor to be, very respectfully, your obedient servants,

JAMES CHESTNUT JR., *Aide-de-camp,*
STEPHEN E. LEE, *Aide-de-camp.*

Considering numbers of guns only, it appears that the opponents in the impending fight are evenly matched. Within the fort are forty-eight guns mounted on the parapet and within the casements, and five mortars are arranged on the parade ground. Against these the Confederates have thirty guns and seventeen mortars. The most of these are in or near Fort Moultrie on Sullivan's Island to the northeast or on Morris Island to the south where that island thrusts Cummings Point out to within easy range of the fort. In addition, the Southerners have batteries ready to repel any attack from the sea.

At 4:30 a. m. the signal shot rises from a mortar near old Fort Johnson, just ten minutes late. Immediately all of Beauregard's batteries join in the fray. For two and a half hours Sumter remains silent but at last, at 7:00 o'clock, opens fire. The entire garrison, including the civilian employees, has been divided into three shifts, each shift to man the guns two hours at a time. Even so, there are not sufficient men to operate all guns.

From the start, the plunging fire of the Southern mortar batteries is telling. The rain of bursting shells on the parapet is so intense that the gun crews on that tier have to be withdrawn and soon only the lower tier is firing. Unfortunately for the defenders, the silenced guns are the fort's heaviest weapons. The ranges are a little long for the lighter guns of the lower tier, so that their shot are ineffectual against the hostile works. By noon the shortage of powder bags is acute, although the six needles are kept busy and even the hospital sheets are sacrificed. Gradually the fire from the fort slackens until only six guns are left in action. Unhampered by the difficulties that obtain in the fort, the Confederates keep up their bombardment all day at almost the maximum rate of fire of four rounds from each gun every minute. Three times their shots set fire to the barracks in Sumter but each time the garrison extinguished the flames. By nightfall the barracks and quarters are riddled with shot and considerably damaged by fire and some of the parapet guns are dismounted, but no serious injury has been done the fortification itself.

Early in the afternoon three Union ships appear off the harbor, bringing a ray of hope to the besieged and anxiety to the besiegers. Unknown to Major Anderson they are bringing reenforcements and supplies, which it is intended to run in under the protecting guns of the *Powhatan,* a man o' war, not yet arrived on the scene.

During the night a terrific gale rages. Sumter lies silent in the darkness while the hostile batteries keep up an intermittent fire. Within the fort the last remnants of cloth are being sewed into powder bags for the morrow's defense.

With daylight the Southern batteries open up again in earnest. Anderson's men breakfast on the last of the salvaged rice and pork and return to their guns. For a while the increased supply of powder bags makes possible a spirited cannonade from the fort. Early in the day a shot from Cummings Point strikes in an embrasure and wounds four men

slightly, the only casualties of the bombardment. In spite of the gale, the Union ships are still standing off the bar waiting for the *Powhatan.* Throughout the day they remain impotent. The best they can do is arrange plans for running in supplies in small boats during the night, but before even this can be attempted the flag on Sumter will be hauled down.

This second attempt at relief, like the first, fails through lack of coordination somewhere in Washington, for the *Powhatan* had been ordered elsewhere on April 7th and the expedition she was to have supported was permitted to sail two days later in ignorance of the changed orders.

This second day of the battle, the defenders of Sumter note an increased accuracy of the enemy fire. Now the guns at Moultrie are hurling hot shot into the buildings within the fort. Columns of telltale smoke burst from the barrack roofs and soon the interior of Sumter is a roaring furnace. Every possible man is impressed to fight the fire but it is soon beyond control. It becomes necessary to seal the doors of the magazines in order to prevent an explosion of the powder within, thus leaving only the powder already near the guns for continuing the defense. Only occasionally can men be found to continue firing. The heat and dense smoke further hamper the gun crews. In the Southern batteries the conflagration serves as a signal to increase the rate of fire. Every gun is strained to throw shot and shell into the disabled fort, which remains silent except for an infrequent, sullen retort. The South Carolinians not actually engaged in manning their guns are swarming over their works wherever they can best watch the spectacle and each time Anderson's guns speak, cheer the fort and its gallant defenders. Twice the Union flag is struck. A third time it is seen to split in two just below the union, an incident hailed by the Confederates as a happy augury for their cause.

At 1:00 o'clock the flag is shot away but almost immediately placed on another staff and again planted on the parapet. The disappearance of the flag has been observed by the commander at Cummings Point, who orders an aide, Colonel Wigfall, to procede to the fort and offer terms. Wigfall, with a volunteer oarsmen, jumps into a rowboat and rows out to Sumter under a dome of bursting shot and shell. Arrived at the fort he informs Major Anderson that the garrison may surrender with the same terms originally offered by General Beauregard before the bombardment began. Reluctantly, Major Anderson orders the Stars and Stripes replaced by a white flag. However, Beauregard himself has observed the plight of the fort with its flag down and its interior in flames. He sends officers of his staff to offer assistance. Arriving just as the white flag is hoisted, they express surprise at finding Wigfall in the fort and advise the Major that Wigfall has not seen General Beauregard for two days and is in no position to discuss terms. Much embarrassed, the Major hauls down the white flag and declines the offer of assistance in fighting the conflagration.

From the city Beauregard has already observed the flag of surrender and dispatches more aides to negotiate and also sends a steamer with a

fire engine and its company from the city fire department. With the raising of the white flag the Confederate firing ceases after thirty-three hours of continuous bombardment. Although Major Anderson has hauled down the flag of surrender on learning of Wigfall's true standing, he agrees not to raise his flag until terms are either accepted or rejected. Toward evening Beauregard's envoys return to Sumter with the following message:

HEADQUARTERS PROVISIONAL ARMY, C. S. A.

April 13, 1861, 5 min. to 6 o'clock p. m.

Sir: On being informed that you were in distress, caused by a conflagration in Fort Sumter, I immediately dispatched my aids, Colonels Miles and Pryor, and Captain Lee, to offer you any assistance in my power to give.

Learning a few minutes afterwards that a white flag was waving on your ramparts I sent two other of my aides, Colonel Allston and Major Jones, to offer you the following terms of evacuation: All proper facilities for the removal of yourself and command, together with company arms and private property, to any point within the United States you may select.

Apprised that you desire the privilege of saluting your flag on retiring, I cheerfully concede it, in consideration of the gallantry with which you have defended the place under your charge.

The *Catawba* steamer will be at the landing of Sumter to-morrow morning at any hour you may designate for the purpose of transporting you whither you may desire.

I remain, sir, very respectfully, your obedient servant,

G. T. BEAUREGARD, Brigadier General.

This chivalrous letter is hardly complete without its answer:

HEADQUARTERS FORT SUMTER, S. C.

April 13, 1861, 7:50 p. m.

General: I have the honor to acknowledge the receipt of your communication of this evening and to express my gratification at its contents. Should it be convenient, I would like to have the *Catawba* here at about nine o'clock tomorrow morning.

With sentiments of the highest regard and esteem, I am, general, very respectfully, your obedient servant.

ROBERT ANDERSON,
Major, U. S. Army, Commanding.

The evacuation takes place the following day. As Anderson's command prepares to embark on the steamer, which is to take them to the Union vessels lying off the harbor, the victors line their parapets and raise cheer after cheer for the vanquished. One last rite remains before the defenders of Sumter depart. The flag of the Union is hoisted and a salute fired in its honor. During the firing of the salute some loose powder explodes, killing one Union soldier and wounding several others. Thus, in a ceremonial after the battle, is killed the first soldier of a great war.

After this manner, in a comic opera setting, begins the war that will later call forth Sherman's historic remark.

Settlement of War Claims in the United States

By Capt. W. L. McMorris, C. A. C.
Formerly Attorney, W. D. Board of Contract Adjustment

THE subject of War Claims is as old as war itself and history is not without instances of wars having come about through the unsatisfactory settlement of claims growing out of previous conflicts between the same belligerents. The Alsace-Lorraine dispute is a leading case. While the subject is almost inexhaustable, an attempt will be made to set forth briefly the problem as it affected the War Department at the end of the late world conflict.

When the last long shout of victory had faded in the distance, when the last factory whistle had sounded its final blast, when the last pre-prohibition celebration had subsided and the guests gone home—on that memorable day in November, 1918, all in fitting tribute to the sixth successive victory of these United States in a major war, thousands of our leading citizens were confronted suddenly with a realization that the winning of the war by the nation virtually meant defeat for them. For they held contracts or agreements with the United States totalling $3,816,112,730.59 —a large order; indeed a very large order, even for those times of high prices and huge profits.

Where only a few days before these so-called profiteers stood to amass untold fortunes they now faced staggering losses. What was to be done—what could be done? Could the Secretary of War take care of the situation? Did he have jurisdiction to do so? He did not in many instances.

Small wonder that these claimants grew alarmed and swamped the halls of Congress with letters, telegrams, petitions, etc., all setting forth in no uncertain terms their sad but hopeful predicament. One-half of the three billion eight hundred odd million dollars worth of War Department commitments was based on informal agreements (agreements entered into orally, by letter, proxy-signed contracts or implied agreements) and which were not executed in the manner prescribed by Revised Statutes. In many cases the contractors had made large commitments but had not effected completion of the contract. These agreements under the decisions of the courts and the Comptroller General were not enforceable against the United States. The Comptroller General further held that the Secretary of War could not lawfully reduce these agreements to statutory form and thus afford the contractors relief.

Jurisdiction—what evasions of the law have been committed in thy name! What solace for the clever barrister who with a losing case can tie it up indefinitely by invoking jurisdiction. I have a pamphlet sixty-nine

pages long entitled "Jurisdiction of the Secretary of War to settle contracts, etc." It represents the combined efforts of three Philadelphia lawyers, aided and abetted by one from Pittsburgh and another from New York. Suffice it to say that when a claimant could break through this barbed wire entanglement of jurisdiction he generally made his objective.

Congress, however, on March 2, 1919, passed what came to be known as the Dent Act, which gave to the Secretary of War authority "to adjust on a fair and equitable basis any agreement, express or implied, that had been entered into in good faith but not executed in the manner prescribed by law, provided said agreement was made during the Emergency and prior to November 12, 1918." It expressly prohibited the allowance of anticipated or prospective profits.

This opened the door at which these claimants had been pounding for four months and the War Department was literally swamped with claims, both real and fancied. They ran up and down and back and forth and even around that well known ladder of dispersion, with a few wild shots here and there just for luck. The smallest claim was for $1.85 to cover the cost of a telegram "asking" for a contract and the largest was for $7,500,000 covering the growing of cotton linters. The peak was reached in June, 1919, when one thousand and twelve claims were filed.

The principal agency through which the Secretary of War settled these claims was The Board of Contract Adjustment of the War Department.

Early in the War it was recognized that controversies would inevitably arise in connection with contracts for supplies for the Army. To meet this the Bureaus of the War Department inserted in their contracts provision for the settlement of disputes. The contracting officer was set up as the referee. His findings were reviewed by the Chiefs of the Bureaus and if their decisions were unsatisfactory the case went to the Secretary of War for final action. So many of these cases arose that the Secretary of War could not handle them, and on November 6, 1918, he created the Board of Contract Adjustment, authorizing it to "hear and determine all claims, doubts or disputes, etc., which may arise under any contract made by the War Department." This board originally consisted of three army officers.

On March 19, 1919, the War Department Claims Board was established. It functioned in the name of the Secretary of War and by his authority exercised all powers and duties conferred upon him. It consisted of the Assistant Secretary of War for Munitions, the Director of Purchase, Storage and Traffic, and a Colonel of the Judge Advocate General's Department. It exercised no original jurisdiction but reviewed the findings of the bureau boards and the Board of Contract Adjustment when the claimant filed an appeal.

Claims were classified in two groups. First, those arising under contracts which had been entered into formally and executed in the manner prescribed by law. Second, those contracts which had not been so exe-

cuted. The latter were further subdivided into two classes, namely: Those which were based on informal contracts evidenced by writing and those made orally or implied.

If the claim was based on an informal agreement not in writing, either expressed or implied, the Board of Contract Adjustment had original jurisdiction. If it was informal but evidenced in writing either by an unsigned or proxy-signed contract or otherwise irregularly evidenced in writing the claim could either be filed originally with the bureau board—such as the Ordnance Claims Board—or with this Board. However, if the claim was based on a formal written contract duly signed by both parties it had to be filed with the Claims Board of the Bureau concerned and if a satisfactory settlement could not be reached it came to the Contract Adjustment Board on Appeal. In case the decision went against the contractor and he was still unconvinced that his claim was faulty he could have it reviewed by the War Claims Board. If he also lost the decision there and continued to believe he was right he could appeal to the Secretary of War. If after getting adverse decisions all along the line the claimant refused to accept the decision he had one recourse left—The United States Court of Claims. Failing there—well it was just too bad unless he could get a Special Act through Congress for relief in his particular case. That it pays always to run out the hit and never concede the game until the last man is out is shown by the fact that out of forty-eight cases carried to the Court of Claims up to December, 1923, twenty-five, or more than half, were decided in favor of the claimants. However, some three hundred were still pending in that Court in 1924, the results of which are not at hand.

The nature of the claims were many and varied. They concerned cotton, cloth, wool uniforms, service coats, rubber boots, hay, ranges, trench helmets, rifle grenades, copper bands, machinery, toluol, pig iron, gun cotton, airplanes, airplane parts, balloon cloth, castor beans, vegetable ivory for buttons, rails, engines, rolling stock, and trackage for light railways.

The basis for many of the claims covered such features as direct materials, indirect materials, direct labor, articles in process, operation overhead, commitments, administrative expense, and unabsorbed amortization. This latter feature included such factors as facilities and equipment, experimental work and fees for expert advisors, cost of plant rearrangement, special tools, etc. They included a number of costs incurred by the contractor for the performance of the whole contract and which were wholly or in part to be amortized over and in the price to be paid by the Government for the finished articles. The theory in those cases was to ascertain how much of the cost was covered in the unit price of each item and then pay the contractor that amount multiplied by the number, delivery of which was not made nor paid for because the contract was suspended by

the action of the Government. Another prime factor of much difficulty and dispute was the matter of liquidated damages.

The Board of Contract had in all presented to it for adjudication 2,859 cases. Hearings averaging three hours long were held in 1,717 cases. Relief was granted to eight hundred and eighty-nine claims and denied in one thousand three hundred and forty-one, while four hundred and eighty-five claims were withdrawn.

To handle the vast volume of business the personnel was increased from its original three members to twenty-two, with General John Ross Delafield, a prominent New York Attorney as its chairman. The others were high ranking officers of the Juudge Advocate General's or civilian attorneys of high standing.

To investigate each claim, prepare it for hearing, look up the law and court decisions applicable, a trial section of eighty-five Government attorneys was organized under the direction of Dr. John Garland Pollard, formerly Attorney General of Virginia. In addition there were more than one hundred appraisers, experts, accountants, clerks, stenographers, etc. The entire organization occupied ninety rooms.

Cases were heard as in any court of law or equity. The Government attorney took charge of the Government case, examined his witnesses, and cross-examined the claimant's witnesses. Court reporters were employed and transcripts of the testimony made. Oral arguments were not encouraged but written briefs were submitted. The cases were taken under advisement immediately by the members sitting and decision rendered promptly —in most cases within two or three weeks. There were in all one hundred and four thousand pages of testimony taken. On one day eighteen different hearings were conducted simultaneously.

In each case the written decision consisted of the findings of fact, the conclusions arrived at, and the appropriate disposition ordered. The result was that no matter how violently a claimant may have disagreed with the decision on the facts or on the law, he had no ground to complain that he had not had his day in court. The Board was dissolved June 30, 1920, and the work taken over by the War Claims Board which, however, continued to use much of the same personnel. This latter board was dissolved March 1, 1922, when the docket was practically cleaned up. In the course of these adjustments, however, many instances of fraud, payments to contractors of large sums through mistake, etc., developed and these matters were made the basis of suits in the Federal Courts, being handled by the Department of Justice. The spruce scandal in connection with airplane production was an outstanding case.

To show the range which these claims ran I shall enumerate a few specific instances of which I have direct knowledge.

Brewster and Co., carriage makers of Long Island City, presented a claim for $325,000.00, which amount represented the difference between

their actual loss of $525,000.00 and the $200,000.00 which their contract allowed them in the form of liquidated damages. They had contracted to manufacture Le Pere Combat airplanes at a flat rate of $5,005.00 each—the $5 to cover the cost of transportation from the plant to Mitchell Field. They had completed and delivered one plane when they received a stop order from the War Department, and they actually incurred the loss of a half million dollars, mostly for plant facilities and new machinery installed. But having agreed in writing to take $200,000.00 as full damages the Secretary of War could not go beyond the formal written contract and they had to seek relief in the Court of Claims.

At the other extreme was the case of the Bethlehem Steel Co., which laid down a large order of steel ingots at the Frankford Arsenal to be machined into shells. They were rejected as being of wrong dimensions and were subsequently sold as scrap steel and the proceeds conveyed into the Federal Treasury. It was held that the selling of this material which reverted to the steel company when rejected imposed an implied obligation on the Government and some $1,400,000 was allowed the claimant.

One company making buttons imported a whole boat load of vegetable ivory and then endeavored to have the General Staff authorize the use of vegetable ivory buttons in place of the bronze standard type. At the hearing it was shown that this company's president was a $1.00 a year man in the morning and a contract seeker in the afternoon. Its claim was denied on the ground that taking a business hazzard and anticipating a contract did not obligate the Government.

The most far-fetched claim was one for $110 to reimburse claimant for expenses incurred while staying ten days at a leading hotel in Washington seeking a contract. This claim was of course denied.

To sum up it may be stated that the policy was to grant relief wherever it was shown that the claimant had acted in good faith and every effort was made to bring the claims within the jurisdiction of the Secretary of War and to view them in the light of equity rather than stern law, wherever possible. The total number of claims filed was thirty-one thousand four hundred and seventeen. The total number denied in full or withdrawn was five thousand three hundred and fifteen. The total number of claims settled was twenty-six thousand one hundred and two. The claims presented on formal contracts which were settled by the contractor's accepting the amounts offered by the Claims Board was seventeen thousand eight hundred and fourteen. The total number of claims on informal agreements (under the Dent Act) settled by awards made by the War Department Claims Board was eight thousand two hundred and eighty-eight. The value of the suspended part of all contracts, *i. e.*, what it would have cost the Government had said contracts gone to completion was $3,816,112,730.59.

The total amount approved for payment in settlement of all claims was

$505,290,943.14. The basis of settlement was 13.24 cents on the dollar. The total cost of the work of disposing of the vast number of claims was approximately $12,000,000.00. This included all salaries, traveling expenses, office expense, and other overhead items. The operating cost to the War Department was 32/100 of one per cent.

Secretary of War Newton Baker in his report of 1922 stated:

> The adjustments thus accomplished without recourse to litigation in the courts, with protection for the interests of the United States and with equity to the contractors, constitute the greatest episode of its kind in business history. It speaks eloquently of the fairness and patriotism of the average business man in America and of the ability and faithfulness of the officers engaged on behalf of the Government. I endorse it all.

*Unremitting advocacy of national and international reconstruction on lines of peace, is wholly consistent with thorough-going belief in preparedness for war in the light of the always conceivable war possibility. * * * Large standing armies are inconsistent with democratic governments. The standing army system of a militarized Europe will always be, as it should be, repugnant to this free country. But we should have a regular army amply sufficient for our needs, an army which in event of war shall serve as a substantial and disciplined nucleus about which to rally the citizen soldiership of the United States.*—Buffalo *Evening Times.*

Errors Probable and Otherwise

By "ONAGARCHUS"

A RECENT article in the COAST ARTILLERY JOURNAL, coupled with a season's target practice reports, brought the question of errors in use in T. R. 435-55 very forcibly to my attention. I indulged in some thought on the subject and, being a humble follower of Pyrrho, brought the verdict, "I doubt it."

1. Just what is a D. A. P. E. anyhow. How and by what process of reasoning are we justified in plotting shots fired at different elevations, different times, different azimuths as though they were all fired at a single fixed point? Are we not adding sheeps and goats and getting horses? I submit the following mathematical proposition: That the error of any single shot is zero. Hence, the mean errors will be zero and our D. A. P. E. be zero. Where salvos are fired, we will have a C. T. and an error. Although some one—Von Humboldt I think—said, "A scientist, given a glass of water, could therefrom argue the possibility of a Niagara," I rather think that even Von Humboldt would have shrunk from predicating the infinite upon two. It may be said that where our instrumental error is large and changes of range, azimuth, and time are small, we may consider the shots as all fired at the same range and azimuth for practical purposes. This is to say, that the error of assumption is less than our instrumental error. If this later proposition is correct I would like some of our mathematical sharks to present the proof thereof. Meanwhile, I for one am going to continue to regard the D. A. P. E. as the farmer did the giraffe, "There just aint no sich animal."

2. Next, for the sake of the argument, admitting there is a D. A. P. E. I once made assertion that error could never be less than a deviation, although it might theoretically become equal thereto. Whereupon my attention was called to certain practices in which the D. A. P. E., so-called, was less than the P. E. published in T. R. 435-55. I felt that the suspicions of years were justified by the event. However, my evil genius got in its work and I reflected that the age of miracles seems to be with us again. Next, an old rule of thumb, not unknown to the gunners of France, anent F. P. E. equals 1.5 P. G. P. E. came into my mind and furthermore, the fact that this rule was not predicated on any very limited number of shots but was nearer infinity than we are ever likely to come again. Then came the horrid thought that even the authors of T. R. 435-55 had some recollection of this rule or else why the strange rule for the determination of wild shots. It looked as though the rule might have been 8 P. E. (Proving Ground = 1 Dispersion Ladder. Multiplied by 1.5 = 12 P. E. Proving Ground or 8 P. E. (Field) = 1 Dispersion Ladder (Field). Alas for the boasted efficiency of the C. A. or the suspected ineptitude of the

Ordnance Department! If the rule was true and the C. A. Board believed it to be true, how could our field P. E. be less than our tabular P. E.? The answer seems to be that our tabular P. E.'s are not based on true proving ground data or that our Jockey Club is being powerful casual in handing out handicaps.

3. Looking over Table 2 in T. R. 435-55 I came near missing a bet. This table is an old, old friend of mine. I am so familiar with it that to question it is almost like questioning the alphabet or the Arabic system of numerals. However, what do these figures mean—P equals .238? So far as it means anything it means that in firing an infinite number of rounds under uniform conditions we shall get on the average two hundred and thirty-eight hits per one thousand rounds. But as our strings are generally ten to thirty rounds, would not a probability of .2 be a bit more useful, practically speaking?

Years ago we used to employ seven-place log tables and carry our calculations out to the fifth and sixth places, apparently laboring under the delusion that we increased our accuracy by this procedure. Some iconoclast of the period whose name escapes me now but whom our lieutenants, if they are not dead to all gratitude, should immortalize, wrote an essay which was entitled "The Illusion of Accuracy." This paper, if I recall it correctly, demonstrated beyond question that where the accuracy of computation exceeded the accuracy of instrumental observation the result was to decrease and not increase the accuracy of the experiment.

With this demonstration the Corps scrapped its seven-place tables and double interpolation formulae and got down to some common-sense practices. Recently I have observed a tendancy toward the return to the meaningless abracadabra of former times; and it seems to me that Table 2 might be cut several decimal places to the advantage of all concerned.

4. Now as to Table 1, I have no experimental data upon which to base my conclusion and in case this table should be based upon accurate proving ground data I run some risk of meriting the secondary meaning of the "Nom de Guerre" signed hereto by animadverting thereon. However, here goes and if I get policed it won't be the first fall I have ever had.

I note that P. E. for Mortars, Table I, varies as a percentage of the range. Its curve, if drawn, would be a straight line with ordinates running from ten per cent of the range at two thousand five hundred yards to one-half of one per cent of the range at eighteen thousand yards. If true, this is magnificent in its simplicity. Neither zone, weight of projectile, shape of projectile, nor elevation enter into the matter. But this is so at variance with my observations and the laws which were taught me afore time as governing high-angle fire that I feel that the ballistic data upon which this table is based should be published to the Corps. Though it may be that is a matter too esoteric to be entrusted to the vulgar herd of troop officers.

For my own part, pending such information I shall contend that—

a. Within each zone the armament error will vary with the elevation, that is, inversely with the range. Otherwise, why have the zones at all?

b. That the Armament Error as between zones will have its minimum value in either Zone 2 or Zone 3. It will reach its maximum in Zone 1. If not, our tactical ideas on the location of mortar batteries certainly need revision.

P. S. Onagarchus—This can, without too much strain on the original, be rendered into the vernacular as either "Master of Artillery" or "Chief Ass" as the gentle reader may elect.

EDITOR'S NOTE—*We are waiting for someone to shove him back in ranks. Who wants him?*

Adequate military preparation against such emergencies does not constitute militarism unless the militaristic purpose is plainly fostered. You may have a standing army of a million men without the slightest hint or trace of militaristic purposes. Or, on the other hand, you may maintain a standing army of less than a hundred thousand men and still hape a veritable militaristic machine. It all depends upon the spirit and training fostered and promoted. Militarism depends not upon numbers, but primarily upon motives. —The Manchester Union.

Movement of the 52nd Coast Artillery (Ry.) from Fort Eustis to Fort Story, Va. and Return May, 1929

By MAJOR O. C. WARNER, C. A. C.

THE 52nd Coast Artillery (Ry.) moved to Fort Story, Virginia, from Fort Eustis, Va., during May, 1929, for its annual target practice. A similar move was made in 1928. The training of a mobile unit is incomplete unless a part of its training is in movements. The 52d Coast Artillery is now the only Regular Army railway regiment in the United States. In order that officers of Coast Artillery generally may get a definite idea of such a movement, the writer kept a diary from April 22 to May 31, 1929.

April 22.—Rejoined for duty. The regiment began outdoor artillery drills on March 1, and some units have completed subcaliber practice. All triple valves have been tested this month in Chesapeake and Ohio shops and so stenciled, and all air brake cylinders have been cleaned by the Ordnance Department and so marked. Also, all car journals have been repacked by the Ordnance Department recently. Artillery Drill this a. m.

April 23.—Visited Fort Story with party of officers for reconnaissance, particularly to determine necessary repairs to track.

April 24.—Make-up of train issued by Railroad Transportation Officer.

April 25.—Memorandum for advance party of one officer and thirty-five enlisted men and for rear echelon of one officer and forty-two enlisted men issued.

April 26.—Battery "C" subcaliber practice completed (Mortars).

April 27.—Battery "D" subcaliber practice (Mortars).

April 29.—Battery "D" subcaliber practice. One 8-inch gun, Battery "F," transferred to another car and carriage.

April 30.—Field Order No. 1 issued. (Appendix I. Annexes omitted.) Battery "D" completed subcaliber practice. Night emplacing drill for 2nd Battalion (Mortars). Both batteries emplaced without lights: Time one hour ten minutes.

May 1.—Mortars taken out of drill positions. Advance party left (one officer, thirty-five men). Tug and targets from Fort Monroe arranged.

May 2.—Battery "F" subcaliber practice completed. Began making up train at 1:00 p. m. Ration cars and powder car loaded this p. m.

May 3.—Finished railway train make-up at noon. Ordnance Officer began his inspection and repair of air-brake system, car journals, and car trucks.

May 4.—Ordnance Officer finished at 9:30 a. m. C. & O. inspectors finished their inspection of train in one hour. Everything O. K. Train moved at 11:00 a. m. to Regimental Park for completion of loading.

May 6.—Train completely loaded today. Three cars already put in train cut out so as to expedite movement on ferry. Entire train will now go on one car float.

May 7.—Train of one locomotive, four mortars, four 8-inch guns, seven fire-control cars, two battalion power cars, three ration cars, one powder car, three projectile cars, two kitchen cars, one track materiel gondola, three empty cars, total thirty-one, with six officers and three hundred and fourteen enlisted men, left Fort Eustis at 5:30 a. m. and arrived at Fort Story at 1:50 p. m., by way of C. & O. to Newport News, C. & O. car float to Sewall's Point, Norfolk Belt Line R. R. to Tidewater Junction, and Norfolk and Southern R. R. to Cape Henry, Virginia. Total time eight hours and twenty minutes. Of this only four hours were used in actual running, the remaining time being spent on the car ferry at the three junction points and getting on and off the ferry. The personnel did not ride the train on the car float but went aboard an Army Mine Planter for the trip from Newport News to Sewall's Point (eight miles). Total distance of movement, sixty miles.

At Fort Story, our locomotive was off track for two hours' delay and one ammunition car was off track for one-half hour delay. All guns and mortars were spotted by 7:45 p. m. and emplaced by 9:00 p. m. Communications were already laid by advance party. Field Order No. 2, Occupation of Positions, issued at 2:15 (Appendix II). Battle practice mortar ammunition shifted to unit cars after arrival at Fort Story. Motor element left at 5:00 a. m. for Fort Story. Now at Fort Story: seventeen officers and four hundred and eight men. Strength of regiment is twenty-three officers and five hundred and eighteen men, or twenty per cent of regiment not present for various reasons.

May 8.—Telephone communications tested and faults corrected. Shelters for B′ stations begun.

The advance party of one officer and thirty-five men, between May 1 and May 6—

(a) Completed platform at B″ tower.
(b) Laid eleven miles of telephone twisted pair.
(c) Put in 18 cross ties on old track.
(d) Established B′ stations for four batteries.
(e) Moved seven tent floors.
(f) Prepared electric light lines for fifty-six tents, and all drop cords; attached to Post power system.
(g) Prepared officers' quarters.
(h) Moved ninety 200-lb. projectiles and forty-eight 700-lb. projectiles from storage points to firing position.

May 9.—Wind and rain. No drill. Firing schedule issued for 51st C. A. and 52d C. A. and schedule for towing tug.

May 10.—Drill, all batteries. No tug for tracking; ocean too rough. The C-41 airship flew over at 3:00 p. m. No radio communication with C-41.

May 11.—Drill in a. m. Preliminary practice all four batteries in p. m. Both mortar batteries required two courses, for various reasons.

Battery "D" began at 1:40 and finished at 2:23 p. m. Fourteen shots.

Battery "C" began at 3:18 and finished at 4:23 p. m. Fourteen shots.

Battery "F" began at 5:15 and finished at 5:26 p. m. Eight shots.

Battery "E" began at 5:29 and finished at 5:39 p. m. Eight shots.

Radio communication with spotting airship unsatisfactory.

May 13.—Analysis. Plans for battle practice received.

May 14.—Analysis finished. Band arrived today: one W. O., twenty-six men.

May 15.—All batteries simulated target practice on service course. Mortar course towed twice from 1:42 to 3:55. Mortar batteries ready to fire.

Air service officer here for conference re spotting.

May 16.—Simulated target practice 8:30 to 9:00 with tug on service course. All batteries ready for service practice tomorrow.

May 17.—Ocean too rough for tug *Pence* in a. m. All batteries fired in p. m. Delay in meteorological message and bad course.

Battery "E" began at 3:06 and finished at 3:18. Sixteen shots.

Battery "F" began at 4:08 and finished at 4:22. Sixteen shots.

Battery "C" began at 4:40 and finished at 5:31. Twenty-two shots.

Battery "D" began at 6:12 and finished at 6:54. Twenty-two shots.

May 18.—Analysis.

May 20.—Analysis. Rain, windy and cold.

May 21—Analysis. Scores: Battery "C," one hundred and sixteen; Battery "D," one hundred and nineteen; Battery "E" seventy-nine; Battery "F," ninety.

May 22.—Command Post Drill. Average time for group commander to put a battery on a target and fire one salvo is three minutes and twenty-five seconds at drill.

51st C. A. (155-mm. G. P. F.) fired three practices today.

May 23.—Simulated battle practice with three tugs towing targets.

May 24.—Artillery inspection; camp police. Field order for minor joint exercise issued by Lieut. Col. Taylor.

May 25.—Inspection of camp, tents, and grounds.

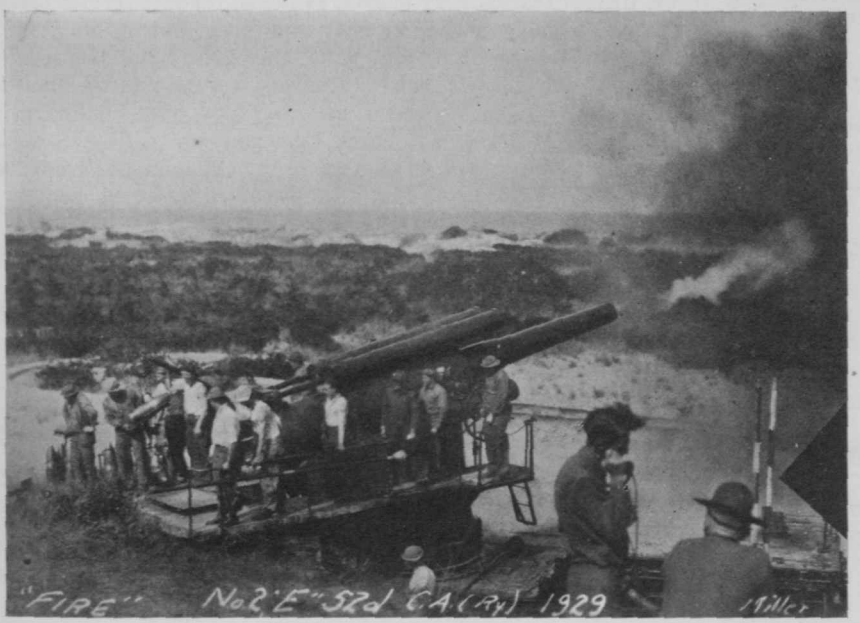
May 27.—Minor joint exercise and tactical inspection of regiment in a. m. by General Callan. Advanced class, C. A. S., in actual command of groups. Battle practice in p. m. Very thick fog. Visibility limited to eight thousand yards. General Hero, Chief of Coast Artillery present. Practice postponed until 5:00 p. m. and held at about eight thousand five hundred-yard range. Mortars did not fire. Ranges too short for powder furnished.

May 28.—Analysis of battle practice. Guns and mortars prepared for movement. F. O. No. 3 for return issued (Appendix III). Visibility excellent. Rainy in p. m.

May 29.—Train made up in p. m. for homeward movement. Kitchen and dining cars respotted for use until last minute. Train air tested and two air-line breaks repaired. Rainy in a. m.

May 30.—Memorial Day. All target practice and battle practice reports and all indorsements finished and mailed. Tactical inspection report finished. Twenty per cent hits obtained in battle practice with 8-inch guns.

May 31.—Policed camp site. Left Fort Story at 10:30 a. m. and arrived at Fort Eustis at 5:00 p. m. Total time, seven hours. Running time from Newport News to Lee Hall (nineteen miles) was thirty-five minutes.



"FIRE"
NO. 2 GUN, BATTERY "E" 52D C. A. (RY.) AT FORT STORY, VIRGINIA, 1929

Going and return movements by rail developed no difficulties and no faults in materiel. District Engineer has appropriation now for replacement of rotten ties in main line track at Fort Story. The cost of the rail movement of the 52nd C. A. (Ry.) from Fort Eustis, Virginia, to Fort Story, Virginia, and return was: for equipment, going $4,113.60, returning $3,258.43; for personnel, three hundred and fourteen men, going $301.44, three hundred and seventeen men, returning $304.32; a total cost of $7,977.79. Freight charges on one locomotive eighty-eight and one-half tons dead on own wheels were $68.26, whereas freight charges on one 12-inch mortar eighty-eight and one-half tons were $353.12, or five times as much. Effort is being made to obtain a freight reclassification of railway artillery materiel. With a cheaper rate, the appropriation would permit longer movements, which would give better training and varied tactical problems to the regiment.

APPENDIX I

FIELD ORDER
NO. 1.

52nd C. A. (RY.)
FORT EUSTIS, VA.,
30 April. 29, 6:00 A. M.

MAPS: Geological Survey, 1: 62,500: YORKTOWN, HAMPTON, NEWPORT NEWS, and CAPE HENRY Sheets.

1. *a.* * * * * *

b. The 51st C. A. (TD) arrives at FORT STORY 4 May 29.

2. *a.* The 52nd C. A. RY. (less 1st Bn.) will, under the provisions of S. O. 30 and 31, HEADQUARTERS, THIRD COAST ARTILLERY DISTRICT, c. s., and S. O. 67, HEADQUARTERS, FORT EUSTIS, VA., c. s., conduct service target practice and battle practices at FORT STORY, VA., during May, 1929.

b. This regiment will move at 5:15 A. M., 7 May 29, by rail transportation to FORT STORY, VA., via NEWPORT NEWS—SEWALL POINT—VIRGINIA BEACH.

3. *a.* ADVANCE PARTY—1ST LT. JOE D. MOSS, Commanding.

(1) A detail of 35 men will go to FORT STORY, VA., by motor transportion, via the 7:45 A. M. Ferry, NEWPORT NEWS—PINE BEACH, 1 May 29. See Annex No. 1.

(2) The Advance Party will install communications, repair railroad track, and prepare observing stations.

(3) The Advance Party will be rationed with the FORT STORY Detachment.

b. ARMAMENT TRAIN—MAJOR O. C. WARNER, Commanding.

(1) The makeup of the train will be as listed in Annex No. 2.

(2) All cars will be loaded, except personal equipment, before 12:00 Noon, 6 May 29, by the organization to which they are assigned. LT. GREGORY will supervise loading of cars not assigned to batteries.

(3) The personnel accompanying the train will be loaded as indicated in makeup of train. One gun commander and mechanic will accompany each gun and mortar. One ordnance machinist will accompany train.

(4) Officers who accompany the train will ride in the Regimental Fire Control Car, Car No. 10.

(5) Personnel will travel by Quartermaster boat, C. & O. railroad car float slip, NEWPORT NEWS—SEWELL POINT.

(6) The proposed train schedule on 7 May 29 is:—

Leave FORT EUSTIS	5:15 a. m.
Leave LEE HALL	6:15 a. m.
Leave NEWPORT NEWS	7:57 a. m.
Leave SEWALL POINT	9:13 a. m.
Leave TIDEWATER JUNCTION	11:28 a. m.
Arrive CAPE HENRY	1:39 p. m.

(7) Camp will be made immediately upon arrival. Guns will not be spotted until after 7:00 p. m.

c. MOTOR ELEMENT—1ST. LT. E. M. GREGORY, Commanding.

(1) 6 G. M. C. trucks, 1 motorcycle with sidecar, 1 light repair truck, with battery cooks, rations, and equipment, will move, FORT EUSTIS to FORT STORY, via NEWPORT NEWS—PINE BEACH FERRY, 4:30 A. M., 7 May 29.

(2) Officers, who so desire, may travel in privately owned automobiles. Soldiers of first four grades and those of fifth grade specially authorized, who may so desire, are authorized to take their own automobiles to FORT STORY. Ferry tickets cannot be furnished.

d. REAR ECHELON—1ST LT. J. M. MOORE, Commanding.

(1) A rear echelon, as shown in Annex No. 3, will be left at FORT EUSTIS, VA.

(2) The mess operated by this detachment will be Service Battery Mess.

x. (1) Each man will carry pack, with web belt and holster, service hat, and a barrack bag containing mosquito bar, extra blankets, and clothing.

(2) Each battery will take cots and bedsacks or mattress covers.

(3) Uniform en route: Woolen OD, with cap and leather belt.

(4) Six pistols, in locked chests, will be taken by each firing battery.

(5) Mail will be obtained from the Post Office each day by the Personnel Office, Rear Echelon, and sorted. Mail for officers' families will be delivered to their quarters. Mail for organizations and personnel at FORT STORY will be securely bundled and returned to the Post Office at 3:30 P. M. each day.

4. *a.* Each member of the command will carry a canteen of water; each battery will arrange to carry lunch for each man.

b. Attached Medical Personnel, consisting of 1 officer and 3 enlisted men, will travel in the Regimental Fire Control Car, Car No. 10.

5. REGIMENTAL COMMAND POST closes at FORT EUSTIS at 8:00 A. M., 7 May 29, and opens at FORT STORY the same hour.

ANNEXES:

Annex No. 1.—Memo. No. 8, Hq., 52d C. A. c. s. [not reproduced].
Annex No. 2.—Makeup of train, 52d C. A. [not reproduced].
Annex No. 3.—Memo. No. 7, Hq., 52d C. A. c. s. [not reproduced].

TAYLOR.
Lt. Col.

DISTRIBUTION:

52D C. A. (Ry.)

Each Battery	(6)		
Bn. Comdr.	(2)		
Regt. Comdr.	(1)		
Executive	(1)		
P. & T. Officer	(1)		
Adjt.	(1)		
Sup. Off.	(1)	FORT EUSTIS	
Comm. Off.	(1)	C. O.	(1)
Pers. Adjt.	(1)	Adjt.	(1)
1 each Officer	(20)	Q. M.	(1)
C. G., Third C. A.	(1)	Surgeon	(1)
C. G., Third C. A. D.	(1)	Ord. Off.	(1)
Q. M., Ft. Monroe	(1)	Comdt., C. A. S.	(4)
C. O., C. D. of C. B.	(1)	C. O., Ft. Story	(1)
C. O., 51st C. A.	(1)		

APPENDIX II

FIELD ORDER
NO. 2.

52nd C. A. (Ry.),
FORT STORY, VA.,
7 May 29, 3:00 P. M.

MAPS: U. S. Geological Survey, CAPE HENRY quadrangle.
U. S. Coast & Geod. Sur., Sheet 1227, CAPE HENRY—CURRITUCK.
FORT STORY, VA., Lay out of Trackage (Blue Print)

1. *a.* * * * * *

b. The 51st C. A. (TD) is in position east of the railway, near the south edge of the reservation.

2. The 52nd C. A. (Ry.) will occupy positions today, beginning the spotting of guns at the points selected by Battery Commanders at 7:30 P. M.

3. *a.* (1) The 2nd Bn., 12-inch Mortars, will be emplaced on the main line of the U. S. Engineer Railroad, between the spur leading to NO. 2 HOWITZER and the switch west of the COAST GUARD STATION.

(2) The Fire Control Cars of the 2nd Bn. will be spotted on the second spur S. W. of the U. S. ENGINEER OFFICE.

b. (1) The 3rd Bn., 8-inch guns, will be emplaced on the main line of the U. S. Engineer Railroad between the spur leading to NO. 2 HOWITZER and the spur leading to emplacement for 14-INCH MODEL E.

(2) The Fire Control Cars of the 3rd Bn. and the Power Car will be spotted on the spur which leads past NO. 2 HOWITZER to POWER HOUSE NO. 1.

x. All firing batteries will establish base-end observing stations at HOLLIS TOWER, about 6,000 yards S. of the battery positions, and near B. C. STATION, about 300 yards W. of NO. 4 HOWITZER.

4. Ammunition, which has been delivered at FORT STORY for use of the 52nd C. A. (Ry.), will be available to the batteries to which allotted on the spur about 100 yards N. of the spur leading to NO. 2 HOWITZER.

5. *a.* The Regimental Fire Control Car and the Radio and Power Car will be spotted on the same spur as the 2nd Bn. Fire Control Cars.

b. Headquarters Battery will establish and maintain telephonic communication between Fire Control Cars and Observing Stations and between Fire Control Cars and Guns.

c. Headquarters Battery will maintain radio communication with the tug, which will tow targets, with the airship, which may be used for observation of fire, and with FORTS MONROE and EUSTIS.

d. COMMAND POSTS:

52nd C. A. (Ry.) }
2nd Bn., 52nd C. A. (Ry.) } On Sand Dune in Vicinity
3rd Bn., 52nd C. A. (Ry.) } of BC STATION.

DISTRIBUTION:
Same as Field Order No. 1.

TAYLOR
Lt. Col.

APPENDIX IV

FIELD ORDER
NO. 3.

52nd C. A. (Ry.),
FORT STORY, VA.,
28 MAY 29, 11:00 A. M.

MAPS: GS, 1:62,500, CAPE HENRY, NEWPORT NEWS, HAMPTON, YORKTOWN Sheets.

1. *a.* * * * * *

b. The 51st C. A. (TD) moves to FORT EUSTIS, VA., 31 May 29.

2. This regiment will move at 10:00 A. M., 31 May, to FORT EUSTIS, VA.

3. *a.* ARMAMENT TRAIN—MAJOR O. C. WARNER, Commanding.

(1) The makeup of the train will be as directed by Major Warner and will be completed by 6:00 A. M., 30 May, and air brakes tested.

(2) All cars will be loaded except personal and mess equipment before 12 noon, 30 May. Ammunition cars 359, 512, 372, 361, 343, 507 and 522 will return empty except for personnel. Lt. Gregory will supervise loading of Cars No. 116 and 503 and other cars not assigned to batteries.

(3) All personnel who accompany the train will be assigned to cars by Major Warner for the trip STORY *to* EUSTIS and will travel by QM boat from SEWALL POINT to C. & O. WHARF at NEWPORT NEWS.

(4) Tentative train schedule on 31 May is—

Leave FORT STORY	10:00 A. M.
Arrive SEWELL POINT	12:00 Noon
Arrive FORT EUSTIS	5:00 P. M.

(5) On arrival at FORT EUSTIS the train will be spotted in the 52nd Regimental Park so that cars 503 and 116 are near the Service Club.

b. MOTOR ELEMENT—1ST LT. E. M. GREGORY, Commanding.

(1) 18 vehicles (1 Ford Sedan, 8 GMC trucks, 5 FWD trucks, 1 tank truck, FWD, 2 motorcycles with sidecars, 1 light repair truck) will leave FT. STORY via NORFOLK—FREE BRIDGE (east of BERKLEY BRIDGE—S. NORFOLK—PORTSMOUTH—JAMES RIVER BRIDGE ROUTE FOR FT. EUSTIS at 8:00 A. M., 31 May.

(2) Travel by privately owned vehicles by those who desire is permitted.

4. *a.* Each member of the command will carry a canteen of water. Each battery will arrange to carry lunch for each man.

b. Attached Medical personnel will travel in Car No. 10.

5. Regimental CP closes at FT. STORY at 10:00 A. M., 31 May, and opens at FT. EUSTIS same hour

Lt. Col.
TAYLOR

DISTRIBUTION:

Each Officer	(1)—20	C. G., THIRD C. A. D.	1
Each unit	(1)— 7	C. O., C. A. S.	1
C. G., FT. EUSTIS	1	C. O., H. D. of C. B.	1
Q. M., FT. EUSTIS	1	C. O., 51st C. A.	1
O. O., FT. EUSTIS	1	File	3
C. G., THIRD C. A.	1		

Recent Developments in Chemical Warfare

By Lieut. Robert E. Sadtler, First Gas Regiment

THE Chemical Warfare Service is constantly at work seeking to protect the soldier against a weapon capable of destroying three million times its weight of living matter. This weapon is mustard gas. The problem of protection against poisonous gases is of the utmost importance, as the modern gas mask will only protect the respiratory organs, the eyes, and the face. It is now possible to spray materials like mustard gas over a column of troops a mile long in about twenty seconds. This has actually been done—a harmless red dye being substituted for the poisonous liquid, the men wearing white muslin suits so that it was easy to calculate the quantity of liquid on each man and the effectiveness of this method. It is apparent that we must be able to protect the entire body of the soldier against this form of attack. Research on this problem has led to the development of protective clothing.

The first forms of protective clothing were very crude and uncomfortable and gave only partial protection against penetrating liquids of the mustard type. The first type of protective clothing consisted of an ordinary uniform which was rendered impervious to gas by treatment with a linseed-oil compound. Then other types of clothing were developed which were more satisfactory but too heavy. The latest type of protective clothing is very light and comfortable and offers very complete protection against blistering liquids. Protective clothing must satisfy the following requirements:

(1) It must completely cover the body and it should not hinder the movements of the wearer.

(2) It must be light in weight, inexpensive to manufacture, and adequate facilities must exist for quantity production.

(3) The material used in the protective clothing must be permeable to air but impervious to dangerous liquids of the mustard type.

In addition to protective clothing for individual protection, there must be means of collective protection for entire units. This would include mechanical protective devices and chemical means of large-scale neutralization of poisonous gases.

It should be remembered that all chemical warfare work has been divided into four great phases:

(1) Combat—Including the development of weapons for offensive and defensive warfare.

(2) Research—including physical, mechanical, and chemical work. The chemical research covers work on the development of new and more toxic gases and gases for special purposes. The mechanical research covers an equally wide field and includes the development of protective devices and clothing. The physical research involves the determination of the specific

properties of gases and chemical warfare compounds. Medical research is exceedingly important in the development of chemical warfare. The physiological and toxicological properties and reactions of every compound used in warfare must be carefully studied and the data obtained must be correlated to special tactical uses. A great deal of work has been done by the Chemical Division, Edgewood Arsenal, in determining the fundamental nature of toxicity.

(3) Supply—All protective equipment and clothing must be supplied by the Chemical Warfare Service. Special gas weapons and gas shell must be supplied by the Chemical Warfare Service. The most important problem, however, is to insure an adequate supply of gas masks and protective clothing to all units of the Army, Navy, and Marine Corps.

The Chemical Warfare Service is constantly striving to develop the ideal war gas, which must possess the following characteristics:

(1) Physical appearance—odorless and colorless.

(2) At ordinary temperatures, it should be in the gaseous state. If the compound is a liquid, it should have a very low boiling-point and low freezing-point, as the compound must not be a solid at ordinary temperatures.

(3) The compound must possess a high vapor pressure so that it will be volatile and thus build up an effective concentration of the gas in the atmosphere.

(4) The gas must possess certain definite chemical properties, it must not be decomposed by water vapor, and it should not be reactive with metals. It must also have stability during storage and be stable to explosive shock.

(5) The physiological action of the gas should be so combined that it is corrosive to all parts of the body.

(6) The persistency of the gas can be made to vary with the tactical use.

(7) The gas should be adaptable for use in all modern projectiles.

The ideal war gas must be capable of being easily manufactured from native substances. The cost of the raw materials used must not be prohibitive. The toxic gas should be formed only from the last step of the manuufacturing process.

Training is the fourth phase of chemical warfare work. Its importance must be kept in mind if we are to reduce the number of gas casualties which may be suffered. It is extremely important that all Army units should be able to recognize any gas in the field and that they should know the immediate measures for individual and collective protection.

Although the ideal war gas, as described above, has not yet been developed, there has been remarkable progress in this field. If we are to maintain our present rate of progress, more stress must be laid upon the development of defensive methods. Our supremacy in this field will largely depend upon our recognition of the vital importance of these developments to our National defense.

Office of Chief of Coast Artillery

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In approaching the chair of the Editor of the COAST ARTILLERY JOURNAL, just vacated by Maj. Robert Arthur, we are inclined to tread softly if not reduced to wearing our rubber-soled shoes—particularly so when upon entering the office we observed a series of photographs of those officers who have at some time guided the destinies of the dignified, and, at times, ponderous organ of the Coast Artillery. To tell the truth we were a little afraid to sit down, but the chair was comfortable so here we sit, and we do not propose to feel hot and bothered about it.

Major Arthur, during his four years as Editor of the JOURNAL, has made it very difficult for anyone to step into his shoes. All who know him consider him one of the most conscientious officers in the Coast Artillery Corps or the Service. His attention to details and his ability to make a correct estimate of the situation are well known. When these faculties are coupled with imagination and perspective the combination is difficult to beat. As a result we find the JOURNAL in a very healthy financial state and hitting on all eight.

It would be surprising if this publication could be issued and read without criticism of any kind. There has even been some sarcasm as to the matter which it has contained. It has always been considered a technical magazine. As such it is only natural that many readers consider it dry and uninteresting. Many of our subscribers leaf through it rapidly when the new issue arrives then lay it aside to be read later. Somehow or other it never gets read. Others don't like the articles published. They are too high brow, they say. Still others don't like the authors. They want to know who told the writers they know anything about the subjects on which they are writing.

When we first came into the service it seemed that everyone who wasn't working on the Coast Artillery War Game was covering reams of paper with ballistic computations. If we had thought of it at all we might have wondered why so much weight was given to the War Game and why it was that all this couldn't be done at the battery. Ballistics is an interesting mathematical study but we have since known officers who could knock the stuffing out of the target and have yet to learn that Ballistics is divided into two parts. We haven't seen a War Game played for ten years. Not that these two subjects, picked at random, aren't worth while but it is certain that they are not given as much

weight as they once were. We have more important things to worry over—antiaircraft, railway, and tractor artillery, for instance. The Coast Artillery changes. The JOURNAL should change with it. It might not be out of order to hint that it will probably lose some of its academic and technical character.

It is our conception that the JOURNAL exists for the sole purpose of increasing the efficiency of the Coast Artillery Corps and by that we mean, principally, to help the guns to make more hits per minute. It is one means of making audible to the Corps the doctrines, thoughts, and opinions of the Chief of Coast Artillery; it is the agency through which the entire Corps is informed quickly of new developments in materiél and methods of training; it is the medium through which new lines of thought are introduced to the Corps; it should assist greatly in increasing the esprit de Corps and in maintaining the prestige which the Coast Artillery has acquired.

In accomplishing this purpose it seems important to us that the human and practical side should receive some attention in addition to those subjects purely academic or dealing with equipment of steel or stone. The trickiest plotting board ever built will not help Private Jones' nervousness at target practice. And no matter how friendly you may be with the curve of probability there comes a day when the 155 gun gets off the road into the mud and requires a different kind of treatment to get it back on the road again.

In editing the COAST ARTILLERY JOURNAL, we ask for all the support given Major Arthur. To speak frankly, we ask for considerable more support than he received. By support we mean not only suubscriptions and advice but also pen pushing by some officers who know their job but who have been rather secretive, so far, as to how they were able to put it across. If we can get your support and interest, we can make the JOURNAL something more than a mere reference book. We can make it something which you will not want to miss.

Assignment of West Pointers

The following named newly commissioned second lieutenants of Coast Artillery, graduates of the U. S. Military Academy Class of 1929 have been assigned as indicated:

To the 3d C. A (Hd.) Fort McArthur, Calif.:
2d Lieut. O. H. Gilbert.
2d Lieut. J. G. Reynolds.

To the 6th C. A. (Hd.) Fort Winfield Scott, Calif.:
2d Lieut. Andrew Samuels, Jr.

To the 7th C. A. (Hd.) Fort Hancock, N. J.:
2d Lieut. H. E. Pearson.

To the 9th C. A. (Hd.) Fort Banks, Mass.:
2d Lieut. K. J. Woodbury.

To the 11th C. A. (Hd.) Fort H. G. Wright, N. Y.:
2d Lieut. J. R. Seward.

To the 13th C. A. (Hd.) Fort Barrancas, Fla.:
2d Lieut. L. McI. Guyer.
2d Lieut. W. F. McKee.

To the 14th C. A. (Hd.) Fort Worden, Wash.
2d Lieut. J. T. Barber.

To the 51st C. A. (Tr. Dr.) Fort Eustis, Va.:
2d Lieut. W. M. Talbot.
2d Lieut. E. F. Heidland.

To the 61st C. A. (A. A.) Fort Monroe, Va.:
2d Lieut. W. H. Francis.

To the 62d C. A. (A. A.) Fort Totten, N. Y.:
2d Lieut. L. H. Brownlee.
2d Lieut. G. E. Keeler, Jr.
2d Lieut. K. E. Rasmussen.
To the 63d C. A. (A. A.) Fort Winfield Scott, Calif.:
2d Lieut. H. R. McKenzie.
2d Lieut. W. M. Vestal.
To the Philippine Department:
2d Lieut. R. L. Anderson.
2d Lieut. K. M. Briggs.
2d Lieut. P. Elias.
2d Lieut. W. L. McCulla.
To the Panama Canal Department:
2d Lieut. N. A. Congdon.
2d Lieut. P. W. Steinbeck.
2d Lieut. Joseph Horridge.
2d Lieut. E. B. Hempstead.
To the Hawaiian Department:
2d Lieut. N. R. Thompson.
2d Lieut. George R. Carey.

We desire to welcome these gentlemen into the Coast Artillery on behalf of the COAST ARTILLERY JOURNAL and to assure them that they are now members of one of the most progressive and interesting branches of the service. The versatility of the Coast Artillery is rivaled only by that of the chameleon. At one moment it may be pounding sand in its projectiles behind the tons of concrete poured for it by the Engineers; the next moment it may be in Texas keeping watch along the border; it fires on targets in the air, on the ground, in the water, under the water. It becomes Field Artillery simply by changing its collar ornaments. It has done all this and more. It has done it well. You who are newly arrived from that institution strong in tradition and in custom, we ask you to catch the spirit of the Coast Artillery and carry it on to greater accomplishments.

You who are about to receive these incubates we plead with you not to make it easier for them than it was for us. We recall prespiring through our puttees. We ask you to do as much for them; to feed the badger nothing but raw meat from now on to the end that he may put up a good fight and serve the educational purpose for which he was created.

Antiaircraft Exercises at Aberdeen Proving Ground

Antiaircraft exercises will be held at Aberdeen Proving Ground during the period September 16-October 31, 1929. These exercises have been held for the past several years and have been of great value in developing antiaircraft materiel and methods. The War Department board designated to observe and report upon the exercises consists of the following:

Col. Edwin D. Bricker, O. D.
Maj. Sanderford Jarman, C. A. C.
Maj. Walter P. Boatwright, O. D.
Maj. Fred H. Coleman, A. C.
Capt. Willis H. Hale, A. C.
Capt. Guy H. Drewry, O. D.
Capt. John H. Gardner, Jr., S. C.
Capt. Frank J. McSherry, C. A. C.
Lieut. Fabius H. Kohloss, C. of E.

The troops selected to carry out the program are the 61st C. A. (A. A.) Fort Monroe, Va. This regiment will move to Aberdeen Proving Ground some

time prior to September 16, and will remain during the duration of the exercises. Air Corps and Ordnance personnel stationed at the proving ground will also take part. In addition to the members of the War Department Board the Coast Artillery Board will be present as will a certain number of Coast Artillery officers attached to the 61st for the purpose of assisting in the preparation of records and in the analysis of firings. The materiel available for use during the tests is:

4—3″ A. A. Mobile mounts.
  2—Mounts M2 (standard equipment).
  1—Mount M2E1 (welded steel top carriage).
  1—Mount M2E2 (cast aluminum top carriage and pedestal).
4—Continuous fuze setters M2 (for 3″ A. A. gun M3).
4—3″ A. A. guns M3.
2—Continuous fuze setters T5 for mechanical fuze M2 and 3″ A. A. gun M3.
2—3″ A. A. mounts M1917MI equipped with Sperry torque amplifiers T2.
2—3″ A. A. guns M1917MII.
3—Continuous fuze setters M3 (for M1917MII gun).
1—Instrument trailer TI.
1—Multiple machine gun truck mount TI.
4—Tripods MI for caliber .50 machine guns (equipped with telescopic sights T6).
1—Sound locator T5.
2—Sets Sperry torque amplifiers T2.
1—Remote control unit for 3″ A. A. fixed materiel (Frankford).
1—A. A. director T4 (Sperry).
1—Vickers director MI modified for 3″ A. A. gun with mechanical fuze M2.
1—Vickers director MI modified for Multiple M. G. Truck Mount TI.
1—Modified 4-meter Lavallois height finder T2.
1—Zeiss height finder T7.
1—Morrison mechanical sighting system.
10—Machine guns, caliber, 50, Browning M1921, heavy barrel type (4 to be equipped with aircraft type of charging slide).
1—Range finder, stereoscopic, French, 1-meter TI.
1—Height finder, stereoscopic, French, T12, on multiple M. G. Truck Mount T1.
1—Range finder, Bausch & Lomb, coincidence, 4½ feet, T11.
1—Data computer, Frankford Arsenal model T3, modified, with data transmission system.
1—Antiaircraft spotting unit T2.
2,000 rounds shrapnel Mk. 1 for 3″ A. A. gun M1918, with Scovill Mk. III fuze.
1,000 rounds shrapnel Mk. 1 for 3″ A. A. gun M1917MII, with Scovill Mk. III fuze.
1,000 rounds shell Mk. IX for 3″ A. A. gun M1918 (practice loading).
1,000 mechanical fuzes M2.
50,000 rounds caliber .50 ball ammunition (type to be determined).
8,000 rounds caliber .50 tracer ammunition.

The purpose of the exercises is to determine the suitability for service of all elements composing the fire control system, guns, machine guns, and ammunition. This also applies to the sound locator and acoustic corrector.

The expectancy of hits at various ranges with the several types of weapons and various systems of fire control.

Efficiency of the means provided for making photographic records of bursts.

The proper use of tracers as a means of fire adjustment, both with and without the aid of stereoscopic instruments.

The rate of fire which should be regarded as standard for each of the new weapons tested in the exercises and for weapons for which these data have not been determined.

Some of the general principles upon which the exercises will be conducted are mentioned.

The value of the materiel and the soundness of the methods employed will

be determined. The exercises will be carried out so as to obtain a broad basis of comparison of the accuracy and effectiveness of each of the several weapons, fire control instruments, and types of ammunition. Service conditions will be simulated. Records will be sufficient to provide a complete record of performance, and to permit analysis of the results.

In all firings the fire control apparatus employed by the battery will be supplemented by the use of other fire control apparatus, independent of the battery, as a means of comparison of the accuracy of the instruments.

Radio telephone or telegraph will be the primary means of communication between airplane and ground, with panels as an alternative in daylight and the incandescent lamp at night.

For gun firings the target will be towed at attitudes not less than 2,000 yards. The slant range will be normally in excess of 3,500 yards. Effort will be made to obtain as great a rate of change of range, direction, altitude and speed of the target as practicable while conforming to the possible movements of a loaded bomber. Some firings will be conducted at the maximum elevations.

For machine gun the target will be towed at altitudes not in excess of 2,000 yards. The maximum slant range for the caliber .50 machine guns will be normally 3,000 yards for day firings and 2,000 yards at night. Maximum elevations will also be used for machine gun firings.

The firing schedule will call for five day firings and three night firings per week.

Upon the conclusion of the exercises the Board will prepare a final report for printing and publication. This report will be confidential.

PROFFESSIONAL NOTES

Overhead Loading Device for 12-Inch Mortar (Ry.)

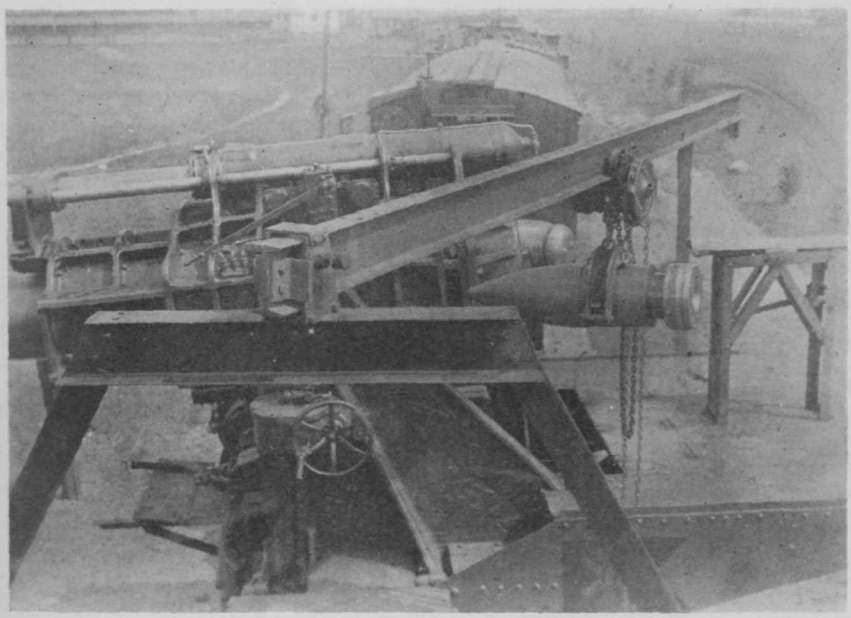
By CAPT. H. W. OSTRANDER, 52d C. A. (Ry.)

The overhead loading device installed on the 12-inch mortars, railway, in April, 1928, by the 52d C. A. (Ry.) is designed to shorten the time of loading and saves about thirty seconds per shot. Before its installation, the mortar carriage, after each shot, was traversed back to the loading position where the projectile was then hoisted and swung to the loading tray by a triplex block and chain, suspended from a swinging davit mounted on the loading platform. The carriage then had to be traversed to the firing position. The overhead device saves both the time of hoisting, which can now be carried out simultaneously with other operations of loading, and the traversing.

The device (see figure) consists essentially of an A frame, with angle iron standards, and a top girder, mounted midway on the rear platform over the shell track. A long I beam carrying a triplex block, rides in a pivoted sleeve on the top girder of the A frame, the front end of the I beam being swiveled to a rigid davit made of a bent 60-lb. rail, which is bolted to either side of the loading platform and overhangs the loading tray. The A frame was improvised from materiel furnished by the local Ordnance shop and the I beam was taken from an ammunition car. The rear end of the I beam is fitted with a stop to prevent it from leaving the sleeve at the limit of traverse. As the mortar is traversed the I beam slides in the pivoted sleeve. The projectile is picked up from the shell track on the rear platform by the triplex block and chain and run forward on the I beam to the loading tray without traversing the mortar.

As now mounted the mortar can cover an arc of traverse of 105 degrees without interrupting firing—from ten degrees on one side of the track to ninety-five degrees on the other. The rigid davit is however movable in ten minutes from one side of the loading platform to the other side thus giving an additional eighty-five degrees of traverse. By placing the rigid davit in sockets instead of bolting it, the ten minutes required to move the davit from one side of the platform to the other would be reduced to an estimated two minutes. Firing is possible, however, through the full one hundred and ninety degrees without changing the rigid davit at all, but through eighty-five degrees of the arc of fire on one side the rate of fire would be slower due to the necessity of traversing back to the ten-degree limit for loading on that side.

In order to fire to the rear, an A frame, extra I beam triplex block, and



OVERHEAD LOADING DEVICE FOR RAILWAY MORTARS

sleeve complete, could be mounted on the front platform and projectiles served from an ammunition car at the front of the mortar or the projectiles could be placed on the front platform before firing. It should require only about five minutes to life one I beam from its swivel on the rigid davit and place the other in position, thus shifting fire from front to rear with little interruption.

The overhead loading device is thus made to lift projectiles to the loading tray for any position of the mortar in traverse, providing all-round fire. It is believed that a change in the type and mounting of the rigid davit would do away with the necessity of moving it from one side of the platform to the other.

The I beam now installed permits only ninety-five degrees traverse on either side of the track because of its length. A longer I beam could be installed, giving greater traverse.

With the track pointing towards the middle of the arc of fire, few tactical situations would require more than ninety-five degrees traverse on either side.

On the movement Fort Eustis to Fort Story and return in May, 1929, the

mortars made the journey with the device installed without mishap, but there was considerable vibration. For this reason, the A frame and rigid davit should be socketed rather than bolted, so that they could be quickly and easily dismounted for a long move.

This device, in conjunction with the cut down loading tray, gravity loading, and change in the elevation gear ratio, has reduced the time of firing of the 12-inch railway mortar from two minutes to one minute. Credit is given the local Ordnance personnel for whole-hearted cooperation and solution of mechanical difficulties.

Gravity Loading for Railway Mortars

By MAJ. O. C. WARNER, 52nd C. A. (Ry.)

Since January 1, 1929, the rate of fire for 12-inch RR mortars has been increased to one round a minute from one round in one and one-half minutes. About six seconds is saved by tilting the projectile tray and starting the projec-

CUT DOWN TILTED TRAY AND GRAVITY LOADING FOR 12-IN. RAILWAY MORTARS

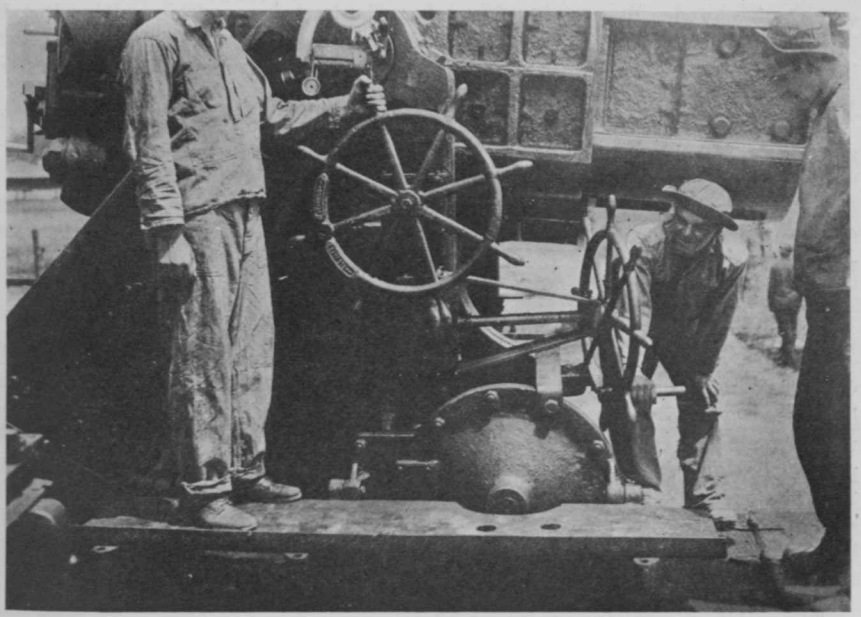
tile down its inclined path towards its seat by a push from three men by hand without the use of a rammer. The figure shows the breech detail in the act of starting the projectile off the loading tray into the breech recess. The incline is 5°, sufficient to give the projectile considerable velocity if started by a strong push from three men. The old tray was removed and a much smaller one built and installed, having a hinged projectile tray actuated by a lever. The lever is pushed down after the projectile is placed on the tray, thus tilting the projectile and tray about 5° towards the breech. The sliding surfaces are well lubricated with graphite. The front leaf of the drop platform was also removed. It served no useful purpose and required time to operate. Loading by this method gave good seating of projectile in the 1929 target practices of the 2d Bn., 52d C. A. (Ry.), at Fort Story, Va. Credit is due several officers of the regiment for perfection of this device, particularly to Captain Slicer, Battery "C," 52d C. A.

The device was built in the Ordnance Department shop at Fort Eustis, Va. The cooperation of the Ordnance Department personnel has been excellent and made possible this construction.

12-Inch Mortar (Ry.) Elevation Device

By MAJ. O. C. WARNER, 52d C. A. (Ry.)

On October 11, 1928, the 2d Bn., 52d C. A. (Ry.) fired forty rounds from 12-inch mortars (Ry.) at a moving target on one and one-half minute intervals. Some relays occurred on one mortar due to delays in laying, but it was considered that firing at one and one-half minute intervals could be maintained for a short burst. The next practice occurred on May 17, 1929, when both batteries of the



MODIFIED ELEVATION DEVICE FOR RAILWAY MORTARS

battalion fired at one-minute intervals. This thirty-three and one-third per cent improvement in time is mainly due to the installation on these carriages of new elevation devices.

The writer joined the battalion on the day of the October, 1928, practice. The excessive time in elevating and depressing these mortars was apparent in this practice. However, thirty seconds had recently been cut off the firing interval by building new loading devices. A study was at once begun on how to elevate and depress more quickly. A change in the gear ratio from 1 to 1 to 2 to 1 was decided on and carried out.

Battery D mortars were equipped with an additional elevation handwheel and platform set lower and at an angle to the old elevation handwheel (see figure). The elevation system of Battery C mortars was simply changed by putting in a 2 to 1 gear ratio instead of the old 1 to 1 ratio. Either design is satisfactory. Battery D design has the following advantages over Battery C design.

(a) Retains the lower gear ratio of the old elevation handwheel, thus permitting quicker and more accurate laying.

(b) Only one gunner is required on the old platform. Battery C design has the disadvantage that the elevation setter must stand on one side out of the way until the piece is approximately elevated.

Both designs require three elevation details of two men each, instead of one man each for the old elevation detail. Two details rest while one works. Power elevation by means of an electric motor has been considered.

The new elevation device speeds up the elevation and depression of the mortar by about twenty-four seconds, and in conjunction with the gravity loading has increased the rate of fire since October 11, 1928, to one round per minute.

The entire weight of the recoil and counterrecoil systems of the 12-inch mortar (Ry.) is carried on the mortar trunnions, while the 12-inch mortar (fixed) recoil system is not carried on the mortar trunnions. The railway mortar carries about twice the weight of metal on the trunnions, with resulting increase in friction when turned in elevation or depression. An anti-friction roller bearing device for railway mortar trunnions has been designed by the Ordnance Department but never installed due to lack of funds.

Credit is due for this thirty-three and one-third per cent improvement in the rate of fire of the weapon assigned to this battalion, not only to the officers of the battalion, but to the regimental commander, Col. Taylor, and to the Chief of Coast Artillery for supplying much needed funds on request. The Commanding Officer, 32d Ordnance Co. (HM), Fort Eustis, Va., built these devices and made possible the success of the plan.

The 1929 Antiaircraft Exercises

Plans are being made to conduct antiaircraft exercises, at Aberdeen Proving Ground, Md., from about September 16 to about October 31. Questionnaires have been sent to various interested Army activities calling for suggestions and recommendations concerning the exercises, and after receipt thereof it is expected that the detailed program will be prepard and announced about August 15. The exercises this year will be concerned mainly with fire control, with tests also of some other developments in the way of material and methods made since last year's exercises. It is understood that it is not the intention to subject the 107-mm. antiaircraft gun to further tests this year.

The exercises will be conducted under the auspices of a board to consist of Col. Edwin D. Bricker, ordnance department; Maj. Sanderford Jarman, coast artillery; Maj. Walter P. Boatwright, ordnance department; Maj. Wm. H. Lanagan, corps of engineers (with 1st Lieut. Fabius H. Kohloss, of that corps, as alternate); Maj. Fred H. Coleman and Capt. Willis H. Hale, air corps; Capt. John H. Gardner, jr, signal corps, and Capt. Frank J. McSherry, coast artillery. —*Army and Navy Register.*

U. S. S. R.

Laws of Military Service, Terms of Service and Periods of Training in the Soviet Army

1. Laws of military service.

Military service in the U. S. S. R. is based on the Law of Military Service, dated 18th September, 1925, amended and amplified by a law of 8th August, 1928.

Military service is compulsory for all citizens (male and female) of the U. S. S. R. between the ages of 19 and 40.

The honour of fighting for their country is reserved exclusively for the workers, other classes being employed in non-combatant duties.

2. Pre-enrollment training.

Male citizens undergo one month's pre-enrollment training in each of their 20th and 21st years.

3. Terms of service and periods of training in the Active Army.

Many citizens serve in the Active Army for the five years following enrollment, which takes place in the autumn of the conscript's 22nd year, as follows:—

(a) In regular formations—

Cavalry, Artillery, Infantry, Engineers	2 years' training.
Coast defense, Air arm	3 years' training
Navy	4 years' training

after which the man is sent on long leave to complete his five years' Active Service. During this leave he may be recalled for a total of two months' training, but not exceeding one month in each year.

(b) In territorial formations.—In the first year, one period of three months for all arms.

In the remaining four years, periods of instruction totalling:—

For infantry and artillery	5 months
For engineers and non-divisional troops	6 months
For cavalry	8 months

but not exceeding two months in any one year.

(c) Industrial military service.—This is a new type of service introduced by the law of 1928 for men with higher technical education. For these men, service in the Active Army can be replaced by service in factories and works.

Service is for two years.

4. Service in the Reserve.

Completes the thirteen years up to the age of forty, and is sub-divided as follows:—

First category	7 years up to the 34th year
Second category	6 years up to the 40th year

During this Reserve service, the soldier is liable to be recalled for periods up to a total of three months.—*Journal of the Royal United Service Institution.*

Foreign Periodicals

BELGIUM

BULLETIN BELGE DES SCIENCES MILITAIRES, June, 1929.

Les operations de l'Armée belge; La periode de stabilisation (continued)—Quelques aspects de la campagne des autos-canon mitrailleuses en Russie—Une journée de defensive (continued)—Le General Baron Jacques de Dixmude—Dispotif pour l'étude en chambre du pointage indirect á la mitrailleuse maxim lourde—Le nouveau brancard du Service de Santé belge—Remorque citerne pour char léger Renault.

CZECHOSLOVAKIA

VOJENSKE ROZHLEDY, April, 1929.

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THE ARMY, NAVY AND AIR FORCE GAZETTE, May 16, 1929.

The Relation Between Infantry and Armoured Fighting Vehicles—The French Council of National Defense.

THE ARMY, NAVY AND AIR FORCE GAZETTE, May 23, 1929.

Cavalry today—Eighty Years Ago: An Early-Victorian Army.

THE ARMY, NAVY AND AIR FORCE GAZETTE, May 30, 1929.

Territorial Army Training—The Army in Sea Warfare (continued)—Education in the Army—The Royal Tournament—The Avro "Antelope."

THE ARMY, NAVY AND AIR FORCE GAZETTE, June 6, 1929.

The Army in Sea Warfare (continued)—"Modern Ways with Ancient Tasks."

THE ARMY, NAVY AND AIR FORCE GAZETTE, June 13, 1929.

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THE ENGINEER, June 7, 1929.

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ENGINEERING, May 24, 1929.

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A New Straight-line Motion—The Carl Zeiss Works and the Zeiss Foundation—2,000-kw. Hydro-electric Plant on High Concrete Piers—Four-Head Multiple-Spindle Drilling Machine—Powdered Coal for Ships—Torpedo-Boat Destroyers for the Dutch Navy—Fuel Control in Electric Power Stations.

ENGINEERING, June 7, 1929.

Supersaturation in steam and its influence on some problems of steam engineering (continued)—The Transpyrenean railway via Confranc (continued)—The P. and O. turbo-electric liner "Viceroy of India" (continued).

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JOURNAL OF THE ROYAL UNITED SERVICE INSTITUTION, May-June, 1929.

Prize Essay (Naval) for 1928—The Training of the Regimental Officer—A Channel Tunnel—The Air Menace to Germany: German Views—The Board of Trade and the Fighting Services—The Provost Services from 1809 to the Present Day—Morale and Leadership—Foch—The Cadre, Auxiliary Air Force and University Air Squadrons—The Submarine and Its Antidotes Today—Retrospect and Suggestion—Naval Exercises in the Mediterranean, 1929—Arms and the Map—Fishery Protection Service—Regimental Journals—The Sand Table—French Medical Services in the Great War: A Review—The Russo-Polish War of 1920—The International Situation.

THE ROYAL ENGINEERS JOURNAL, June, 1929.

Railways in War—The 23rd (Field) Company, R. E., in the Great War (continued)—With an Improvised A. C. Company on Manoeuvres—Psychology and the Fighting Services—Keuai River Bridge—Economic Readiness for War—Inspection of Building Works—The Olympia Tank Mountain—Improvisation in North China—The Demolition of a Pyramid—Impact—Wellington College Footbridge.

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REVUE D' ARTILLERIE, May, 1929.

Le marechal Foch—Remarques au sujet du pointage de precision—Contribution à l'étude de la guerre 1914-1918: Carnets d'un artilleur (continued)—Note sur un dispositif de tir simulé—Tir du 75 sur les batteries en arrière des orêtes.

REVUE MILITAIRE FRANCAISE, May, 1929.

Montdidier, le 8 août, à la 42e division (continued)—Le problème abyssin—les services de la Xe armée pendant les offensives de 1916 sur la Somme—La VIIe armée allemande en couverture en août 1914 (continued)—Trois conferences à l' Etat-major de l'armée en 1902.

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MILITAR WISSENSCHLAFTICHE UND TECHNISCHE MITTEILUNGEN, May-June, 1929.

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MILITAR-WOCHENBLATT, May 18, 1929.

Organisation und Ausbildung der französischen Luftflotte—Luft-und Gaskrieg—Der englishche Heereshaushalt 1929/30—Die internationale Spionage in Frieden—Das Unteroffizierkorps—Kleintanks—Neue Auslandstimmen zum Bau des Panzerkreuzers A.

MILITAR-WOCHENBLATT, May 25, 1929.

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THE JOURNAL OF THE UNITED SERVICE INSTITUTION OF INDIA, April, 1929.

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REVISTA DI ARTIGLIERIA E GENIO, June, 1929.

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REVISTA MILITARE ITILIONA, June, 1929.

Grandi unit à da' montagna—Il reggimento di fanteria nell 'incontro col nemico—Il cannone dello stratega—La cooperazione tra fanteria ed artiglieria (continued)—Addestramento della fanteria; Ediz. 1929-VII.

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El tiro a tiempos con granada rompedora (concluded)—De vulgarización cientifica. Destilerias de petróleos (concluded)—Aprovechamiento de un salto de agua (continued)—Coloidequimica industrial (continued)—La técnica y el Diccionario (continued)—Estudio técnico-militar de los ataques a la ciudad de Mallorco (continued)—Conferencias de guarnición—La fabricacion de cojinetes de balas (continued)—Conferencias de guarnicion—La fabricacion de cojinetes de balas (continued)—Defense contra ataques aéreos.

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ALLGEMEINE SCHWEIZERISCHE MILITAR ZEITUNG, May, 1929.

Zum Exerzier-Reglement—Detachements Manöver—Befehlsgebung—La Méthode de Combat de l' Infanterie—Ueber Artillerie-Verwendung—Ueber die Klagen mangelnder Verpflegung in den Wieder ho lungskursen.

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. W. E. COLE, *Colonel Coast Artillery Corps, President.*

Project No. 708, Ramp for Use With 3-Inch A. A. Gun Trailer, M1918.—The Coast Artillery Board has received prints showing the design of a ramp constructed for use with the 3-inch field gun trailer, M1918, in carrying tractors and used in the mechanized force maneuvers last year.

Project No. 709, Figure of Merit for 75-MM. A. A. Gun Target Practice.—There is at present no method prescribed in TR 435-55 for computing a figure of merit for target practices held by batteries armed with 75-mm. A. A. guns. This matter was brought to the attention of the Board by Maj. A. E. Rowland, C. A. C., who is on duty as Instructor of the Rhode Island National Guard. The Board has recommended that the figure of merit for 75-mm. A. A. guns be adjusted.

Project No. 710, Graduation of Range Scales for 14-Inch Guns, M1910.—The Coast Artillery Board recommends that there be no change in the scales now in use until the adoption of an electrical transmission system.

Project No. 711, Test of Electrician's Knife Type TL-116.—In view of several complaints from the using arms and services stating that Electrician's Knife, type TL-29, as now issued is not sufficiently strong to meet severe service conditions, the Chief Signal Officer has investigated several types of heavier knives. One type of knife has been selected for test, to be known as type TL-116. Several of this heavier type knife have been received by the Coast Artillery Board and are now undergoing service test.

Project No. 712, Conduct and Adjustment of Antiaircraft Fire.—A detailed study of this subject is now being made by the Board and a comprehensive report will be submitted.

Project No. 713, Modification of Concrete Blocks and Attachments for Mounting 3-Inch A. A. M1918 Guns.—This project was originated as a result of a report of malfunctioning of 3-inch M1918 guns on concrete blocks at Fort Barrancas, Fla. The Board has studied the report and is submitting recommendations covering modifications of existing blocks and blocks to be installed in the future.

Project No. 714, Comments on Proposed Revision of TR 430-85, "Gunnery for Field Artillery."—The Board has received, for comment and review, part of Chapter IV of a draft revision of TR 430-85.

Project No. 715, Test of Redesigned Clip, Type TL-86 (Frankel Test Clip).—Clip, type TL-86, commonly known as the Frankel Test Clip, has been remodeled to provide a groove in which to center the wire just under the pin which pierces the insulation, in order to make it easier to attach this clip to wire when making tests. Twelve (12) of these modified clips have been received by the Board for test.

Project No. 716, "Rothenberg" Fire-Control Telephone for Coast Artillery.—Staff Sergeant Martin Rothenberg, Hq. Battery, 1st Coast Artillery, has submitted for consideration a description of a new type of telephone for the Coast Artillery Corps. The Coast Artillery Board is having a set made up locally and will subject it to service test.

Project No. 717, Test of Breast Reel, Type RL-21.—The Signal Corps has recently designed and improved type of breast reel which is believed to possess numerous advantages over the present standard breast reel, type RL-9. Two of the new type reels have been received by the Coast Artillery Board for service test.

Project No. 718, "Indestructo" Scatterproof Glass for Plotting Rooms.—A sample of this glass has been received by the Board, with request that the Board submit its views concerning the need for this type of glass in materiel or installations manned by the Coast Artillery.

*As every student of history knows, it has always been the civil arm of our government that has caught the war spirit first, and has thrust the Army, inadequately prepared, into the firing line. * * * Throughout our history the Army has kept itself remarkably clear of intrigues designed to bring on war. We do not know of a single instance of an international complication created by it.*—The New Republic.

BOOK REVIEWS

Attila, The Scourge of God. By Marcel Brion. Translated from the French by Harold Ward. New York: Robert M. McBride & Company. 1929. 5¾" x 8¾". 275 pages. Il. $6.50.

Attila the Hun has been the synonym for barbarity and terrorism for many centuries, yet our actual knowledge of him is comparatively little, and it must be remembered that all is derived from his enemies. There are no available Hunnic Records; otherwise we might get a different impression of the man who was called by a Frankish monk, "the Scourge of God." Even without such records, M. Brion has given us a new character sketch. Under his hands Attila is not the ferocious barbarian, the ruthless exterminator, we have been led to believe, but a competent, even a great, ruler; a diplomat of the highest order who "made war simply to insure peace, peace favorable to himself of course; not to annihilate the enemy, but to make him open to discussion." Attila's ferocity was "an intelligent ferocity; calculated, deliberate, economical; to kill, not much but well, giving to each occasion the utmost publicity, this was Attila's ferocity."

However, it is difficult entirely to reconcile this view of the great Hun king with his actions as described by M. Brion himself, at least in so far as his alleged aversion to war is concerned. He seems to have deliberately provoked wars for the sake of conquest in order that he could "reign over all lands from the China Sea to the Pillars of Hercules," even on M. Brion's own showing.

Attila's conduct of war appears to have been well adapted to the conditions then existing in the world. He prosecuted it with the utmost vigor and his reliance on terrorism as an ally was but a mirror of the times. His early campaigns found the Hun army a mounted force only, but under his able leadership the Roman phalanx was copied and siege weapons adopted, making an interesting story to read.

The military reader will be struck by the remarkable resemblance of Attila's strategy in his invasion of Gaul in 451 to that of the Germans in 1914. It was in this campaign that the Huns suffered the disastrous defeat of Châlons at the hands of the Romans, Visigoths, and Franks.

This book gives an excellent picture of the life and diplomacy of the Huns and Romans of that era and the comparison is not always in favor of the more civilized people. While there is no pretence of describing military operations from a military standpoint, nevertheless a very good conception can be formed of the strategy involved in campaigns noted for the enormous forces employed for that epoch.

Altogether this book is well worthy of being read by all officers.—R. E. W.

Bolivar the Liberator. By Michel Vaucaire. Translated from the French by Margaret Reed. New York: Houghton Mifflin Co. 1929. 5¾" x 8¾". Il. 205 p. $3.50.

Bolivar is a name familiar to us all, but how many are really acquainted with his story? In fact, we generally know more of the history of Europe than of our sister republics in South America. This is a pity, because we have many dealings with these countries and a better understanding of their problems would conduce to better relations.

M. Vaucaire's new book is a biography; it does not attempt to give a his-

tory of the period except in so far as the events bear directly on Bolivar's life. Nevertheless that is sufficient to illustrate certain Latin American characteristics which have strongly influenced the subsequent history of Central and South America, so a study of this work will be of distinct benefit to any one who wishes to improve his knowledge of those nations.

There can be no doubt that Bolivar was one of the great patriots of history and a man of genius. He was the liberator of the entire northern part of the continent, and, in conjunction with General San Martin, of Argentine, he overthrew the last Spanish armies in Peru and Bolivia, completing the freedom of the continent. Then, as president and sometimes dictator, he governed Colombia, Venezuela, and Ecuador.

The South American revolution, at least in the north, was a sanguinary affair, quarter was rarely granted, brutality was rampant. Only Bolivar appears to have had any spark of humanity. Cruelty was not a part of his character as his actions abundantly proved. Nevertheless even he was forced in self defense to take some reprisals, as when he ordered the Commandant of La Guayra to execute all his Spanish prisoners, to the number of five hundred. M. Vaucaire says "if he was forced to retaliate by terrible means, which were repugnant to him, it was solely to deliver his country from a shameful and blood stained tyranny."

Bolivar's enemies were not only the Spaniards. Other revolutionary leaders were jealous and he was continually forced to take action against his own followers. Only General Sucre, the victor of Ayacucho, the last battle of the war, never appears to have wavered in his devotion to the Liberator.

Bolivar was not only a soldier, he was also a statesman, and after freedom had been won he governed the United States of Colombia, which then included Venezuela and Ecuador, and was the first to conceive the idea of Pan-Americanism. In 1826 he summoned all America to a congress at Panama to discuss the basis of an agreement for unity or at least "a mutual understanding from which each would benefit." But the time was not ripe, Bolivar's vision was too far sighted. Neither the United States nor the countries in the southern part of Latin America attended the conference, which "was a lamentable failure." However, the conception of such an idea is sufficient to show the statesmanlike quality of Bolivar's mind.

In 1830 the Liberator, literally worn out by his exertions, died at Santa Marta, in his native Venezuela, at the early age of forty-seven, leaving a name second to none in the annals of freedom.

The author has given us an interesting work, and the translator has preserved most admirably the characteristic Gallic style of the original.—R. E. W.

The Outpost of the Lost: An Artic Adventure. By Brigadier General David L. Brainard, Retired, of the Greely Expedition. New York: Bobbs-Merrill Co. 1929. 317 pp. $3.00.

General Brainard is the only officer shown in the Army Register as receiving a commission "for specific distinguished services." He was the acting First Sergeant of the Greely Expedition and this book is formed from the entries made in his diary during the tragic winter of 1883-84.

Under the command of Lieut. A. W. Greely, Signal Corps, now Major General, Retired, the United States in 1881 sent an expedition of three officers, twenty enlisted men, and two Eskimos to the artic for scientific observations and exploration. They were to spend one year and possibly two in this work. So they were not greatly concerned when the second August did not bring a

ship. The year had been pleasant and fruitful. A party had penetrated to the then farthest north and many valuable records and specimens had been secured. But it looked very grave when the summer of 1883 brought no relief. By August a decision was necessary and Lieutenant Greely ordered that the party proceed to the south in small boats.

For forty days the small boats drifted in the pack ice, one by one being crushed and sunk. After terrible hardships living on the ice and when all hope had been lost they landed on a point in Smith Sound and made a poor camp where they spent the Winter of Despair. On October 2 a careful check revealed thirty-five days' full rations of bread and meat. The entries from October to March are published under the chapter called "Starvation." No relief could be expected until the following summer and rations were reduced mercilessly, or rather mercifully. Hunters were detailed but there was little game and the very intestines of the few foxes and birds were eaten. In November the daily ration amounted to but 14 ounces of food for men living in unheated half tents in temperatures that reached 50 degrees below zero.

The chapter entitled "Death" covers the period from April to the rescue. Eskimo Fred was the first to succumb to starvation and Lieutenant Lockwood who had led the party to the farthest north was third. Sergeant Rice died in a vain heroic attempt to reach a cache of food to the south and a private was shot on the proven charges of theft of food. The rations were consumed and in late May and early June the survivors subsisted of a species of sand fleas laboriously gathered from the water. Finally nothing but skin garments remained. But for seven life flickered on until June 21, the summer solstice, when a terrible gale blew the tent onto the dying men in their sleeping bags and on the twenty-second for the first time in three years there was no record written in the diary. At midnight of that day Commander Schley arrived with the rescue party. "'Greely, is it you?' 'Yes—yes—seven of us left—here we are dying like men.'"

The diary grips one like a detective story—it is hard to lay it down. In a calm matter of fact way he tells a dramatical story. It is a wonderful record of the days of artic exploration that will never be seen again.—H. C.

Our relations may at any moment produce a crisis in which a ready force is required. To possess such a force, to have in being a highly trained and equipped expeditionary army of two hundred thousand would in virtually all such instances mean that the crisis would never develop. Peace in this hemisphere would be assured.—Chicago Tribune.

THE COAST ARTILLERY JOURNAL

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