No. 2

MAJOR GENERAL FRED T. AUSTIN

CHIEF OF FIELD ARTILLERY, DECEMBER 22, 1927

THE FIELD ARTILLERY JOURNAL

VOL. XVIII MARCH-APRIL, 1928 NO. 2

MAJOR GENERAL AUSTIN

Major General Fred Thaddeus Austin, the second Chief of Field Artillery, was born at Hancock, Vermont, December 28, 1866. He graduated from Norwich University as Master of Science in 1888.

General Austin's military record begins as First Lieutenant and Adjutant, 5th Massachusetts Infantry. August 17, 1899, he was appointed First Lieutenant, 46th U. S. Volunteer Infantry. He distinguished himself as an engineer in the Philippine Islands, having been on mapping duty, on duty repairing bridges, and architect in charge of construction of the refrigerating and ice-making plant in Manila.

General Austin entered the regular service, August 22, 1901, when he was appointed First Lieutenant, Artillery Corps. Upon the separation, in 1907, he was assigned to the 3d Field Artillery, of which regiment he became the first adjutant. He remained with the Third until 1915 and for several years commanded a battery in General (then Major) Summerall's battalion. Later he served, both as captain and major, in the 2d Field Artillery at Camp Stotsenburg and the 1st Field Artillery at Schofield Barracks.

During the World War, General Austin served successively as Instructor, Field Artillery School, Fort Sill, commanding the 346th Field Artillery, Camp Lewis, the 350th Field Artillery and the 167th Field Artillery Brigade, Camp Dix, and the 156th Field Artillery Brigade, Camp Jackson, having been appointed Brigadier General, National Army, April 12, 1918. In June, 1918, he organized the Field Artillery Replacement Depot at Camp Zachary Taylor. For his conspicuous service in this assignment, the War Department, July 15, 1921, announced that he had been awarded the Distinguished Service Medal "for exceptionally meritorious and distinguished services while in command of Camp Zachary Taylor, Ky., and particularly during the period that said camp was subject to a severe epidemic of influenza."

General Austin is a man of many accomplishments. Recently he has added to the long list the qualification of aeroplane pilot. His most outstanding characteristics are sincerity, kindliness, and constructive ability. The last he possesses to a peculiar degree. In every work upon which he has been engaged he has left behind him a record of lasting, constructive, practical achievement.

SONG OF THE PORTÉE GUNS

488TH FIELD ARTILLERY'S OWN

By MAJOR THOMAS C. BOURKE, 488th F.A.

(Tune: "Song of the Vagabonds")

Sons of Marne and Argonne—
Hear the front line, far gone—
    Calling for the Portée Guns!
Hurling all their might—
Up into the fight—
    In they go, the Portée Guns!

Onward! Onward! Muzzle to the foe!
Forward! Forward! The bright red guidons go!
    Drop the trail-spade quick—
    Hear the breech-block click—
Three rounds sweeping—"On the way!"

It's our boasted pride
We're from far and wide,
    Men who serve the Portée Guns!*
From the Houn' Dog's lair
To the Bad Lands bare,
    Men who serve the Portée Guns!

Like the Gypsies, home is the open road.
Always ready, "Hit First" is our code.
    Drop the trail-spade quick—
    Hear the breech-block click—
Three rounds sweeping—"On the way!"

"Vagabonds"—they call us
As our big trucks haul us
    With our Seventy-fives Portée!
But when need is great
We are never late
    With our Seventy-fives Portée!

Crashing, splashing, rest we never know—
To the front line, our trucks take us and go.
    Drop the trail-spade quick—
    Hear the breech-block click—
Three rounds sweeping—"On the way!"

* The 488th Field Artillery (75-mm. Portée) is allocated to the 7th Corps Area.

FIELD ARTILLERY FIRING AND STATIC DETONATION OF SHELL TESTS ON SWIFT ISLAND FERRY BRIDGE

EXTRACTS FROM REPORTS

THE War Department authorized certain demolition tests on the Swift Island Ferry Bridge (popularly known as the Pee Dee River Bridge) over the Pee Dee (Yadkin) River near Albemarle, N. C., to be conducted by the Air Corps, Ordnance Department, Corps of Engineers, and Field Artillery under the supervision of the Commanding General, Fort Bragg, N. C. A board was authorized to conduct the tests, and the Chiefs of the Air Corps, Ordnance and Engineers were directed to designate one or more officers as members of that Board.

The Carolina Power and Light Company had projected an hydroelectric power development on the Pee Dee River which would require a dam at Norwood, some five miles below the Swift Island Ferry Bridge. The flooding of the area above the dam would bring the water level some six or seven feet above the floor of the old bridge. Therefore the Carolina Power and Light Company, by arrangement with the State Highway Commission of North Carolina, built a new bridge about 2000 feet north of the old Swift Island Ferry Bridge. It was considered necessary that the old bridge be demolished so that it would not interfere with any navigation of the reservoir. The State Highway Commission conducted a series of tests on the old bridge with a view to obtaining data as to the strength of reinforced concrete in bridge work.

It was understood that the dam would be closed about January 1, 1928, so that by the middle of January the water level would be raised ten or twelve feet, that is, about half way up to the floor level of the old bridge.

On December 17, 1927, the State Highway Commission of North Carolina completed its tests on the old bridge, and formally turned the bridge over to the War Department for test purposes. The Commanding General, Fort Bragg, N. C., directed that tests begin on December 19, 1927.

The tests conducted were in general as follows:

Air Corps and Ordnance Department. Effect on bomb cases dropped on such a target.
Functioning of bomb fuzes against such a target.
Effect of demolition bombs.

Corps of Engineers. Effect of varied charges of high explosives on selected members of the bridge.
Field Artillery, Corps of Engineers and Ordnance Department. Effect of high explosive shell.

The reports of test under the three classes mentioned above are rendered separately.

Object of test—to determine the effect on a reinforced concrete bridge of:

155-mm. howitzer shell fire.
240-mm. howitzer shell fire.
75-mm. shell detonated in certain locations.
155-mm. shell detonated in certain locations.
240-mm. shell detonated in certain locations.

DESCRIPTION OF BRIDGE

The bridge was a reinforced concrete structure called the Swift Island Ferry Bridge, but popularly known as the Pee Dee River Bridge. It was located over the Pee Dee (Yadkin) River, between Mt. Gilead, N. C., and Albemarle, N. C., about 100 miles west of Fort Bragg, N. C., by road and about 65 miles by air. The bridge was designed by the State Highway Commission of North Carolina and built in 1921.

The bridge consisted of three arch spans over water, each 146.25 feet long and fourteen short spans, each 42.5 feet long. The total length of the bridge was 1073.75 feet. For the purpose of test the arch span, its two large piers, and the seven short spans at the west end were assigned to the Air Corps and Ordnance Department. The remainder of the bridge was assigned to the Corps of Engineers.

The width of the bridge was about twenty feet including parapets, the parapets being solid reinforced concrete. The roadway consisted of seven inches of reinforced concrete and light road surfacing. It rested on three deck girders of reinforced concrete about two feet square which ran lengthwise of the bridge. These girders in the arch spans were supported by the large piers, small vertical columns to the arch rings, and the two arch rings, each about four feet square.

The photograph shows the construction in the arch spans. In the short spans the girders were supported by bents.

MATÉRIEL AND AMMUNITION

The 155-mm. matériel used in firing was an 155-mm. howitzer model 1918 (Schneider).

The 240-mm. matériel used was a 240-mm. howitzer model 1918 (Schneider).

FIG. 1.—VIEW OF OLD BRIDGE BEFORE THE TESTS STARTED. PICTURE TAKEN FROM NEW BRIDGE

FIG. 2.—BRIDGE AFTER BOMBING AND BEFORE ARTILLERY FIRE

FIG. 3.—HIT OF 155-MM. SHELL NO. 20 IN ROADWAY (FOREGROUND). BOTH NORTH AND SOUTH PARAPETS WERE BROKEN

FIG. 4.—EFFECT ON ROADWAY OF THREE HITS—240-MM. SHELL NO. 12 ON THE RIGHT, AND TWO 155-MM. SHELL ON THE LEFT, NOS. 13 AND 23. (155-MM. SHELL NO. 14 ALSO APPARENTLY STRUCK IN THIS VICINITY BUT THE EFFECT WAS BLOTTED OUT BY THE 240-MM. HIT.)

SHELL TESTS

The ammunition used for firing was:

Twenty-three 155-mm. H.E. shell, Mark I, TNT loaded.
Twenty-three fuzes, Mark III.
Twenty-three propelling charges, Zone II.
Fifteen 240-mm. H.E. shell, Mark III, TNT loaded.
Fifteen fuzes, Mark IV, short delay.
Fifteen propelling charges, Zone I.

The following shell were detonated statically in selected positions on the bridge:

Twelve 75-mm. H.E. shell, Mark I, TNT loaded.
Twelve 155-mm. H.E. shell, Mark I, TNT loaded.
Six 240-mm. H.E. shell, Mark III, TNT loaded.

DETAILS OF TEST

155-mm. Howitzer

Battery "A", 17th Field Artillery, Captain S. J. Cutler, Commanding, was designated to conduct fire with 155-mm. howitzers.

Two howitzers were taken to the bridge on December 15, 1927, for the firing. One was carried in a section made up as follows:

One Coleman 5-ton truck, loaded with 5-ton tractor.
One 3-inch field gun trailer, loaded with 155-mm. howitzer.
One howitzer limber towed behind trailer.

The Coleman 5-ton loaded with a 5-ton tractor towed the trailer loaded, and limber at an average speed of twelve miles per hour.

The second howitzer and its limber were towed behind an improved 3-ton F.W.D. truck with pneumatic tires at an average speed of seven miles per hour. One gun wheel ran slightly warm. Precautions were taken to grease wheels every hour.

The distance traveled was 114 miles over roads as follows: 114 miles total one way, of which 90 miles were paved, 24 miles over sand and clay; slippery. Weather: Cold and rainy, not freezing.

Returning, the howitzers were transported in the same way except that the howitzer towed behind the F.W.D. truck ran at an average speed of ten miles per hour. With wheels greased every hour, the same gun wheel ran slightly warm.

In order to avoid the slightest possibility of a ricochet it was decided to use high-angle fire, and at short ranges so as to avoid clearing any more country of inhabitants than necessary.

As the angle of elevation to be used, about 80°, was far beyond that ordinarily used by the howitzers, preliminary firings were conducted by the 17th Field Artillery on the Fort Bragg reservation to obtain ballistic and matériel data to be used. These data proved to be of great value when the firing was actually done at the bridge. In these preliminary firings Mark IV, short delay fuzes were tried,

but in all cases the shells were duds. Hence when the firing was conducted on the bridge, Mark III fuzes were used.

The howitzer position was chosen at a distance of about 3800 yards from the east end of the bridge and in prolongation of axial line of the bridge. This point was accurately located by survey.

Gun emplacements: One gun was emplaced with the wheels on two cribs of triangular shape, so arranged that the trail was in the V formed by the cribs. The trail was in a hole about 6¼ feet deep. The axle of this howitzer was about 5 feet above the ground level. The second howitzer (this howitzer was not fired) was located on the edge of a road, the wheel being on the road, and the trail down a steep bank to the bottom of a large ditch. Both howitzers were secured by cables from the draft hooks to sunken logs to prevent any movement to the rear. The shields of both howitzers were nearly horizontal. The howitzers were accurately located, because in this position no traverse by moving the trail was possible. They could only be fired on a target within the limits of traverse in the carriage.

The target assigned was the west center pier of the three arch spans. The O.P. was located under the new bridge, about 1800 feet north of the target, with the second O.P. for bilateral observation located on the new bridge near the other end, giving a base line of approximately 600 feet. The observation and plotting of shots were made by the First Observation Battery.

The map range was 3950 yards. The corrections applied gave a gun range of 4300 yards at an elevation of 1072 mils (about 60 degrees) using Zone II. The first two rounds were shifted left 30 mils for safety. The adjusted elevation was 1016 mils. On December 24, 1927, twenty-three rounds were fired, obtaining eight hits on the bridge and four within a yard of the bridge, giving practically 50 per cent hits.

Functioning of matériel: At the normal pressure, 34 kg. per sq. cm. in the recuperator, the howitzers remained 6 inches out of battery. With 37 kg. per sq. cm. the howitzers stayed out of battery slightly on the first two rounds, but returned to battery thereafter. The length of recoil was 52 inches.

Loading: The piece as laid had a maximum elevation of 1480 mils and a minimum angle of elevation about 800 mils. The rammed shell stayed in place and the measured head space showed a variation of not over ⅛ inch. The powder charges were held in place by cartridge silk from surplus increments.

Lanyard: A wire lanyard was used as rope has too much stretch. The firing hammer hung in such a position that the length of stroke was greatly reduced. It was necessary to hold it back by tying, to get a stroke that would fire the primer.

240-mm. Howitzers

Battery "C", 5th Field Artillery, Captain M. S. Creusere, Commanding, was designated to conduct firing with a 240-mm. howitzer.

One howitzer was taken to the bridge December 15, 1927, the loads being towed behind Militor trucks. One 10-ton tractor was carried on a 10-ton trailer towed behind a Militor truck. The drawbar of the trailer broke about 30 miles from the bridge and this tractor ran under its own power this distance to the bridge position. The howitzer load had trouble with its brakes going down one hill. It pushed the truck towing it off the road and both turned over. The load and the truck were righted with the tractor and the march completed without further mishap.

The return trip was made in the same way except that the tractor ran under its own power, its load being a gas trailer and a water trailer. The battery returning made the march in 11½ hours, except for the tractor, which completed the march in 24 hours. Two drivers were used on the tractor.

The 240-mm. howitzer position was located by survey at a point about 3200 yards east of the bridge and on the axial line of the bridge. The position was on a slight forward slope. The howitzer platform was, however, inclined about five degrees from the horizontal to be sure to have all the elevation needed. Special precaution was taken to use high-angle fire in order to avoid all possibility of ricochets. The O.P.'s were the same as for the 155-mm. howitzer firing, bilateral observation being used.

The map range was 3207 yards. The corrections applied gave a range of 3300 yards, with an elevation of 1028 miles in Zone I. The first round was shifted left 30 mils for safety. The adjusted elevation was 1050 mils in Zone I. A total of 15 rounds was fired obtaining 7 hits on the bridge, practically 50 per cent. One of the hits on the bridge was a dud.

RESULTS OF FIRING*

155-mm. Shell

Round	Remarks
9	Struck on floor of fallen approach span between bent No. 3 and No. 4—broke hole about 1 foot in diameter in floor, between center and south girders.
13	Struck on roadway, 28 feet west of pier No. 2 and 2 feet south of center girder. Broke concrete floor out, making a hole about 3 feet by 4 feet, but did not break any reinforcing rods.
20	Struck on roadway, 18 feet east of pier No. 3 and midway between center and north girder. Small amount of concrete

* The effect of rounds not definitely identified or merged with those of a different caliber are omitted from the following list.

of floor broken out, no reinforcing broken. Five feet of north wall broken out, including top rail reinforcing, and a 3-foot hole was made in south wall by fragments. (Fig. 3.)

22 Struck roadway of standing approach span, near bent No. 3. It was impossible to reach location because of broken roadway. About 12 feet of north wall was broken out, none of south wall.

23 Struck on roadway, 36 feet west of pier No. 2 and 2 feet south of center girder. Broke a 3-foot hole in concrete flooring but no reinforcing rods. This shell together with No. 13, and 240-mm. shell No. 12 combined to break out side walls as shown in Fig. 4.

240-mm. Shell

8 Struck about 70 feet east of pier No. 3, on south railing. Cut out about 6 feet of top railing, and wall about 1½ feet down. Fragments cut out north wall for about 15 feet along top rail, and cut a number of holes through this wall. The largest—a diagonal cut 4 feet long. All reinforcing rods in top rails, both sides of bridge, were broken.

11 Struck 7 feet west of pier No. 3 on roadway over south girder. Cut out 6 feet of girder, and made hole in floor 5 feet wide and 6 feet long. All of south wall, including top and bottom rails, cut out for a distance of 15 feet. All reinforcing rods in both girder and wall, of section broken, were either broken or pulled out. Edge of roadway—outside of section of girder cut out, was also broken out. North wall broken out for a distance of about 15 feet (Figs. 5 and 6 show effect clearly). This was the only shell that appreciably damaged bridge main structure.

12 Struck on roadway 30 feet west of center line of pier No. 2 and 3 feet north of center girder.

Broke a hole about 3 feet by 6 feet in concrete floor and a hole 2 feet in diameter through reinforcing rods. This shell, together with 155-mm. shell No. 13 and No. 23, the hits of which appear in the same photo, broke out the north wall, including upper rail, for about 15 feet, and the concrete on south wall was also broken out for about the same distance, although the combined effect of the three shell cut only three reinforcing rods on this wall. (Fig. 4.)

13 Struck on shoulder of base of pier No. 3, north side, broke out several cubic feet of concrete.

14 Dud shell—struck about 5 feet west of center line of pier No. 3—on roadway, near north girder—passed through floor and struck on arch ring below, knocked out about a foot of concrete.

15 Struck on shoulder of base of pier No. 2, north side. Broke out small amount of concrete from shoulder of pier.

SHELL TESTS

STATIC DETONATIONS

75-mm. Shell

Twelve 75-mm. shell MK I, TNT loaded, were detonated statically by electric magneto on the roadway of the bridge. These shell had no penetration. Varied angles were chosen as follows:

2 at 75 degrees with the horizontal,
2 at 60 degrees with the horizontal,
2 at 45 degrees with the horizontal,
2 at 30 degrees with the horizontal,
2 at 15 degrees with the horizontal,
2 horizontal.

Sand bags were piled on the side of the shell toward the new bridge to prevent fragments from going in that direction.

155-mm. Shell

Twelve 155-mm. shell MK I, TNT loaded, were detonated statically on the roadway of the bridge and on the roadway over the beams. These shell had no penetration. Varied angles were chosen as follows:

2 at 75 degrees with the horizontal,
2 at 60 degrees with the horizontal,
2 at 45 degrees with the horizontal,
2 at 30 degrees with the horizontal,
2 at 15 degrees with the horizontal,
2 horizontal.

Sand bags were piled up on the side of the shell toward the new bridge to prevent fragments from going in that direction.

240-mm. Shell

Six 240-mm. shell MK III, TNT loaded, were detonated statically on the bridge. Five of these shell were located in holes made by 155-mm. shell so as to give penetration. The sixth shell was located on an arch ring to simulate the position of the "dud" which in the firing went through the roadway and struck an arch ring.

1 at 75 degrees with a penetration of 15″
1 at 60 degrees with a penetration of 15″
1 at 60 degrees with a penetration of 5″
1 at 45 degrees with a penetration of 10″
1 at 45 degrees with a penetration of 4″
1 on an arch ring at 60 degrees with no penetration.

Sand bags were used, except for the shell on the arch ring, to prevent fragments going toward the new bridge.

DISCUSSION

Safety was a prime consideration in the conduct of these tests. A state highway, Route 74, crossed the new bridge, and there were a number of inhabited houses in an area which is considered dangerous in War Department safety regulations for such work. Elaborate precautions were therefore taken to see that the highway and roads leading into it were clear and such inhabited houses as were in the danger area were actually vacant at the time of firing and during the static detonations. Two officers and a detail were used at all times, and for part of the time, four officers were used for this purpose. Two traffic control stations were established, one on either side of the river on the main highway. These stations were connected by field telephones to a switchboard at the new bridge, so that traffic could be controlled with the least possible delay. These stations and telephones were operated by the Headquarters Battery, 1st Battalion, 17th Field Artillery. Officers and men required for clearing the area and traffic control were detailed from Fort Bragg, and from other organizations on duty at the bridge. These latter organizations were Company A, 4th Engineers, and the First Observation Battery.

The use of high-angle fire was another safety precaution. It was within reason that a shell fired at a low angle and ricocheting might cause trouble. No effort was spared to assure that ricochets would be impossible. This precaution caused the use of Mark III fuzes with the 155-mm. shell however, since preliminary firing on the Fort Bragg reservation indicated that Mark IV short delay fuzes would cause "duds" in this caliber howitzer when fired at these elevations.

The question of fuzes for this type of target seems however to be in large part theoretical. Examination of the photos of the results obtained with 155-mm. shell fired, and those exploded statically with no penetration show little or no difference. Both damaged the roadway, but static shell when exploded over a girder did no material damage to the girder. Examination of the 240-mm. shell results as shown in the photographs, indicate that the penetration as exemplified in the static tests did little if any more damage than the fired shell. The fired shell rarely cut any floor reinforcing iron rods, so it is fairly clear their penetration was slight. It seems then at least with the remaining velocities used, about 600 to 700 feet per second, that there was practically no penetration with 240-mm. shell. The results obtained indicate a very similar action then between the Mark III fuzes in the 155-mm. shell and the Mark IV short delay fuzes in the 240-mm. shell. The 240-mm. shell with the Mark IV, short delay fuzes, were evidently retarded by the roadway concrete so that the burst occurred before the shell had penetrated very far.

The shell will penetrate the roadway, except over a girder, as was shown by the dud.

It was believed beforehand that the 75-mm. shell would do no damage to the bridge. The shell exploded at 0 degrees made a slight hole in the roadway, about 2 inches in diameter. The others hardly marked the road surface.

The 155-mm. shell when exploded on the roadway, not over a beam, made a hole in the floor, but without cutting any reinforcing rods. The parapet opposite the burst was usually knocked down. When exploded over a beam very little effect was obtained, a small hole being blown in the roadway, but the beam not even cracked.

The 240-mm. shell striking the roadway tore holes about 4 feet by 6 feet and cut a very few of the reinforcing rods in the floor. One 240-mm. shell struck on a beam and cut out a section of the beam, which was about two feet square, eight feet long as well as damaging the roadway over an area about eight feet square. This portion of the floor was dropped down and held up only by the reinforcing rods. Statically detonated shell close to beams with penetration failed to cut the beams. Two 240-mm. shell struck the conical portion of pier bases. These only removed or damaged the conical portion however without damaging the piers otherwise.

The 240-mm. shell at 60 degrees on the arch ring cracked the ring but did not remove any concrete from it. The ring was evidently entirely safe after the burst. The short vertical column by the shell was removed however. The "dud" which struck an arch ring did almost as much damage to the ring.

In the aircraft bombing tests it was shown that a reinforced concrete bridge of this type is most easily damaged by mining action of bombs striking the ground close to a pier or bent. Practically all the members of this type of bridge are in compression, so that force applied from above will not accomplish damage as easily as force applied to the supports. In the case of shell, the radius of mining action is very small, and hits on piers by 240-mm. shell did no material damage to the piers. Mining action of a 240-mm. shell might blow out a column of a bent, but the shell would have to hit at its base and have a delay fuze in order to obtain penetration in the ground. The bents and piers present a very small target and even when a hit is obtained, there is doubt as to whether it would do any effective damage. It seems then that the greatest damage that can be expected from shell fire would be on the roadway. Shell of calibers less than 240-mm. may be expected to do little damage even to the roadway.

CONCLUSIONS

That 75-mm. shell are entirely too small for demolition of reinforced concrete targets of this type.

That 155-mm. shell will damage the roadway of a reinforced concrete bridge, but will not render it impassable.

That 240-mm. shell can render a reinforced concrete bridge impassable.

That the supports of this type of reinforced concrete bridge are its most vulnerable points, but due to the small size of the supports, the chances of hitting are very small and the chances of obtaining an effective hit are much less.

That the main damage to be expected from 240-mm. shell will be on the roadway.

That short delay fuzes apparently give almost instantaneous action when striking reinforced concrete seven inches or more in thickness.

Notes on Preliminary 155-mm. Howitzer Firing at Fort Bragg by the Seventeenth Field Artillery

RANGE TABLES

In the absence of any range tables for firing at angles superior to 45 degrees, range tables were calculated by the regimental plans and training section as follows:

The value of the ballistic coefficient was determined by working backwards from existing tables published in Artillery Circular "M." This value was subsequently corrected for altitude.

Using the ballistic coefficient thus found, range tables were constructed for Zones I and II, by means of Ingalls' formulas and tables as published in Artillery Circular "M." The range tables as calculated are as follows:

Ø	Zone I				Zone II			
	X	*C*	*T*	*W*	*X*	*C*	*T*	*W*
50°	4130	3.813	31.16	53° 12′	4833	3.876	33.88	53° 40′
55°	3918	3.645	33.26	58° 10′	4576	3.718	36.10	58° 36′
60°	3580	3.440	35.07	62° 58′	4182	3.517	38.03	63° 23′
65°	3134	3.200	36.61	67° 41′	3657	3.274	39.62	68° 02′
70°	2604	2.904	37.76	72° 19′	3029	2.976	40.90	72° 37′

Ø = ∠ of departure
X = Range in yards
C = Ballistic coefficient
T = Time of flight—seconds
W = ∠ of fall

Upon completion of the range tables, firing for verification was had by firing five rounds each at 55°, 60°, 65° and 70° in each Zone I and II—40 rounds in all. Not all shell holes were identified,

FIG. 5.—EFFECT OF 240-MM. SHELL NO. 11 WHICH STRUCK ON ROADWAY OVER A LONGITUDINAL GIRDER, CUTTING OUT SIX FEET OF THE GIRDER. THIS WAS THE ONLY SHELL THAT APPRECIABLY DAMAGED THE BRIDGE MAIN STRUCTURE

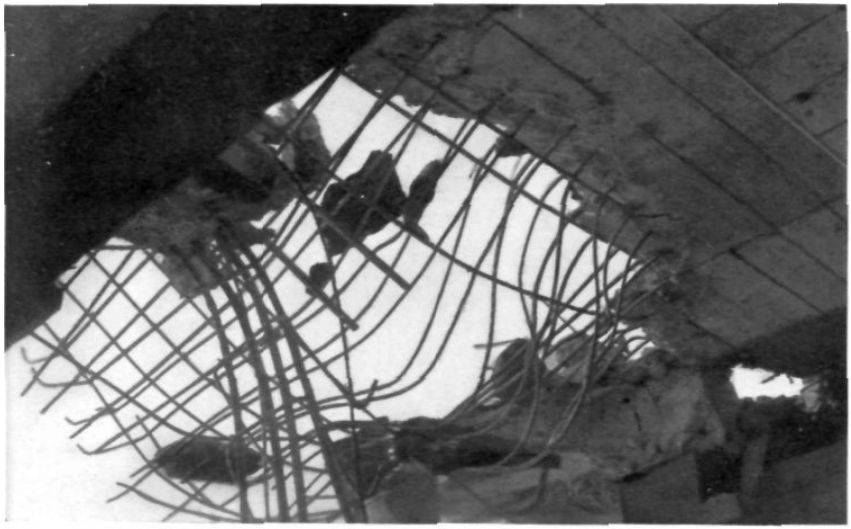

FIG. 6.—EFFECT OF 240-MM. SHELL NO. 11 AS SEEN FROM BELOW. ONE END OF THE CUT GIRDER IS SEEN IN THE UPPER LEFT-HAND CORNER OF THE PICTURE

but most were. The ranges obtained were carefully measured by an accurate survey and then compared with the range table range, after the latter had been corrected for:

a. Density of loading—measured for each shot.
b. Difference of level of wheels.
c. Wind—measured hourly.
d. Temperature.
e. Barometer.
f. Ballistic density.

The maximum and minimum differences between calculated and measured ranges after correcting for above factors were:

	Calculated Ranges		Measured Ranges, Yds.	Remarks
	Elevation	Yds.		
Zone I	55°	3918	3904	Least differences
Zone II	60°	4182	4268	Greatest differences

It is realized that if the range tables had been calculated by the short arc method, greater accuracy could have been obtained, but the necessary tables not being on hand, this could not be done.

EMPLACEMENT OF MATÉRIEL

Four pieces, with wheels on the ground, fixed spade and float, were emplaced as follows:

	Trail	Soil
No. 1	In pit, 8½′ deep	Sand
No. 2	In pit, 8½′ deep	Sand
No. 3	In sunken road	Loose rock
No. 4	In pit, 6½′ deep	Loose rock

About six hours' work was required in emplacing pieces Nos. 1, 2 and 4, the digging of the pit taking this time. About four hours were required for piece No. 3, the digging of a pit being unnecessary.

To prevent any danger of the piece traveling backwards, a leg was sunk in the ground, parallel to the axis of the piece, and wire guy ropes fastened from this leg to the draft hooks. Examination after firing showed some stress had occurred on the guy ropes, but there were no means of measuring the amount.

In piece No. 3, a wooden platform was placed under the wheels, the nature of the soil requiring this to prevent the wheels sinking into the ground.

Pits for trail were so narrow that the piece could not be traversed.

Any movement of the wheels to traverse the piece would bring one wheel near the edge of the trail pit, and result in breaking the edge of the pit.

Platforms of logs were constructed for use of cannoneers in loading pieces.

This method of emplacement is suitable only for firing at targets whose positions are known before emplacing the pieces.

FUNCTIONING OF PIECES AND AMMUNITION

Recoil was normal—about 52″.

Pressure in Counter Recoil: At 34 kilograms per square centimeter, the howitzers did not return to firing position by 6 inches, and had to be pushed in by hand.

At 37 kilograms per square centimeter, the howitzers did not quite return to firing position after first two rounds, but thereafter the counter recoil system functioned normally.

Loading Ammunition: The minimum elevation obtainable was about 45 degrees. Loading projectiles at this elevation was practicable, as the band would hold the projectile in place after ramming. Powder charges had to be wedged in by using cloth from unused sections of powder charges.

The maximum sustained *rate of fire* was one round per 2½ minutes, including ¾ minute for taking cover in compliance with War Department Safety Regulations.

Zones of Fire used were I and II. The higher numbered zones were not used, as the target (bridge near Swift Island) was at such a distance from the gun positions, that only Zones I and II were available.

Projectiles: H.E. shell, Mark I, was used for all firing.

Fuzes: With Mark III, all projectiles detonated. With Mark IV, no detonations were obtained. In order to secure greater penetration it had been desired to use Mark IV fuzes, but as detonations could not be had with them, Mark III fuzes had to be used.

FIRST PLATOON OF BATTERY "A", 103RD FIELD ARTILLERY, 26TH DIVISION, IN APPLE ORCHARD NORTH OF BEAUVARDES, JULY, 1918

KALEIDOSCOPICS

PEN PICTURES OF THE FIELD ARTILLERY IN FRANCE

BY BURTON HARRINGTON

[This is the second of a series of Kaleidoscopics. The purpose of the author, who served in the Field Artillery during the World War, is to make a contribution to Field Artillery literature in the form of short word pictures. These are written around the activities of a battery which was in action for 210 days officially, between the dates of February 3 and November 11, 1918. —EDITOR.]

IN an apple orchard just north of Beauvardes, July, 1918, was passing into history. The breezes were drowsy.

For the battery the drive had settled down to an apparently unending succession of routine firing, limbering up, hiking, and firing.

The apple orchard position promised relief. Perhaps it might be a permanent position; a sort of paradise for a battery which had been steadily moving forward for nearly a fortnight. It was not such a bad sort of hole.

Squatting along the left of the road, a bereft farm house with a well-vaulted cellar stood. Further to the east and *en arriere* was a small sand pit, bordered on its north edge by several closely built, paralleling stone walls, reminiscent of New England stone fences save for the fact that they were quite as broad as they were wide, with just enough room between the sides for a man to crouch hidden from intruding shell splinters.

Immediately south of the main farm building was a somewhat smaller house, possibly used by a thrifty tenant, while to the west across the road one could see a small barn and the artillery picket line. To the north of the group of buildings and closely adjacent, was a scanty apple orchard, split by the road. Still further north, after one had looked across an expanse of open field, towered the solid, shadowy wall of the Forêt de Fère.

On either side of the road four squat howitzers were divided, snuggling close to the trunks of their protecting canopies. Their snouts reached skyward sufficiently, one judged, to lob their hundred-pound messages just across the tree tops ahead.

Behind the guns in the welcome shelter of the trees, cannoneers stretched out lazily on partly spread 'paulins and shelter halves, sleeping or half-heartedly discussing what might be in the show windows along Westminster Street.

Over by the line of caissons bordering the woods ahead, a detail was cleaning up the mess of early morning when a few scattering "105's," coming from nowhere, had inconsiderately and violently interrupted the morning shaving and rifle cleaning activities.

Over the road toward the front, a troop or two of French cavalry jingled along with the accomplished air of veterans who anticipated nothing beyond a morning canter.

Far to the rear, hard by Beauvardes, erupted the regular, thunderous coughing of a Schneider "long."

Idly swinging feet over the edge of the sand pit, backs to the stone wall which bordered the pit, two soldiers were painstakingly oiling and polishing partially dismantled side arms.

It was a strange scene of utter peace; a hiatus in the grim business of the month; a sort of recession to days along deep, black streams bordered by tall, wind-ruffled grasses.

The soldiers who sat by the sand pit were in tune with the day. Tired and sun-warmed, they were in silent communion with their surroundings.

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There came the sustained stuttering buzz of 'planes flying low.

"Our 'planes are sure givin' us good support this trip," offered one of the soldiers. "Remember the flock that went over at Belleau? Never saw so many in my life."

He turned, cocking his head lazily at an angle to better admire the evolutions of the pilots.

"I'm a son of a . . . !" he gasped.

Roaring down in a slanting dive, straight for them, came the two 'planes. Instead of the familiar red, white and blue markings on the under wings, there stared, unblinkingly, the severe black crosses of the enemy.

"Tac . . . tac, tac, tac, tac, . . . tac, tac, . . . tac, tac!" Four maxims were spitting chattering bursts of fire. Roaring, sputtering, thudding death from the sky.

One soldier crouched behind the wall; the other, panic stricken, was engaging with a dismantled automatic in an unequal duel until kindly Providence toppled him backward over the edge of the pit, where he rolled down the sandy sides and came up crouching under the feeble cover of a small bush.

Wild excitement in the farm yard! Popping Springfields—machine gunners wildly circling the Hotchkiss on its cart-wheel mount—soldiers crawling under guns, under wagons, diving into cellars, hugging trees, standing transfixed, or running aimlessly to and fro. And then, quiet, except for the disturbed murmurings of scattered groups punctuated by hasty glances aloft.

The afternoon achieved morning's peacefulness. Up ahead a few "75's" growled and barked in desultory fashion, as if keeping up the pretense of war. Back by Beauvardes, the insatiate Schneider "long" persisted with monotonous regularity in its rumbling coughing;

a huge, unseen beast, vainly trying to clear its throat of annoying phlegm.

* * * * * * *

Twilight.

A familiar sound from the days along the Chemin des Dames and the valley north of Soissons. The interrupted growl of the snooping Gotha. Those who knew were properly frightened.

It came—closer, closer. So low, it seemed to scrape the roof of the farm building. Like some noisome monster of Siegfried's day, it swayed and sniffed over the farm yard below.

Soldiers stopped in their tracks. Soldiers held their breath, praying to God that no damned fool would venture a shot with rifle or gat. All thoughts, like some underlying theme of a fearful symphony, thrummed on the machine gun crew. Would the fools let drive a burst at that vague creeping bulk overhead?

Black stillness. Tense quiet, a fearful quiet of men holding their breath. The machine gunners, thank God, had some sense.

The beast heaved its ungainly bulk onward. Dimmer, dimmer its growl.

Then . . .

Swish—swish—swish—swish—swish. Followed by a crash and a blindingly white, searing flash. Another and another. Far to the south. About over Beauvardes.

"Bet they went after that 'Long Tom,'" remarked an unseen soldier.

"Thank God, they didn't stop here," ventured another.

That night and the next day the Schneider "long" must have cleared its throat. It failed to cough.

Maybe they were moving to a new position.

AERIAL OBSERVATION FOR FIELD ARTILLERY

[In the July-August, 1927, issue, there appeared an article entitled, "The Flying Battery Commander." The writer of the present article, who prefers that his name be withheld, presents a different view. As this is a controversial subject of considerable interest to the Field Artillery, the presentation of varying views is desirable.—EDITOR.]

THE Field Artillery problem is to put fire where needed. The problem is solved under a vast variety of conditions, but the answer is always the same. The war brought a new sub-problem, that of aerial observation. No one will pretend this sub-problem was solved on the battlefield. The scarcely discernible results obtained shouted to the skies that the new variation had not been solved.

It was then thought that a very few years would give the answer. Yet nine have now passed and we seem no more able than on Armistice Day to say where the aerial observers for Field Artillery—or for Infantry either—will come from in the next war! Common sense dictates that an answer be found. We do not think that aerial observation of fire is a particularly difficult task and we think that the Air Corps can do it. But we think that the Field Artillery can do it better. That being the case, let us say why.

Be it understood that we do not intend to reflect in the slightest degree on the prowess of our brethren of the Air—on the contrary! Since the World War, the Air Corps has made tremendous progress. The time has arrived when like the centurion of old a commander of air force can say "Go," and he goeth, "Come," and he cometh. Those who served with the Air Corps only during the war, can have no conception of the fine service that it now performs for the other branches.

In our posts, and more especially at the Field Artillery School, airplane shoots are habitually carried out with eminent success. They are not difficult if it be admitted that there is no difficulty in riding in the rear seat of a plane. Forty per cent of the Field Artillery observers get on the target in from two to four salvos on their first problem and forty per cent more arrive by the third attempt. The great gain in visibility of target and burst much more than offsets the inconveniences of flight and of being one's own radio operator.

We do not think that a Field Artillery observer needs to know equitation, motors, draft or battery drill in order to be efficient as an observer, but we do think that he must know thoroughly the

technique of the firing battery. And nothing but service practice with the battery will give him this. If he has had this experience, he may perhaps, when difficulties arise, be able to diagnose them and proceed with the shoot; without this experience he is apt to be helpless. Remember that difficulties do arise during shoots and that when they do explanations from the battery are hardly possible. On the other hand, a knowledge of aerodynamics, meteorology or stream-lining are *not* of the least value to an observer.

Sufficient data has now accumulated at the Field Artillery School to make it certain that officers who cannot adjust fire on the ground can rarely do so in the air, in spite of its greater simplicity. And it seems fairly evident that the relegation of an Air Corps officer to the grade of Observer on account of his inability to qualify as a Pilot or his superannuation as such will not qualify him to conduct artillery fire.

There are two ways in which an observer can work with a battery, be he on the ground or in the air. He can transmit just what he sees, leaving the commands to be worked out at the battery, or he can give the actual commands. Since the introduction of indirect fire, both methods have had a full trial, and the unanimous verdict is that the former method is the best. The observer should know the principles of conduct of fire, and be able to conduct fire either from the ground or the air. But a study of the methods of communication, of the time required for each type of adjustment, and of the probable amount of training it will be possible to give observers in wartimes, indicates that the observer should normally act as the eyes of the battery commander, and report what he sees.

The Field Artillery and the Infantry went to the World War with communication systems that differed radically. In the Field Artillery the brigade furnished its own communications; in the Infantry they were furnished by a Staff Corps. But when the war had run its course and organization for the next war was in order, the Infantry appeared at the War Department and averred that all the elements of a fighting team *must* belong to that team and, pointing to the notable communication achievements of the Field Artillery, which had furnished its own communications, demanded to be allowed to do the same. The principle of the homogeneous fighting team prevailed and the Infantry team is now wholly Infantry.

The same principle is again involved. It seems too well established to admit of discussion, but perhaps it is not generally recognized that any principle is involved in the observer question.

We are aware that a question like this is not so simple as the proposition: "Who can best do it?", but it may do some good

to state some of the arguments, pro and con (as we see them), in parallel columns, in the hope that the subject may yet receive the attention it deserves and possibly even be decided before the next war.

CONTENTIONS

Field Artillery	*Air Corps*
1. A fighting team should be a real team and not a conglomeration. A field artilleryman will sacrifice more for the Field Artillery than will anyone else.	The Air Corps observer will be more proficient, being unaffected by altitude and speed and accustomed to the observation of ground forms from the air. The best team work will be assured by both pilot and observer being of the Air Corps.
2. The ability of the Field Artillery observer to conduct fire can be definitely ascertained before he goes into the air. If the adjustment be a failure, the Field Artillery observer can be summarily relieved by the officer responsible for the delivery of fire; an Air Corps observer probably could not be.	Fire need not be conducted from the air. The sending of coördinates alone is sufficient. The fact that the Field Artillery has rejected this method of fire for terrestrial observation does not necessarily prove it inefficient for aerial observation.
3. The familiarity of the Field Artillery observer with battery procedure and the incidents of his fire will be great assistance, especially when communication is difficult.	
4. The Field Artillery observer will spend more time with the Field Artillery than will the Air Corps observer and will be more familiar with the Field Artillery battle problems.	Officers of other branches in Air Corps camps may be highly critical and even obnoxious at times.
5. A landing sufficiently good to save life, though probably not the plane, can be made after a very moderate amount of instruction.	An observer should have some knowledge of flying so that in case of accident to the pilot he can take the controls.
6. Aerial gunnery can be learned in two weeks. The Air Corps officer should learn it faster, but his proficiency will be no greater.	The pilot expects, and is entitled to, the protection of a proficient aerial gunner in the rear seat.
7. If the observer be not a pilot, his attention will not be diverted by the way the plane is being flown. He will take a good deal on faith.	Observer's ratings are highly convenient to superannuated pilots. With a large observer reservoir men can be rejected as pilots, yet not lost to the Air Corps.

A SUB-CALIBER MOUNT

SERVICE RIFLE ATTACHED TO 75-MM MODEL 1897 GUN

BY LIEUTENANT MICHAEL G. SMITH, F.A.

ABOUT six months ago Captain K. Rowntree, commanding Battery "A," Tenth Field Artillery, asked me to devise some means of using the Springfield rifle for sub-caliber practice, due to having considerable trouble with our present sub-caliber tubes. The faults of our present tubes are well known to any field artilleryman who has ever used them. A few of the difficulties I have experienced are:

1. Separating of shell cases and the lodging of the fragments in the sub-caliber tubes, thus necessitating a delay in firing while they are extracted.
2. Breaking of firing pins.
3. Firing pins piercing primer caps and drawing them into the firing pin recess, thus causing delay while they are being removed.
4. Excess work involved in cleaning both the sub-caliber tubes and the gun bores and breech mechanisms after firing.
5. A false site must be used for short ranges in order that the range scale may be set at something near service range. In direct firing and quadrant firing the ranges and elevations are of necessity abnormally small.

With the instructions of Captain Rowntree and the faults of our present sub-caliber tubes in view, I devised a mount which sets on top of the gun tube. I enlisted the aid of the Ordnance Detachment in making the mounts and for ideas in its construction, and received much assistance from that source.

On December 1, 1927, the Ordnance had completed the four mounts, and Battery "A" of the Tenth Field Artillery tested them in our regular firing school for the officers of the regiment. The results were highly satisfactory.

DESCRIPTION OF MOUNT

As will be observed from Fig. 2, the Springfield rifle is mounted on two upright supports on top of the 75-mm. gun tube. *C* (Fig. 2) is a one-half inch in diameter steel bar which fits around the gun tube and holds *D* (a block of steel cut on the under side, to fit the gun tube). *C* has a common piece of rubber hose inserted over it to prevent scarring the paint on the tube. As can be seen (Fig. 2) *C* is bolted to *D*. *B* screws into *D* and has a lock nut at the lower end to prevent turning. The upper end of *B* fits into *E* and is held in place by a steel pin. The upper side of *E* is grooved to fit the

rifle barrel and is fastened to *E* by two bolts. *L* (Fig. 3) is the same as *D* (Fig. 2) except that it has a steel band one inch wide and three-eighths inch thick attached, against which the butt of the rifle rests. Between the band and the butt of the rifle is a rubber pad one-half inch thick, which takes up the recoil of the rifle. *K* is made like *B* of Fig. 2, except that instead of having a pin in the upper end preventing motion of the piece, it has a screw bolt *H* which acts as a set screw and works in a groove in *K*. *I* and *G* (Fig. 3) serve similar purposes to *E* and *F* (Fig. 2), the only difference being that they are cut differently to fit the larger part of the rifle. The whole rear support sets back one inch from the rear sight to allow for the recoil of the rifle in firing. The front support is one inch in rear of the front sight for the same reason. The rifle recoils about one-half inch.

METHOD OF ADJUSTING ATTACHMENT FOR FIRING

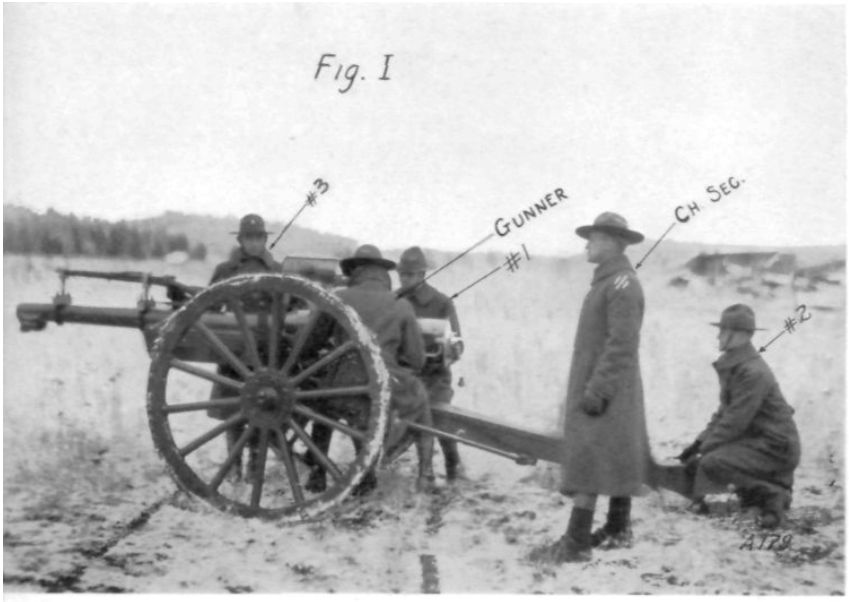
(*a*) *For Deflection*.—Set Plateau o, Drum 100, on your guns and bore sight them on some distant point. Then move *D* and *B* to right or left until the rifles bore sight on this same point, after which clamp *B* and *D* to the tube.

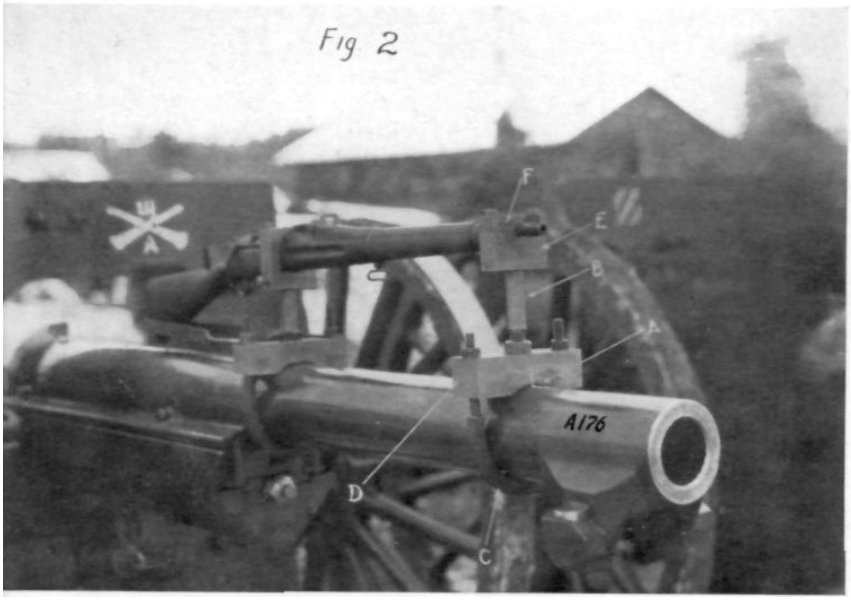
(*b*) *For Elevation*.—Set all 75-mm. gun scales at Site o—and any desired service range (2000 to 4000). Then by lowering the elevating screw *B* and raising *K* the Springfield is brought to the horizontal and checked by means of the gunners quadrant placed on the rifle barrel. No false site is then necessary for sub-caliber ranges and after the range has become familiar to the students, the elevating process may be repeated using a different range setting.

(*c*) *Alternate Method*.—The rifle is then mounted as shown in Fig. 2. You then bore sight the rifle on some distant, sharply defined point, first setting your gun tubes at the same level. The rifle is elevated or depressed by first loosening *H*, then the set nut on the lower part of *K*. Then take a wrench and turn *K* which screws into *L*, thus raising or lowering the elevation of the rifle. The rifles are elevated or depressed in this manner and you then have them all at approximately the same level.

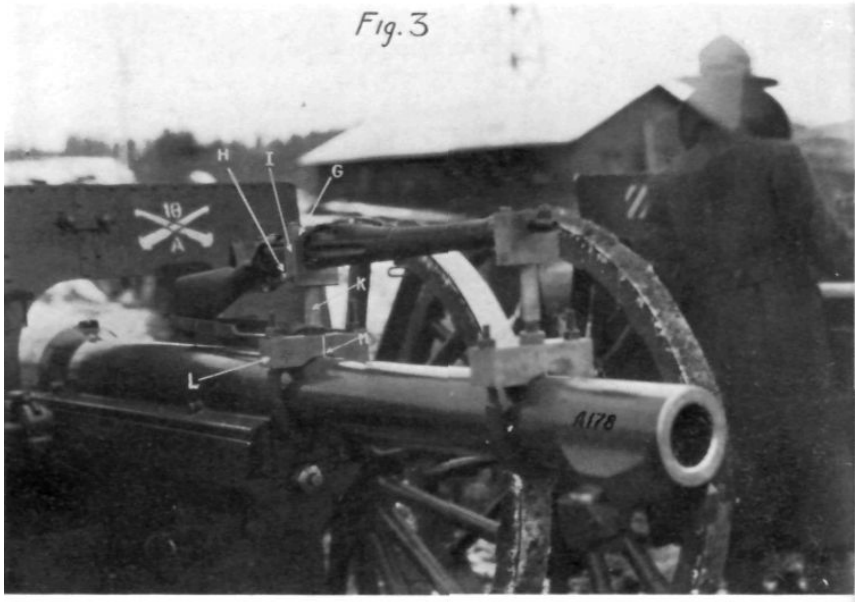
After completing, for the first time, your operations for elevation and deflection, mark the brackets *D* and *L* (Figs. 2 and 3) as shown at *A* and *M*. The next time the sub-caliber mounts are assembled, all you have to do to have the guns adjusted for deflection is to place the mark on *D* and *L* in line with the line on the gun tube.

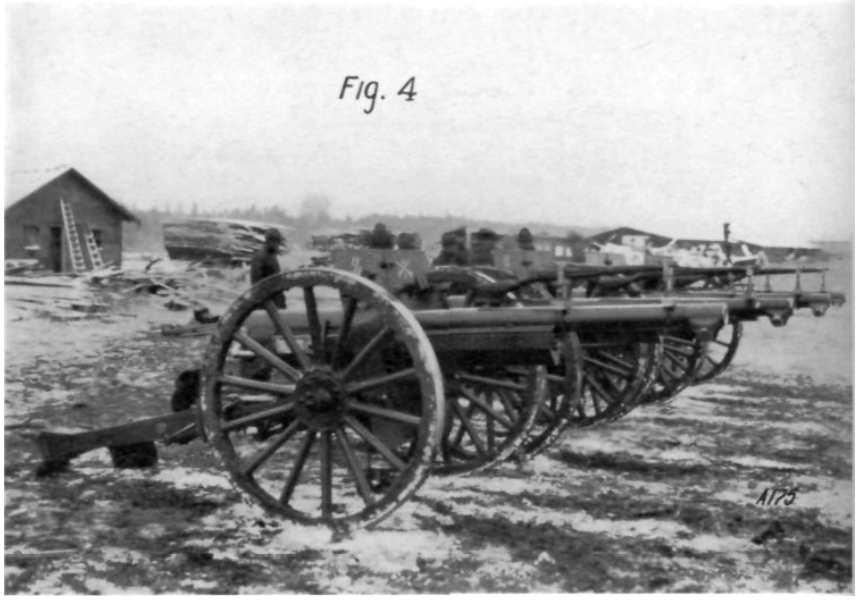
Before firing this mount the lock nuts at the base of *K* and *B* should be tightened, also tighten *H* and be sure the pin is in the upper part of *B*.





SUB-CALIBER, BATTERY "A", 10TH FIELD ARTILLERY





SUB-CALIBER, BATTERY "A", 10TH FIELD ARTILLERY

A SUB-CALIBER MOUNT

OPERATION OF FIRING

(*a*) *Duties of Gunner*.—(Same as in regular service practice.)

(*b*) *Number One*.—(Same as in service practice.) He opens and closes the breech and fires the 75-mm. gun at the command of his chief of section. (If desired Number One may fire the Springfield by attaching a lanyard.)

(*c*) *Number Two*.—(Same as in service practice.) He stimulates taking the regular ammunition from Number Four and inserting it in the chamber.

(*d*) I believe it is a good idea to have your caissons out for sub-caliber practice, and have your pieces and caissons in line hub to hub and then have Numbers Three, Four, and Five perform their duties as in regular gun drill.

(*e*) A higher numbered cannoneer (No. 6) stands in front of the shield of the piece on the right side (so as to give the gunner an unobstructed view) and loads and fires the Springfield rifle at the command to fire.

ADVANTAGES OF THIS MOUNT

(*a*) I believe it can be seen that with this mount you can get excellent results in training your gun crews during sub-caliber practice by following the above procedure. With the present sub-caliber tube, due to so many delays during firing, you have an impossible task in trying to instill fire discipline in your gun crews.

(*b*) The rifle mounted in this manner is very accurate, so that practically the only dispersion encountered is the result of inaccuracies of data settings. In other words the gun crew can see the result of their mistakes and will be inclined to take great care to set their data accurately.

(*c*) The firing with this mount has been proven to progress without delays, and as a consequence many more problems may be fired in a given amount of time than is possible with the present sub-caliber tubes, thus giving officers more opportunity for firing problems.

(*d*) This mount can be made in a very short time at most any machine shop at practically no cost, as everything except the actual mount is easily obtainable from government supplies on hand.

(*e*) After practice you have only the four Springfield rifles to clean. Anyone who has cleaned or supervised the cleaning of the 75-mm. guns after firing with our present sub-caliber tubes or black ammunition, knows that it is a much worse job than cleaning after regular service practice firing. I believe this is one reason why sub-caliber practice is not very popular with either the officers or enlisted men.

AMMUNITION

In using the Springfield rifle in this manner for sub-caliber practice, the kind of ammunition (gallery or regular service) will depend on the locality. At Fort Lewis, Wash., we have to resort to service ammunition at ranges over 200 yards. Good results can be obtained here at shorter ranges with gallery ammunition. (For best results during wet weather, I would advise service ammunition.)

FUTURE IMPROVEMENTS

It is suggested that if such a mount is put to common use, the lower part of the mount (*L* and *D*, Figs. 2 and 3) should be an integral part of the gun. This would simplify the mounting of the rifle. Also a bracket with a spring pad fitting the butt of the rifle should be placed on the tube to take up the rifle recoil.

COMPILATION OF DATA ON PREMATURE BURSTS

BY LIEUTENANT EMMETT A. NIBLACK, F.A.

(A THESIS WRITTEN WHILE ATTENDING THE FIELD ARTILLERY SCHOOL)

THE subject of premature bursts is one that causes a great amount of study and experimentation. It is a baffling subject, because when a premature has occurred, all the tangible evidence bearing on its cause is blown to pieces. Very rarely can anything that will throw definite light on the probable cause of a premature be obtained from the exploded fragments of the projectile or gun. Consequently, when the cause of a particular premature explosion is investigated, it is usually necessary to consider all the different *possible* causes, and then from the meager evidence at hand, deduce the most *probable* cause in the case.

Major C. M. Steese, Ordnance Officer at Fort Sill, who has specialized in the study of explosives, and who is a recognized authority on this subject, made the statement that there exists in one particular projectile, the high-explosive shell, about thirty distinct and different components, any one of which, it is possible, may cause a premature. It is true that some of these causes are less likely than others, but in a matter, the cause of which is so inevident as in the usual premature, it is necessary that all possible causes be considered. Therefore, it may be seen that the conclusions as to why prematures happen are largely a matter of surmise.

The foregoing remarks will assist the layman to understand the lack of definiteness as to causes which exists in the compilations and discussions which are to follow. It should also help him to appreciate the extremely difficult problem which the Ordnance Department faces in designing and manufacturing safe and satisfactory ammunition for the field artillery. It should also impress the field artilleryman with the importance of his reporting fully and clearly everything which comes under his notice as to the cause of prematures, as well as other malfunctioning of matériel.

A study was inaugurated some time ago on the subject of prematures reported since January, 1919, to determine whether the percentage of prematures was increasing, evidencing a deterioration of the ammunition in the reserve. The study was also intended to show what particular components appeared to be most frequently involved. The study was somewhat hampered by the fact that not all prematures, particularly if not resulting in damage to matériel or injury to personnel, are reported, and when reported important technical details are frequently lacking. It may be stated that

conditions are improving so that at the present time fairly complete technical reports are being obtained and probably most of the prematures are being reported.

For the purpose of making the study, a tabulation has been made, showing prematures occurring since the war period and regarding which reports are available. Probably the most striking thing relative to this tabulation is the relatively large percentage of prematures occurring in calibers larger than the 75-mm. as compared with those occurring in the 75-mm. An estimate of rounds fired is not available but the rounds for the 75-mm. must considerably exceed those fired in all other calibers, yet only seven prematures have occurred in the 75-mm. resulting in destruction of the guns and four occurring in front of the muzzle. Probably a considerably greater number of those outside the muzzle have occurred but have not been reported. In comparison with the seven 75-mm. guns destroyed there have been four 155-mm. howitzers, two 155-mm. guns, four 8-inch howitzers, and in addition thereto two 4.7-inch guns have been slightly damaged and three 240-mm. howitzers damaged beyond repair. Also, there have been three bursts in front of the muzzle, one in 155-mm. howitzers, and two in 155-mm. gun fire. In tabulating the prematures with the 75-mm., there have been omitted two occurring in the gun with smoke shell, damaging the guns, because these are quite definitely due to errors of personnel. There have also been omitted three smoke shell bursts occurring outside the gun, since two of these are very peculiar, occurring some distance down the range. The second striking thing about the tabulation is the extent to which amatol loading appears to be involved. Here again the percentage of amatol loaded shell, as compared with TNT loaded, actually fired is not known. Amatol loading is involved in all of the prematures in the 155-mm. howitzer (four howitzers destroyed and one burst outside the muzzle), and of the 8-inch howitzer (four howitzers destroyed). Another point for consideration is that extremely low order bursts sometimes occur which are not noticed by the gun crew until damage to the bore is observed at some later time. These have invariably involved TNT loading. Two have occurred at the Aberdeen Proving Ground with the 4.7-inch, Model 1920 gun, and three 240-mm. howitzers have been damaged beyond repair by some condition not yet determined, but there exist many points of similarity between the action of the 240-mm. and that of the 4.7-inch gun where an expanded shell body was actually recovered. The tabulation further shows rather frequent occurrence of prematures in pairs or in groups. For example, two prematures occurred in front of the muzzle with the 75-mm. gun at Fort Sill in the spring of 1923. Two low-order prematures with the 4.7-inch gun at

Aberdeen, one with dummy, the other with bore-safe type of fuze, in the fall of 1923. Two prematures with the 155-mm. howitzer in the fall of 1921 at the Aberdeen Proving Ground. Two prematures at Fort Bragg with the 155-mm. howitzer in the fall of 1924. Two prematures at Camp Lewis with the 155-mm. gun in the summer of 1920. Two prematures in the 155-mm. gun with Mark IV fuzes in the year 1924. (These were in front of the muzzle and with different lots of fuzes but with the same lot of shell loading, the latter being similar to that involved in the Camp Lewis prematures.) Four prematures at Fort Sill with the 8-inch howitzer in the season 1919-1920, all occurring in the same battery and with a total expenditure of about 80 rounds of ammunition. Two damaged 240-mm. howitzers at Fort Bragg in the fall of 1922.

The tabulation also covers bursts just outside the muzzle with 75-mm. shrapnel, occurring during the year 1924. Three of these are reported, some being previously reported. It is thought, however, that such prematures have occurred previously but have simply not been reported and that this should not be considered as evidence of deterioration of the shrapnel ammunition. Likewise, other prematures reported, although perhaps somewhat greater in the year 1924 than in the previous years, were probably due quite as much to a more complete report of prematures than to the fact that the prematures were more numerous.

The higher percentage of prematures in calibers larger than 75-mm. noted above, appears to be in accord with British experience during the war, and apparently brings under suspicion other components than the fuzes. It will be noted in particular that practically all prematures in calibers larger than the 75-mm. have suspicions directed toward other features than the fuze, except possibly the two 155-mm. guns at Camp Lewis, and here the distance traveled by the projectile, namely from 10 to 12 calibers, is rather too great for a typical fuze premature. In every other case, while the premature may be due to the fuze, there has been uncovered a more or less direct suspicion on the shell loading. For example, two 155-mm. howitzers at Aberdeen involved 80-20 amatol, 1126-12K. This loading was definitely found to be defective and the lot had been condemned prior to the firing but Aberdeen had not been notified. The four 8-inch howitzers at Fort Sill were destroyed with an average of less than 20 rounds per howitzer, all with the same lot of loading, three with different lots of fuzes, finally one with no fuze. It may be stated that the character of premature with the unfuzed round was decidedly different from the three which were fuzed, the unfuzed round giving a low-order premature and simply expanding the gun, whereas the others were high-order prematures. There is some evidence, however, that a high-order

premature can result from an explosion initiated in the shell charge, there probably being a reaction from the fuze.

This study of prematures, while far from conclusive, gives strong evidence that other features are probably more often responsible than the fuze, which is generally blamed. In this connection it may be stated that a British officer, after analysis of their experience, has expressed the opinion that the fuze is only responsible for one out of every ten.

An interesting feature in the record of prematures is that while the Mark III fuze is involved in each of the seven 75-mm. prematures which resulted in the destruction of the gun, none of these fuzes was of the partially bore-safe type. Similarly, the two 75-mm. guns which were damaged by smoke shell were of the non-interrupter type. It is quite certain that in the latter case where there is evidence that the spiral was removed through error on the part of the gun crew, the interrupter would have eliminated the premature. It is also quite possible that the interrupter would have eliminated other prematures, since the interrupter type of fuze should be much safer than the original type. Information more recently received regarding one of the more recent prematures, originally classed as one of the seven typical fuze prematures, gives considerable ground for believing that the safety spiral was removed by the gunners, thus further reducing the probability that this particular one was a typical fuze premature due to shock action on the detonator.

The premature occurring outside the muzzle with Mark III, Mark IV and Mark V types of fuzes are deserving of special study. These prematures have always been credited to the functioning of the plunger due to retardation of the projectile in the air as the result of a weak or missing retard spring. Examination of a large number of fuzes in connection with the investigation of particular occurrences have failed to discover a single fuze in which the spring was omitted or was greatly below standard strength. Calculation was then made on the strength required for the spring, as it was found that retardation of the 155-mm. projectile fired from the G.P.F. gun, where the Mark IV fuze was prescribed by the French, was actually less than with the Mark I 75-mm. shell. This raised some doubt as to whether the French data, requiring the stronger restraining spring of the Mark IV fuze which was claimed to be necessary for the G.P.F. gun and the high-power guns, was based on correct information. Firings were then inaugurated and thirty rounds were fired in the 75-mm. gun and five in the 155-mm. G.P.F., in which the retard spring was omitted. Not a single premature burst was obtained in these firings, quite definitely eliminating the retard spring from the responsibility but leaving practically

no explanation for the bursts occurring in front of the muzzle, except that they are actual prematures originating in the primer and delaying until after the projectile is outside the muzzle through a hangfire action of the primer or due to the delay pellet of the fuze where a delay action type is involved. It appears very surprising if primers could premature with the frequency of these muzzle bursts, but should this be found to be the case it might also explain prematures occurring with the Mark III fuzes, since that type of fuze used the same primer, but the primer in that case is located so close to the upper detonator that the hangfire action may be eliminated, resulting in prematures always occurring in the bore with the Mark III fuze, whereas they appear to be most common outside with the short type of fuze (Marks IV and V).

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EXTRACT FROM LECTURE DELIVERED BY MR. A. ADELMAN, ORDNANCE DEPARTMENT EXPERT ON AMMUNITION, ON JANUARY 31, 1927, ON THE SUBJECT: "PROGRESS IN THE STANDARDIZATION OF AMMUNITION."

At this point I should like to say a few words in defense of our fuzes, which seem to have been condemned on incomplete evidence. In 1920 I went to Fort Sill with Major Hunter, after two prematures had occurred in a few days with 8-inch howitzers, a third having occurred the previous season, the three with a total firing of about seventy rounds. Different types and lot numbers of fuzes had been used and circumstances pointed to the shell loading as being responsible. We started the investigation by firing without fuzes, a premature occurring in the tenth round. Two prematures occurred in rapid succession in 155-mm. howitzers at Aberdeen in War Reserve Tests, using shell which Picatinny Arsenal had previously examined and found to have defective loading, but notice of which had not yet reached Aberdeen. Two 155-mm. howitzer prematures occurred at Fort Bragg, subsequent examination showing defective shell loading. Two low-order prematures occurred in a 4.7-inch gun at Aberdeen, one with a dummy fuze, the other with a bore-safe fuze. Three 240-mm. howitzers have been damaged under circumstances which indicate low-order prematures. One was without fuze. Out of a total of twenty-two prematures listed since the World War, seven have been in the 75-mm. caliber, and fifteen in calibers above 75-mm., an entirely disproportionate number considering the rounds fired and the fact that a far higher percentage of fuze prematures should be expected in the 75-mm. than in the large caliber howitzers, on account of the higher acceleration.

Of the fifteen prematures in calibers above 75-mm., only two

have the characteristics of fuze prematures, and even these were at a point in the bore well past the maximum acceleration. Of the seven prematures in 75-mm. caliber, four had circumstances which indicated the possibility that the safety element of the fuze was removed in preparing it for firing. This is a somewhat defective feature of the particular fuze, but could be corrected without an entire change in type. The data available at this time indicate that our fuzes are not so unsafe as seemed to be the case when the type was condemned; moreover, we have since reduced the size of the detonators to ten grains or less in bore-safe fuzes, in order to reduce the size of safety chamber required. If that size is sufficient for bore-safe fuzes, it might be used in the non-bore-safe types, thus adding to the safety of these types apparently already safer than the shell loading.

* * * * * * *

It may be of practical value to the field artilleryman to learn that premature explosions of such a high order as to constitute a hazard to personnel not in the immediate vicinity of the gun, are not of very frequent occurrence. Of the seven 75-mm. guns "blown up" in our service since January, 1919, only five can be so classified, and even in the case of some of these, fragments were not thrown very extensively. The two remaining prematures caused only extreme bulging of the tubes, and were not accompanied by flying fragments. It is of definite value to learn that several of the most serious of the prematures were due to avoidable errors by members of the gun crews in removing the spiral from the Mark III fuze.

Beside following existing orders and the use of common sense, there is little that the artilleryman can do to prevent premature explosions. The Ordnance Department, of course, recognizes the fact that it is their function to give us ammunition that is safe and satisfactory within the limits of human ingenuity, science, and the limitations of appropriations by Congress. It is indeed comforting to realize that they are doing so well.

FIELD ARTILLERY: PAST, PRESENT, AND FUTURE

BY GENERAL HERR OF THE FRENCH ARMY

SIXTH INSTALLMENT

[This treatise by General Frederick Georges Herr, published in French by Berger-Levault, Paris, is believed to be an outstanding book on the subject of field artillery. In the belief that heretofore there has not been an opportunity to read this in English, it is hoped that its publication in serial form, beginning in the May-June, 1927, JOURNAL, will be the means of acquainting more of our officers with this excellent work. During the World War, General Herr was successively the commander of an artillery brigade, an infantry division, an army corps and of an army detachment. He then became Inspector General of the French Artillery.—EDITOR.]

PART TWO

THE FIELD ARTILLERY NECESSARY FOR WAR

CHAPTER I

MATÉRIEL.—THE SYSTEM OF ARTILLERY MATÉRIELS RESULTING FROM TACTICAL MISSIONS

THE war of 1914-1918 took the form of a long period of stabilized warfare between two periods of open warfare.

No one can say what the war of the future will be like.

However, contrary to the opinion which is often heard to-day, it is wise to admit that it will again comprise periods of stabilization and phases of open warfare. The very conditions under which the fighting will begin, the delays incident to a progressive military mobilization, will very probably make the campaign begin with a phase of stabilization. Later, during the active period, the necessity for one of the belligerents to compensate for a temporary inferiority by using fortifications, or else the desire of one of the belligerents to await national or allied reinforcements, will lead to the rebirth, several times perhaps, of position warfare. Moreover the assailant himself, in spite of his desire for a rapid offensive, will of necessity be forced to postpone his attack on an enemy established in a fortified position, until he has assembled all his means. Whether one wishes it or not, there will thus be a temporary stabilization during the delays incident to bringing up reserves and a mass of matériel.

It thus seems that war will inevitably take the form of uneven movement. The preparation for battle will force the two adversaries to a temporary stabilization of the front. Battle itself will be a succession of slow movements of small extent and long duration. Exploitation of success may perhaps involve a period of rapid displacements until contact is made with a new fortified position.

It is also wise to admit the new conditions will doubtless modify the physiognomy of stabilization and the characteristics of movement.

In any event, in default of some happy invention which will completely revolutionize armament,* it is correct to believe that the evolution

* This hypothesis should not be rejected *a priori*. However, as long as the invention does not exist there is no point of departure on which to base a revolution in matériel.

commenced during the last war will continue during peace. Since daily experience in war will no longer be available to serve as a guide and the spur of necessity will not force haste, this evolution in peace will doubtless be at a more moderate rate but it will very probably continue along the same lines.

The curve of progress sometimes has points of inflection but rarely makes abrupt changes and never stops.

The above considerations are, we believe, necessary to justify the method which we are going to follow, which will consist of supporting our deductions and proposals by the latest lessons of the World War instead of bolstering them up on seductive views of the future. Our exposition will doubtless thus lose in originality but we will remain in closer contact with reality and we will run less risk of misleading ourselves by theoretical conceptions with no solid foundation.

* * * * * * * *

Based on the experience of the last war, it seems that one can, *from the field artillery viewpoint*, paint the following picture of battle in its most general form.

The two opposing armies will march against each other, or only one of them will march against the other, which, less ardent or less confident, prefers to await the shock on a position chosen and prepared in advance.

From the beginning of movement, and even before if the assembly zones of the two armies are within the radius of action of aviation, march columns, cantonments and bivouacs will be subjected to enemy aerial observation and bombardment. Accordingly there will arise the necessity, which will thereafter be continuous, of chasing off enemy aviation with gun fire. Thus antiaircraft will be the first to enter action.*

Soon our march columns will enter the zone beaten by the enemy's long-range guns. In order to protect the march of our troops and to assure its continuity, we will have to counterbattery these guns, and in order to do this we will be obliged to use analogous matériels, that is to say, long-range guns.

As the distance between the two forces decreases, increasingly numerous enemy cannon will open fire on our advancing columns. Some of these cannon will be in the open behind earth embankments, others will be more or less strongly protected in casemates whose composition will vary from simply logs to reinforced concrete. A few may even be in turrets. All these cannon will be considerably echeloned in depth. We will have to *fight a duel with this artillery*, and we must be equipped to silence it, no matter what its range or its degree of protection.

The enemy will have fortified the positions which he occupies and will have protected them with obstacles. Our infantry will be able to take such positions only if the artillery has previously made them ripe for the assault by overthrowing the obstacles and creating passages in them, by annihilating flanking defenses, in a word by *destroying everything which can stop the infantry advance*.

When this artillery preparation is finished, the infantry will assault.

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* Antiaircraft defense includes the employment of other means than guns, such as our own aviation, and, against low-flying aircraft, machine guns. However, only the antiaircraft guns will be discussed here.

All enemy fire weapons which have escaped the preparation will converge their fire on the infantry. The artillery must *protect* the infantry from this danger and must *support* it continuously by neutralizing the action of these enemy fire weapons either by a rolling barrage which will cover the infantry with a protective curtain of fire and smoke, or by massive concentrations on those localities which may shelter the enemy.

In spite of all the above precautions, our infantry in its advance will run up against obstacles which have not been destroyed during the artillery preparation, and into machine guns which have not been neutralized by supporting artillery fires. The artillery which has done all this work is too far to the rear and its communications with the infantry are too precarious for the infantry to hope to obtain its support without delay. The only cannon which can properly act in this situation are those accompanying the infantry and directly controlled by it.

This *immediately accompanying artillery* will complete the clearing of the path for the assault troops.

The defense will attempt to oppose the assailant not only with the fire of all his weapons but also with counterattacks supported by tanks. These new adversaries must be met with special rapid fire cannons with great penetrating capacity, which will constitute the *anti-tank artillery*.

Throughout the engagement from its very beginning the enemy will attempt to engage his reserves. He will have to bring up and distribute supplies of all sorts, ammunition, rations and matériel. Preventing or even hindering all this rear area traffic is an efficient way to paralyze the adversary and lower his morale. A *long-range artillery* must be charged with this mission and must accomplish *interdiction* by incessantly bombarding important approaches, railway stations, points of obligatory passage, ammunition depots, distributing points, etc. It will attempt to hinder the adversary's command system by rendering headquarters untenable, by destroying large signal communication centers, and by bombarding observation posts.

Finally, when the enemy starts to retreat, this same artillery will pound all the routes over which he can get away, sowing disorder and panic in his columns. Meanwhile the more mobile cannon, accompanying the pursuing infantry, will echelon forward across country and on the roads in accordance with their maneuvering capacity.

This brief summary has allowed us to enumerate in passing the principal missions which fall to the artillery in battle. These missions can be classified as follows:

The immediate accompanying of the infantry,
Direct support and protection of the infantry,
Destruction of the enemy's organized forces,
Destruction of material obstacles,
Counterbattery,
Interdiction,
Defense against tanks,
Defense against airplanes.

This enumeration suffices to show how complex and diverse is the rôle of artillery on the battlefield.

Now as we saw in the beginning of this study, in 1914 the official opinion of the French Army was that the 75-mm. gun was adequate for

all battle missions, and from this axiom it was concluded that other matériels were unnecessary. We have shown that the first battles exposed this sophism and that it took the whole duration of the war to create a heavy artillery and to recover from the disastrous consequences of our initial error. To-day we know, to our cost, that battles cannot be fought with a single matériel. The complexity of missions entails a variety of matériels. For every mission there is a particular matériel which is more appropriate than any other for its fulfillment. These matériels should constitute such an uninterrupted series that when one cannon has inadequate power or range, another matériel will be available to take over the mission and solve the problem. To sum up, there is required a rational and complete system of matériels capable of best accomplishing with all necessary but not excessive power, all missions which arise in battle.

In order to establish a coherent system, each of the missions enumerated above must be analyzed to determine what should be the qualities of the matériel which is to be charged with fulfilling it.

A. IMMEDIATE ACCOMPANYING OF THE INFANTRY

The war taught us that the infantry in its advance inevitably runs up against unforeseen obstacles, the most usual and most dangerous of which is the machine gun, or rather the machine gun nest, which unexpectedly reveals itself and pitilessly mows down everything that tries to pass it.

As long as this obstacle remains every advance is blocked. The mass of the artillery is too far away and communications with it are too long and precarious for its assistance to be obtained without delay. Moreover a target so difficult to locate and of such reduced extent can only be attacked with direct observation.*

Accordingly there is required a special artillery to closely accompany the infantry so that all difficulties as to liaison will be eliminated and so that its commander can distinctly see the target to be fired on. In other words, this accompanying artillery will normally maneuver in the fire zone of enemy machine guns.

During the war there were attempts to solve the problem by having the infantry accompanied by horse-drawn artillery. Some guns were detached for this purpose from the divisional artillery (French solution) or true infantry batteries of light matériels were formed (German solution).†

The use of horse-drawn artillery for this purpose was, with but few exceptions, a failure. The horses are too visible and too vulnerable a target for the enemy machine guns. The certain general use of gas, against which it is nearly impossible to protect animals, will prevent them from going into a great many parts of the battlefield.

From the above conditions under which accompanying artillery must be used, it is deduced that it should be armor-proof against machine gun bullets, and should have mechanical traction. In order that it may go

* This restriction applies only to the one who conducts the fire and not to those who deliver it.

† The use of light matériels (37-mm. and Stokes mortars) was not satisfactory to us, the 37-mm. because of its flat trajectory, the Stokes because of its inaccuracy and the resulting great ammunition consumption, complicated by the difficulty of supply of this ammunition.

any place, it is necessary that the motor system be mounted on caterpillar tracks and not on wheels.

The armor should be light, little different in thickness from the present gun shield.

The total weight of the matériel, tractor and cannon should not exceed 4 metric tons, in order that it be capable of being carried on standard army trucks and thus have strategical mobility comparable with the troops which it must accompany.

Three solutions are possible: A self-propelled mount, a truck-carried wheeled mount, and a tractor-drawn wheeled mount. Each of these has its advantages and disadvantages. However, the first has a serious inconvenience which can cause its rejection *a priori*—the gun and the motor being inseparable, the motor remains exposed to the enemy's fire during the whole time the gun is in action, and the motor risks being put out of action. It is more difficult to mask than a tractor-drawn gun when on the march and even more so when in battery. It is more expensive, for the motor and cannon must both be built and the motor cannot be used separately.

As for the cannon itself, the caliber is dependent on the type of target at which it will normally be called on to fire. This target, as we have said, will be a machine gun, sheltered behind a light entrenchment, in a ditch, or behind a hedge or bush. For such a target, a very powerful cannon is not required. A caliber of 65-mm. seems adequate.*

The cannon should be capable of taking cover in average terrain and of attacking targets defiladed behind parapets or embankments. For these two reasons it should be capable of curved fire. Accordingly it should be a howitzer.

Since it must follow continually in the wake of the infantry and destroy obstacles which pop up at the last moment right in front of the infantry, it will not have to fire at ranges of over 2000 to 2500 metres. In order for it to have good accuracy at these ranges, a maximum range of 4000 metres suffices.

The matériel should be capable of very rapid fire, but this requirement can easily be met in such a small caliber weapon by constructing the matériel to be of the semi-automatic type. This obliges the use of cartridge cased ammunition. Since the matériel must be a howitzer susceptible by reason of its intended use, of varying its range and angle of fall, variable changes will be required. Accordingly, there is a special technical problem to solve.

It is believed that a solution would be to adequately supply each cannon with ammunition of various types suitable for varied conditions—this ammunition to be brought to the battery position by a light caterpillar tractor which could be the same one which had previously drawn the cannon, and which then would make the trip from the battery position to the nearest road to meet the trucks carrying large supplies of ammunition.†

* However, if the 75-mm. caliber is retained in the artillery of direct support, it would be well to adopt the same caliber for the accompanying gun. There would thus be accomplished a standardization of caliber which would cerainly be advantageous.

† Cartridge case ammunition is not obligatory. The Germans did not require it for their latest types of field guns. We have been hypnotized by our ideas on advanced guard action which have caused us to give the palm to a matériel which has the characteristic of maximum rate of unaimed fire.

B. DIRECT SUPPORT OF THE INFANTRY

The matériel for the direct support of the infantry constitutes the light artillery.

Light artillery should, first and foremost, be organized for fire against personnel. However, it must, under many circumstances, participate in the counterbattery of unprotected targets. Also, the destruction of accessory defenses is, in principal, a mission of the light artillery.

In order to properly accomplish these missions light artillery matériel should have the following characteristics:

(*a*) Sufficient mobility so that it can follow, over practically any terrain, the infantry which it must support, and remain in close supporting distance;

(*b*) Sufficient power to crush the usual obstacles which the infantry encounters in open warfare;

(*c*) A small enough caliber so that the weight of its ammunition will not handicap the supply of ammunition which must be ample and easy;

(*d*) As great rapidity of fire as possible so that, in critical crises, heavy fire can be delivered in a short time;

(*e*) The capacity for mass action in concentrations. This requires large vertical and horizontal fields of fire;

(*f*) The ability to reach any point, within its range, in its zone of action, no matter what the form of the terrain.

In the last war we used practically only one matériel for direct support of the infantry. This was the 75, and it would be unjust not to recognize the remarkable service it rendered us. Its mobility was sufficient; its rapidity of fire was never inadequate; it was easy to handle; its simplicity victoriously withstood the test of a long and hard campaign. In any case, let us render it the homage that it showed itself clearly superior to all analogous matériels, allied or enemy. This superiority permitted it to valiantly hold in check, in the early part of the war, the German artillery with its heavy matériels.

Nevertheless, in the light of the teachings of the war, it can be criticized for its lack of range and power, for its inadequate horizontal field of fire, and for its inconvenient sighting system. Its flat trajectory renders it unsuitable for occupying very defiladed positions and for reaching steep counter slopes. However, this latter defect is the unavoidable price of a characteristic which we consider indispensable, namely long range, for it is not possible for a light matériel to have long range and at the same time be capable of curved fire. Two distinct matériels are necessary, a gun for range and a howitzer for steep angle of fall. All the belligerent armies except the French have had a light howitzer for several years. We saw in Chapter I of Part I that the utility of a matériel of this kind was not overlooked by our High Command and we set forth the reasons which deferred its adoption. We often suffered sadly because we lacked a light howitzer, and the adoption during the war of a reduced charge for the 75-mm. gun, was an absolutely inadequate palliative.

To-day it is no longer possible to hesitate. There is unanimity of opinion that the future matériel for direct support includes both a gun and a howitzer.

1. LIGHT GUN

The 75-mm. gun, Model 1897 had a maximum range, with the Model 1900 shell, of 7500 meters, and with the elongated shell, Model 1917 or 1918, of about 11,000 meters. These ranges, especially the former, are to-day considered insufficient, and the world is in accord in requiring in the gun for direct support, a range of at least 12 km. and, if possible, 14 km. It would be easy to have this latter range if the caliber of the gun were increased for example to 80 or 85-mm. and this without increasing the weight of the matériel to over 1600 kg. in battery and 2300 kg. in travelling order (with gun crews on the chests). These weights, which exceed those of the present 75-mm. gun by from 400 to 500 kg., are at first glance a little impressive. However, they should not be considered as absolutely prohibitive for a light artillery matériel. Experience has shown that the normal gait off the roads of field artillery, even the light artillery for direct support, is the walk. Under these conditions, six horses can easily pull across country a carriage weighing 2300 kg. Likewise, the weight pulled by them on good roads may reach 2500 kg., which permits of mounting the cannoneers on the carriages when on the road. When going across country they can dismount and go on foot.*

The weight in battery of light artillery matériel is limited by the requirement that the matériel must be susceptible of manhandling in changing targets and in short movements of the piece. A weight of 1600 kg. is acceptable from these two viewpoints, although it is near enough to the maximum limit to be a little disturbing.

However, a matériel with a caliber of from 80 to 85 mm, would meet most of the six requirements which we enumerated above. There are two, however, which it meets poorly. These are those relative to ease of ammunition supply and rapidity of fire. The ammunition for such a matériel would weigh between 10 and 11 kg. or about twice what the 75-mm. shell Model 1900 weighs. With the same ammunition supply organization, the supply for an 85-mm. caliber would be less than half that for a 75-mm. caliber. Such a reduction is absolutely inadvisable. Furthermore, the manhandling of such heavy ammunition would considerably increase the fatigue of the cannoneers and would have an unfavorable repercussion on rapidity of fire.

For these two reasons, and in spite of its incontestably superior power, the 80 to 85-mm. caliber seems to us as being condemned for the light artillery for direct support and we believe that the 75-mm. caliber, which has been satisfactorily proven from these two standpoints, should be retained.

By increasing the length of the tube, strengthening the carriage and making it capable of high angle fire, and by modifying the powder charge, it is possible to make a 75-mm. gun which would have a maximum range of from 13 to 14 km.

These modifications would doubtless run the weight of the matériel up to around 1500 kg. in battery and 2100 kg. in travelling position, but, as we have noted, these weights are not excessive.

The ammunition to give 14 km. range would be heavier than the present shell, Model 1900. It would be necessary to lengthen the projectile, improve its form, increase its weight and the powder charge. However, the total weight would remain under 8 kg., which is not more

* See Chapter II hereafter for a study on this question of mobility.

than that of the present shrapnel which has successfully stood the test of experience.

It is. moreover, to be noted that this heavy elongated projectile with a super-charge would only be used for long-range fire (between 7 and 14 km.).

For fires at shorter range, which would constitute most of the fire, the new gun should have lighter ammunition, less cumbersome, with a smaller propelling charge less wearing on the tube. This ammunition could very well be the present standard shell of which we still have large stocks, the utilization of which would appreciably lessen the cost of adopting a new matériel.

To sum up, the characteristics of the gun for direct support should be as follows:

Caliber, 75-mm.;

Range about 14 km. with a heavy projectile and 7 km. with a light projectile;

Weight of the matériel: 1500 kg. in battery, 2100 kg. in march order (without cannoneers on the carriages);

Rapidity of fire: the same as that of the present 75, or 20 rounds per minute for a few minutes;

Carriage to have as large as possible vertical and horizontal fields of fire;*

Sighting apparatus with continuous graduations, of the panorama type.

2. LIGHT HOWITZER

Generally speaking, the howitzer should have mobility comparable to that of the gun which it must accompany. Accordingly its weight should be about the same as that of the gun. This would permit it to have a caliber of from 85 to 100 mm., with a shell weighing about 12 kg. If a little greater weight is acceptable (2500 to 2700 kg.), the caliber can be around 105 mm. with a shell weighing 16 kg.

The howitzer should be capable of firing on all those parts of the terrain which by reason of their defilade escape the flat trajectory of the gun. Consequently it should be capable not only of plunging fire, but even of vertical fire. This requirement involves an extended series of powder charges.

The maximum range of a howitzer of this type would be around 12 km. with a caliber of 100-mm., and its minimum range would be about 3 km.

These characteristics would permit the howitzer to accompany the infantry everywhere. It could fire over friendly troops with a margin of safety in front of them much less than the gun would require. This property makes the howitzer the true matériel for direct support.

Fixed ammunition cannot be used because of the requirement for a multiplicity of powder charges. Rapidity of fire will accordingly be reduced. However, it should not in any event be less than six to eight rounds per minute for several minutes.

It is well understood that this howitzer should be first and foremost a matériel for the direct support of infantry, constructed for fire on unprotected or slightly protected living targets. This primary mission should not be lost sight of in the details of construction of the howitzer.

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* In Chapter II, we will more fully discuss this question of field of fire, treating it in more detail and from the general viewpoint.

However, the weight of its projectile (12 to 16 kg., permitting of a bursting charge of 1500 to 2000 grams of explosive) also renders it capable of executing some destruction, especially in open warfare. In particular, it should be an excellent matériel for counterbattery.

C. DESTRUCTION OF THE ORGANIZED FORCES OF THE ENEMY

This mission does not in fact require a special matériel. All matériels should participate in this mission, the fulfilling of which is essentially a question of the makeup of projectiles. Accordingly we will revert to this subject when we talk about projectiles.

D. DESTRUCTION OF MATERIAL OBSTACLES

The destructive effects sought for in field artillery are divided into two quite distinct categories:

Surface effect by which one attempts, for example, to destroy unprotected matériel, to churn up trenches, to demolish shelters above ground, etc.

Effect in depth, for the purpose of reaching underground shelters, of breaking in vaulted cellars, of obliterating casemated batteries, of demolishing permanent fortifications, etc.

Surface effects require great sweeping power, and accordingly large capacity projectiles with a large bursting charge.

Effect in depth requires great penetrating power. Penetration is a function of striking energy at the point of impact,* therefore of the weight of the projectile, but especially of its remaining velocity; in addition, the angle of impact must be so great that the projectile will not ricochet (at least 20°).

From this brief consideration it is seen that destructive effects, of whatever nature, can best be obtained, in theory, with large caliber matériels firing heavy projectiles and having steep angles of fall. The matériels for destruction are therefore heavy large caliber matériels and preferably howitzers in order to obtain the desired angle of fall. However, in so far as penetration is concerned, since striking energy depends directly on the square of the velocity, projectiles with a great striking velocity and of relatively small weight can accomplish equal or even greater effect than those obtained with heavier projectiles having less striking velocity. A cannon with high muzzle velocity and accordingly with satisfactory striking velocity can, at the limit of its range where its angle of fall is large, play the rôle of a matériel with penetrating effect.†

1. MEDIUM HOWITZER

The war demonstrated that to obtain good destructive effects on the normal targets of open warfare, we cannot go below a caliber of 150 or 155 mm. We now have a good 155-mm. matériel. This caliber must be retained.

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* Penetration is approximately proportional to striking energy or $\frac{MV^2}{2}$ as was shown by the Otchakoff tests (1912), confirmed by more recent tests at Bourges and Ouiberou. A striking energy of 1,800 kilogram meters per square centimeter is required to penetrate 1.8 meters of concrete.

† Here again, therefore, as in the case of the light artillery, we have need for both a howitzer and a gun, the howitzer for short and medium ranges, the gun for long ranges.

However our 155-mm. howitzer, Model 1917, has insufficient range. It fires its sweeping effect shell with adequate accuracy only between 3400 and 9000 meters. Then, too, we have seen that there is unanimous opinion that the light artillery should have a maximum range of at least 12,000 meters and of 14,000 meters if possible. It would not be logical for the artillery for destruction to have an inferior range, for in such case, the light artillery could keep it from getting within useful range of its targets. Moreover, our matériel for destruction has as one of its most important missions, the churning up of the enemy's battle position. Our present regulations indicate that such a position can, in certain cases, be 8 km. from the outpost position, and can have a depth of from 1 to 2 km. We cannot count on our medium or heavy artillery being able to take position closer to the enemy than 4 km.

Therefore our artillery for destruction, if it is to reach the enemy's battle position throughout its depth, must have a range of 14,000 meters. This range implies a muzzle velocity of around 580 meters per second. This would give a remaining velocity at 14,000 meters of about 300 meters per second and an angle of fall of over 50°. Since our matériel for destruction should be capable of first attacking the enemy's outpost position without having to displace itself to subsequently attack the position further to the rear, this matériel should have a minimum range of 4000 meters with an angle of fall of at least 20° as we noted above. This would require a muzzle velocity of around 270 meters per second.

Thus the matériel should have a series of charges, probably five, giving muzzle velocities between 270 and 580 meters per second.

Such a matériel would be considerably heavier than our present 155-mm. howitzer, Model 1917. It would weigh about twice as much, or about 7000 kg., in firing position. If horse traction is to be retained for it, it would be necessary to separate it into two loads, one carriage load, and one tube load, each weighing from 4000 to 5000 kg. in traveling order. This arrangement would inevitably slow up occupation of position, since after arrival at the position the two elements of the cannon would have to be put together. Automotive traction, which would permit of having a single load, would give a more satisfactory solution from this viewpoint.

If it is desired to retain horse traction and the single load, at any price, a solution which has numerous partisans, and which is supported by tactical considerations of great value, it will be necessary to make concessions as to range. It is possible that our present matériel, with certain easily made improvements such as an improved ballistic shape for the projectile, a nitroglycerine powder, and some modifications in the carriage, can have its range increased by 1000 to 1500 meters so that it will reach 10,500 meters while retaining sufficient accuracy, and still not exceed 4000 kg. in weight. However, we showed above that this range is to-day inadequate.

Moreover, in any event, a single type matériel is not sufficient to accomplish all missions of destruction which arise on the battlefield.

To attack more resistant targets than those appropriate to the 155-mm. caliber, as for example very deep shelters, armored shelters, or powerful concrete works, very great penetrating power will be necessary, requiring either a large caliber howitzer firing a very heavy projectile, or a gun of smaller caliber but with very great remaining velocity.

Moreover, the two matériels would not have the same degree of unwieldiness, nor the same qualities as to range, accordingly both will be necessary.*

2. HEAVY HOWITZER

During the war we used two heavy howitzers, 220 and 280-mm. caliber.

The 220-mm. howitzer has shown itself inadequate for breaking up the powerful concrete works which we to-day believe will be an integral part of battlefield fortifications.

The 280-mm. howitzer would seem to have unnecessary power for such targets.

An intermediate caliber such as the 240-mm. firing a projectile of around 200 kg., seems necessary and sufficient.

Such a howitzer will necessarily be very heavy both in travelling order and in firing position, and will weigh about 12 tons if one is satisfied with a range of 12,000 meters, and undoubtedly 30 tons if a range of 16,000 meters is to be obtained.

With such weights, there can be no question of keeping a box trail carriage on a wheeled axle, provided with a trail-spade, and capable of traversing on the axle. Such a carriage system requires shifting the trail in changing targets, and this maneuver becomes impracticable even in good terrain when the weight to be moved exceeds 10 tons. A large lateral field of fire should be obtained on the supporting carriage which should be:

Either a platform carriage such as the recent 220-mm. Schneider gun matériel;

Or a wheeled split-trail carriage similar to that of the 155-mm. G.P.F.;

Or an automotive caterpillar mount.

Whatever system be adopted, the placing in battery must be comparatively rapid and not exceed from a half hour to an hour. The platform arrangement is from this viewpoint satisfactory for a 12-ton matériel. The split-trail type would doubtless require considerable excavation work when placing the piece in battery position. The automotive caterpillar mount is suitable only for a matériel with a range of over 12,000 meters involving a weight of from 20 to 30 tons.

3. LONG-RANGE GUN

The ranges of the above howitzers are insufficient for reaching very distant targets and for easily accomplishing concentrations of fire. A gun is necessary, where the projectile owes its penetrating power more to remaining velocity than to weight and which will have a suitable angle of fall at the ranges for which it is to be used.

The 155-mm. gun, G.P.F. which we have used since 1918 and which has given perfect satisfaction from both the tactical and ballistic standpoints, should be kept just about as it is. A few improvements which have been made in it since the war, give it a range of about 19 km. and have made an excellent matériel of it.

* Towards the end of the last war there was a manifest tendency towards intensive use of concrete on the battlefield. Technical progress indicates that in the near future a few hours will suffice for the installation of powerful concreted works. We must therefore be prepared to meet these even in open warfare, and be armed to attack them.

If a little greater weight in battery is acceptable, a range of 20 km. could be obtained from it. This gun will fire a shell weighing about 50 kg., and therefore having great destructive power.

4. HIGH-POWER HOWITZERS AND GUNS

In order to accomplish certain exceptional missions such as the destruction of particularly well-protected or very long-range targets, it will be necessary to depend on still more powerful matériels whose weight would exceed 30 tons and might reach 300 or 350 tons.

Vehicles of such weight cannot move over roads and placing them in battery requires special provisions. Such weapons belong to the category of the matériels called A.L.V.P. They constitute a separate family, with quite clearly distinct characteristics. We will devote a special section to them further on in the book.

E. COUNTERBATTERY

Counterbattery is against:

Either unprotected artillery or artillery protected by simple field fortifications;

Or armored or strongly casemated matériels.

Counterbattery attempts the simultaneous placing out of action of operating personnel and the destruction of the matériel and of the cover or armor which protect it.

This is not a new mission for the artillery but simply a particular case of the destruction of the enemy's organized forces and of obstacles which we have discussed above in C and D. The matériels for destruction already studied have all the characteristics desired to assure, under favorable conditions, the accomplishment of this special mission.

In those cases for which these matériels are inadequate, recourse will be had to the matériels which we will study in a following section on A.L.V.P. matériels.

F. "INTERDICTION"

The continuous increase in fire power has entailed corresponding modifications in combat methods. Battlefield formations have thinned out laterally and become echelonned in depth. As a result the density of front line combatants has continually diminished, and at the same time these combatants have more and more attempted to conceal themselves and to utilize the terrain to diminish their vulnerability. Therefore it is no longer in the first line that the field artillery can find its most interesting targets.

On the contrary, the further one penetrates into the enemy rear areas, the more important are the elements encountered, the more these are massed, and the greater is their vulnerability because they take fewer pains to shelter themselves. It is in rear that reserves in relatively compact formation are stationed and maneuvered; it is there that resupply of rations, matériel and ammunition takes place; it is there that the large headquarters work.

By reason of this, the necessity arose during the war, for those fires called interdiction, whose object was to attack all those particularly important and vulnerable distant targets, to catch reserves and troops at rest and prevent them from taking part in the battle, to hinder supply, to impede the functioning of headquarters, and to destroy the enemy's

supply depots and railheads. Front line elements which are abandoned to themselves, which are poorly supported by reserves which can move with difficulty while undergoing heavy losses, which receive neither rations nor ammunition, which are even cut off from orders, quickly lost all combat value. Thus, a powerful, well-conceived and methodically delivered interdiction fire is one of the preponderant factors in victory.

Our commands did not always give sufficient attention to this action on the rear areas of the battlefield. However, it must be recognized that it was often difficult for them to resist the pressing demands of front line troops for artillery support, and to conserve a large number of cannon for these distant tasks, whose utility is not understood by combatants in immediate contact with the enemy, and the benefits from which are not felt immediately. It must also be admitted that, in the early part of the war at least, we did not have the long-range cannon suitable for such missions, and that later on we almost never had enough to accomplish really massive interdiction, the only kind that is really efficacious.

We should not commit this error again. We must have cannon for interdiction.

The primary quality which a cannon for interdiction must have is, by the very nature of the mission, range. Since such a cannon is for the attack of unprotected or but slightly protected targets, it has less need for a very powerful projectile than for one which will give long range. Its caliber should accordingly be the smallest which will give the desired range. On the other hand, effective interdiction requires considerable fire density and the cannon should be capable of large expenditures and should have a rapid rate of fire. This condition eliminates the very large calibers. The targets for this cannon will be distributed in direction and range all over the battlefield. The cannon must be very apt at changing targets and accordingly have a large lateral field of fire and be easily handled.

1. MEDIUM RANGE GUN

The gun for direct support which we have described above could undoubtedly perform certain interdiction missions within its range. However, the depth of the modern battlefield greatly exceeds the range of this gun. It is indeed beyond this range that true interdiction missions will exist.

A horse-drawn 105-mm. gun which can follow the combatants anywhere and which is easy to abundantly supply because of the medium weight of its ammunition should solve part of the problem. A matériel of this caliber can now be constructed whose weight in travelling order would not exceed 4 tons, whose range with an 18-kg. projectile would be as much as 16 km., with a rate of fire of from 8 to 10 rounds per minute, and which would have a lateral field of fire of 30° covering 9000 meters at its extreme range.

2. LONG-RANGE GUN

We have already described a 155-mm. gun for missions of destruction, which would have a maximum range of 20 km. A study of the ballistics of this gun shows that with a less powerful and consequently lighter projectile (44 kg. instead of 50 kg.) of good ballistic shape,

provided for example with a false ogive, a range of 25 km. could be attained. The same gun provided with two projectiles could therefore accomplish destructions up to 20 km. and interdiction up to 25 km., as desired.

It should be noted that we now have a 194-mm. gun which was completed in 1919, whose weight on a caterpillar mount is light enough for it to travel on roads and which has a range of 20 km. It is an excellent weapon for long-range interdiction and we should retain it, improving it, if possible, so that it will have a range of around 30 km.

3. VERY LONG-RANGE GUN

The experience of the War showed that this range of from 25 to 30 km. is still inadequate in many cases, and that interdictions of strategical value in obtaining decisive results must be attempted at a still greater distance in the rear areas of the battlefield.

If, for example, we take the history of the defensive campaign from March to July, 1918, as it is set forth in Marshal Petain's report, we will note that the French strategic reserves were massed, during March, at 60 kilometers' distance from the front so as to be at a maximum of three days' march from the place where the enemy's attack was expected. These reserves were echeloned along the large lateral railroad lines so that they could be rapidly taken towards the menaced point. If the enemy had had a mass of interdiction guns capable of reaching the region where our reserves were assembled, and their railroads, that is to say with a range of from 70 to 75 km., all our arrangements for shuttle movements would have been impossible, and our situation would have been quite complicated.

Accordingly it is particularly important to have very long-range interdiction matériels. However, with the 194-mm. gun of 30-km. range, we reach the limit in weight which can be moved over roads. The matériels which we envisage can only be moved by railroad. We will return to this subject further on when discussing the A.L.V.F.

G. DEFENSE AGAINST TANKS

The tanks used during the war were practically invulnerable to light and medium artillery shell fragments. On the other hand, their armor was too light to protect against direct hits even of light artillery.

Although it is probable that the protective arrangements of these weapons will be improved in the future, it cannot be expected unless they are made unreasonably heavy, that they will be proof against penetration of a direct hit by any cannon. In other words, all modern artillery matériels will be capable of defense against tanks.

However, it is well understood that all the projectiles of these matériels will not be capable of penetrating the armor plates. To surely and least expensively obtain this result, there will be required special rapid and direct fire cannon with a high muzzle velocity (at least 700 meters per second) firing an armor-piercing shell with a delay fuze, of around 75-mm. caliber.

Such a matériel would naturally weigh a good deal, about 4 tons, for it should be armored itself, at least partially. It could have good mobility only if provided with mechanical traction.

The anti-tank gun will thus itself be a veritable tank. However, this weapon while it would fight in close liaison with the infantry, will

not as a rule operate as close to the front lines as the accompnaying gun and the infantry tank. Accordingly its protective armor can be considerably reduced and may even be almost completely eliminated in favor of a machine gun bullet-proof gunshield.

H. ANTIAIRCRAFT DEFENSE

Aviation is due for considerable development in the future. It will become a more and more dangerous enemy to ground troops by reason of its machine gun fire, and high explosive or gas bombs. Added to this is the intense morale effect resulting from the atmosphere of unease and insecurity occasioned by the omnipresence of these weapons which come from any direction to take troops in the flank and rear. Then there is the menace of its observation disclosing movement.

Antiaircraft defense falls primarily to our own pursuit aviation. However, this cannot completely and continuously control the air. Its action, while very efficient at certain moments, will be nothing an instant afterward, and it is absolutely necessary to compensate for its intermittent action. This is the rôle of the antiaircraft gun whose efficiency continually increased during the last war and whose utility needs no further demonstration.

Everyone is now in accord that armies in the field should be provided with antiaircraft weapons, and since it is believed that the number of airplanes to be combated will continually increase, so must the number of antiaircraft guns increase. Indeed there are many who believe that there will never be enough of these special cannon to fight all the airplanes which can simultaneously present themselves on important battlefields, and who wish that all field artillery cannon should be capable of participating in this mission.

This is a very legitimate wish and it is keenly desired that it might be satisfied. Unfortunately it cannot be. Antiaircraft fire requires that the weapons delivering it have many characteristics which make them complicated, heavy, cumbersome and long and difficult of construction. A numerous and specially trained personnel is required. Neither the amount of money which can be spent on war weapons, nor the possibilities of war-time construction, nor the number of personnel effectives which can be allocated the field artillery, would permit of such a solution.

Accordingly we must proceed along former lines and have an antiaircraft artillery of rather limited numbers, armed with a special matériel perfectly adapted to its mission. We will thus have an arm, not of quantity but of quality.

However, it is correct to require ordinary guns to have certain characteristics, notably, a large horizontal and vertical field of fire, which will render them capable of coöperating *to a certain extent* in the antiaircraft fight when antiaircraft weapons are lacking or in inadequate number. The mission of attacking observation balloons should normally pertain to the ordinary artillery and in particular to the artillery for long-range interdiction.

1. ATTACKING HIGH FLYING AIRPLANES

What should the antiaircraft gun be like? The war demonstrated that the solution we adopted in the beginning was the best. From many viewpoints, such as strategical and tactical mobility, flexibility, sighting system and firing methods, the 75-mm. motor-cannon gave complete satisfaction.

However, it was criticized for lack of effective range (a deficiency which was every day being accentuated as the airplane's ceiling mounted) and as having a too low muzzle velocity entailing a consequently too long time of flight. Fast airplanes now cover over 300 km. per hour. In 30 seconds, which is the time of flight of our present projectiles, they cover about 2500 meters. Accordingly in order to have a chance of hitting the airplane, the bursts must be grouped 2500 meters in front of its position at the time of firing. The inadequacy of such fire is apparent.

Furthermore, airplanes equipped with Rateau superchargers, or other similar equipment can easily fly at 8000 meters. Therefore the time of flight of projectiles must be decreased and gun range must be increased. These two conditions require an increase in muzzle velocity.*

Is it possible to obtain these results with the 75-mm. caliber? There is at the present time a high-power 75-mm. gun with a muzzle brake which gives an effective aerial range of 7000 meters with an acceptable time of flight. This matériel could be mounted on the platform carriage now in service, but it is doubtful if it could be made a motor-cannon.

There is also an 105-mm. gun which gives an aerial range of over 9000 meters and at an altitude of 8000 meters has a field of fire of about 5000 meters. From the viewpoint of range it is satisfactory but it has at these long ranges a time of flight of from 30 to 40 seconds, which, as we have just seen, is unsatisfactory.

The antiaircraft gun of the future should have higher muzzle velocity than the above model, a problem which does not seem impossible of solution.

This cannon, like our present standard cannon, should be a motor-gun for reasons which we have already set forth in the first part of this work (pages 239 and 240, May-June, 1927, FIELD ARTILLERY JOURNAL). The motor-gun has perfect tactical mobility over roads and dry terrain, and its strategical mobility leaves nothing to be desired. However, in a cut up or even wet terrain it cannot follow the troops. After the great modern battles which transform the soil into a vast field of shell holes, the motor-gun risks being immobilized. It will therefore be absolutely necessary to have some guns mounted on caterpillar track carriages.

2. ATTACKING LOW FLYING AIRPLANES

Against low flying airplanes the motor-gun which we have just described is powerless, because it has insufficient traversing speed about a vertical axis to follow the rapid angular displacement of such targets, and because the burst of its projectiles at a low altitude over friendly troops would be dangerous.

Two weapons are necessary for the accomplishment of this mission:

(*a*) A rather large caliber, high muzzle velocity machine gun, with an armor piercing bullet for attacking armored airplanes. It is only noted here in passing, as it is in no sense an artillery matériel.

(*b*) An automatic cannon of small caliber (about 37-mm.) whose action would extend beyond that of the machine gun both in range and in altitude. It should have high muzzle velocity and a very flat trajectory so as to reduce sighting corrections to a minimum, and

* At an altitude of 8000 meters airplanes become practically invisible and therefore the artillery cannot attack them. An effective aerial range of 8000 meters is thus sufficient for antiaircraft cannon.

should also be capable of very rapid fire so that intensive fire may be delivered during the very short time the target is vulnerable. It must be very easily handled in order that the target may be followed.

Along these lines, a multi-tube cannon may be practicable. This type of construction would give a rapidity of fire (100 to 120 rounds per minute) which could not possibly be attained with a single tube. The projectile for this cannon should be a high explosive shell. The fuze should be so supersensitive that contact merely with airplane cloth would cause it to function and it should have a simple safety device which would make it inert after a certain range so that it would not function on ground impact. The development of such a fuze is now almost completed.

Remark.—Although existing artillery cannon are not suitable for antiaircraft fire, antiaircraft cannon, on the other hand, perfectly serve to attack all ground targets. It should be noted that these weapons, thanks to their high muzzle velocity, possess considerable penetrating power. With an armor piercing shell they would have formidable effect on tanks, and their all-round field of fire would make them particularly suitable for the attack of these weapons. They are thus excellent antitank weapons.

I. RAILWAY ARTILLERY (A.L.V.F.)

As we have seen, the experience of the War led us to demand for the artillery, always more power for destruction, always more range for interdiction.

However, great power and range can only be obtained with weapons of considerable tonnage, greatly exceeding the weight which can normally be supported by road surfacing materials and by highway bridges or by bridges that can be constructed by the engineers in a limited time.

It is difficult to fix the exact tonnage figure beyond which use on roads is impossible. Moreover this value varies with the method of road construction and with the strength of the bridges to be crossed. During the war it was laid down, as a principle, that bridges could be rapidly constructed to carry indivisible loads of up to 12 tons weight and that such loads could move, under good conditions, over roads or across country, in open warfare. Progress in design would doubtless permit of extending this limiting figure to from 15 to 18 tons. However, we have seen that to-day we require artillery matériels of much greater weight than this.

The use of roads to move these matériels cannot be thought of; movement by railroad is necessary.

Railway artillery was non-existent in 1914. It had to be created from the ground up during the War. The solution which naturally presented itself to the mind, was to utilize the most powerful matériels we then possessed, naval guns and coast defense guns, by mounting them on carriages appropriately constructed for movement by railroad.

There was not only the question of making these matériels mobile, but it was also necessary to assure them good firing conditions, to make them easy of installation in firing position, to give them rapid and accurate means of laying, and to give them the ability to absorb the recoil.

Several solutions were simultaneously adopted. Thus we had:

Matériels which used the railroad not only as a means of transportation, but also for firing such as the 19-cm., 240-mm., and 274-mm. carriages, or railroad trucks, and the 27-cm., 30-cm., 32-cm., and 340-mm. carriages in which recoil was taken up by sliding on the rails;

Other matériels requiring a firing platform integral with the track, such as the 305 and 340-mm. cradle carriages, and the 370 and 400-mm. howitzers;

Still other matériels which normally moved by railroad but used in firing either platforms independent of the track, such as the 240-mm. gun, and 293-mm. howitzer, or road carriages such as the 19-cm. gun and the 24-cm. gun.

Of the matériels of the first category, some could fire from any place on the track without special preparation and had an all-round field of fire (19-cm. and 240-mm. railroad truck carriages)—for this reason these were called *all-round fire* matériels. Others required the construction of curved spur tracks for the purpose of obtaining traverse. These were the *matériels with sliding recoil* whose field of fire did not exceed a few degrees.

By these improvisations we accumulated a comparatively numerous railroad artillery but one absolutely lacking in homogeneity, a regular museum of the most dissimilar types. Many of these matériels were of questionable value and the complications involved in their construction were not paid for by either their power or range.

It is unquestionable that battle targets which, because of their degree of resistance or because of their long range, would be appropriate for railroad matériels, will always be of limited number though of capital importance.

Accordingly to attack them it will not be necessary to have a very numerous artillery but rather a few matériels of exceptional tactical value. Moreover the small number of railroads which will be available under all circumstances, and the unavoidable slowness of constructing new tracks, will always limit the employment of these matériels. The railroad artillery by its very essence must be an artillery of quality, not quantity.*

Accordingly that type of railroad artillery which has given the best results should be chosen and adopted to the exclusion of all others. This general type should be improved along lines indicated by experience.

Now, in order to have satisfactory tactical mobility, railroad artillery should be capable of rapidly taking position at any point on the track. Furthermore, in order to obtain full benefit from its long range, it should be capable of entering into concentrations of fire, and to this end, it should be capable of changing targets almost instantly.

Only all-round fire matériels fulfill these two conditions. Therefore the A.L.V.F. of the future should be comprised of matériels of this type only.

There are several types of design for such a matériel.

* This conception is quite different from that prevailing in France during the War, which led to increasing the number of the matériels to the detriment of their tactical quality. It is about the same conception as that on which the Germans worked.

First, the truck carriage type analogous to that used in our 19-cm. and 240-mm. matériels is satisfactory for medium power matériels. This type, however, is not suitable for extremely high power matériels, due to the unsuitability of the track for absorption of the recoil reactions in transverse fire. For these, recourse can be had to the circular metallic platform system, used by the Germans in some extremely well designed models. These platforms have, however, the serious defect of requiring a long time to emplace. This, while admissible in stabilized warfare, would not permit the tactical mobility necessary in open warfare.

A simple solution springs to one's mind immediately. This is to establish an element of track crosswise to the main track. The front trucks of the mount can be placed over on this lateral piece track, using a device similar to that used by railroad companies, while the rear trucks of the mount remain on the main track. Such an arrangement could be quickly installed and would give the matériel all-round fire and good capacity to absorb recoil.

The rustic and slightly barbarous solution of rigid carriages without recoil mechanisms which are pointed by means of, and recoil on, curved spur tracks was forced on us in 1915, by the necessity of doing something quickly. Of course it should be abandoned. All of our carriages should be of the recoil type with hydraulic recuperators.

It should never be forgotten that the A.L.V.F. has an element of weakness inherent in its method of transportation. The number of railroads available for use on a battlefield will always be very limited. Moreover, the enemy can easily avoid the action of the A.L.V.F. by withdrawing a few kilometers after having made the necessary demolitions in the zone to be abandoned. Thus it will usually be necessary either to completely construct the railways lacking, or to repair roads destroyed by the enemy. If the A.L.V.F. is to be available in time to be of use, this work must be rapidly accomplished, which means that a great deal of embankment or bridge and culvert construction cannot be done. A railway constructed under these later conditions will usually have a rough bed with steep grades and curves of short radius, which matériels can pass over only if drawn by very powerful engines.

To avoid this inconvenience, there has been proposed a convertible type of matériel, capable of moving either over the railroad or on roads.

The Skoda Pilsen works have built three matériels along these lines (38 and 42-cm. howitzers, 24-cm. gun). These matériels split up into four parts: a tube load, a carriage load and two platform loads. Each of these vehicles was a weight of from 30 to 36 tons equally divided on four axles. A 7-ton tractor can tow two of these vehicles on roads as well as on railroads. All the vehicles have double wheels, the inside one flanged for the normal railroad, the outside one rubber tired for road travel. For railroad travel the rubber tired wheels, which are removable, are taken off.

The use of caterpillar tracks offers another solution of the problem; one can imagine matériels in which one could substitute, when needed, axles furnished with caterpillar tracks for the bogies used for rail travel.

The necessity for these double purpose matériels is rather questionable. The great weight of carriages of such type would allow of only very short movements by road and when the railroad is left their ammunition supply would be complicated. At this time such matériels should

merely be studied, and until ideas are more clarified, it does not seem in keeping to attach very great importance to them.

Along with its deficiencies, the A.L.V.F. has elements of power peculiar to it alone, which make it especially interesting. In spite of the weight of its projectiles, ammunition supply is extremely easy, because the ammunition can be brought up from depots in the zone of the interior directly to the firing position without transhipment. Above all, the railroad confers on this artillery an exceptional strategical mobility, which makes it an arm par excellence for large scale maneuvers. Apropos of this, it will be recalled that in 1917, three battalions of A.L.V.F. were moved from the Champagne to the Trentino in three days and opened fire the fourth day.

We have discussed above the necessity of having special weapons for:

(*a*) Destruction of very powerful fortifications;

(*b*) Very long-range interdiction.

The two categories of matériels, high angle fire mortars or howitzers, and flat trajectory guns, which are required for the multiplicity of battle missions, are found in the A.L.V.F. as in all other types of artillery.

1. POWERFUL MORTARS

The targets to be attacked by such mortars are very strong concrete works or the armor of permanent fortifications.

For such targets it is prudent to admit that a mortar should have a caliber of at least 400 mm. and fire relatively heavy armor piercing shell (about 1 ton).

We now have an A.L.V.F. mortar of this caliber. Unfortunately the range of this matériel does not exceed 15 km. and such a zone of action is obviously inadequate for reasons we have discussed above. However, it would seem that it is possible to improve this matériel so that it could fire to 20 km.

It would seem that such a matériel should be amply capable of destroying the most powerful concrete works which can now be constructed. However, in cases of advances in permanent fortification, there should be no difficulty in building a still more powerful mortar, for example a 450-mm. mortar firing a 1300-kg. shell to a range of 25 km. with a tube weighing 80 tons. There could be built even a 500-mm. mortar firing an 1800-kg. shell to a range of 25 km., with a tube weighing 100 tons. However, the building of such mastodons can be postponed without danger.

2. VERY LONG-RANGE GUNS

Our present gun for interdiction can fire to a range of around 60 km. A study of the ballistics of the question shows that it is possible to build the following guns:

(*a*) A 240-mm. matériel weighing about 100 tons and firing a shell of around 130 kg. weight to a range of 40 km. Such a matériel would still have insufficient range for the missions desired to be accomplished by it.

(*b*) A 270-mm. matériel weighing about 150 tons and firing a 200-kg. shell to a range of over 60 km. It is to this latter caliber that we must give attention.

We note in passing that the navies of great powers (England, United States, Japan) are actually studying matériels of a caliber around 450 mm., from which they count on ranges of the same order or a little greater. If our navy should adopt a cannon of this type, it would obviously be advantageous to have the ballistic study made in intimate collaboration by the War and Navy Departments and the same matériel constructed for both Departments.

3. EXTREME RANGE GUNS

The Germans showed us, by the bombardment of Paris by the Berthas, what could be expected of fires executed beyond the zone of the armies, properly speaking, on the vital organizations of the Zone of the Interior. The lesson should not be forgotten.

It may, perhaps be objected that civilized nations, at the head of which we have the legitimate ambition to always remain, have forbidden, by the Hague Agreement, the bombardment of unfortified cities.

However, it is not a question of our attacking inoffensive populations with cannon fire. To-day war is no longer localized in the limited region occupied by the fighting armies. These armies can live and fight only under the condition of receiving from the rear an uninterrupted influx of enormous tonnages of food, matériels, and ammunition, which must be manufactured, assembled, loaded and transported to the front. All the places where these various operations take place, such as the centers of industrial or agricultural production, ration, ammunition and matériel depots, ports of arrival, railroad yards, etc., can and should be considered as an integral part of the armies, because their destruction is one of the most powerful means at one's disposal for completely paralyzing the enemy's military life. Accordingly this destruction is to the highest degree, properly called a military operation.

Furthermore, if the idea of these bombardments is repugnant for aggressive purposes, there can be no possible objection from the purely defensive point of view. With a land and sea frontier equipped during peace with a sufficient number of extreme range guns, it would be possible for us to have powerful action on the enemy's assembly zones, ports, railroads, and detraining points, and to hinder considerably his strategic deployment, or at least slow it up sufficiently to partially establish the equilibrium between his bellicose initiative and our deliberately defensive attitude.

The extreme range gun is therefore not only an offensive weapon of great value, but also a first-class defensive weapon, and an insurance against unexpected attack.

It may perhaps be said that action at great distance within the enemy is properly speaking the normal mission of bombing aviation. We are the first to admit this. However, as we have already had occasion to remark, the action of aviation is essentially intermittent, and only the gun can assure continuity in the bombardment, which is the primordial condition of its efficiency. Moreover, the use of the extreme range artillery would automatically release numerous squadrons for the execution of still more distant missions. Their continually increasing radius of action daily becomes more advantageous in this respect.

From a study of our land and sea frontiers and the various diplomatic eventualities which may arise, there can be very exactly determined the land or sea regions of enemy territories which it would be important for us to hold, as a warranty deed, under the constant menace

of our guns. It will quickly be appreciated that in order to play the intended rôle, these guns should have a range of around 200 km. The density of our railroads is almost everywhere sufficient to insure these matériels excellent possibilities of maneuver, and the indispensable opportunities for surprise action and for efficient concentrations of fire.

This range of 200 km. is nothing to make us hesitate. Studies made in all large armies show that the difficulties of manufacture can be overcome. Without it being necessary to enter into detailed technical considerations, it can be stated that retubing of our most powerful existing A.L.V.F. matériels to a rather reduced caliber, to around 20 cm., for example, should give a fairly good solution of the problem at small expense.

France therefore should do, as every nation which may sometime be an enemy is doing, and immediately adopt extreme range guns.

PLANS OF THE ARMY CENTRAL POLO COMMITTEE

WITH spring approaching, plans are being made by the Army Central Polo Committee for an aggressive season. Not only will the army again enter the Open Championship, having benefited from last year's experience therein, but it will also defend the Junior Championship, won last year for the fifth time in the past six years, and play an active season in preparation for the International Military Tournament, which may be held in the United States in 1929. The Chief of Staff of the Army, Major General Charles P. Summerall, has approved initial plans for the season, and is enthusiastic in his hopes for a successful year. To start the season, a team of seven officers and mounts will assemble at Mitchel Field, Long Island, by May 15th.

By virtue of increased handicaps, three of the members of last year's army squad have become ineligible for play in the coming Junior Championship Tournament. This necessitates organizing an almost new Junior team. Accordingly, after careful consideration, the Army Central Polo Committee has selected a list of twelve players as possibilities. Letters have been sent to the commanding officers concerned to ascertain if these officers can be made available. The distance from which it is necessary to bring a player and horse is, of course, a factor when funds are limited. Questionnaires have been sent to each of the twelve officers and final selection of those who are to try out for the team will be made shortly. In the selection of these players, the committee has continued its policy of the past to bring east each year as many young players as practicable. In this way only will it be possible to improve the play of the army as a whole and establish a reserve of players for future years.

This year again the question of mounts is of paramount importance. The further the army goes in high-class polo, the more necessary becomes a permanent string of top-notch mounts. This was never more evident than in the Open Championship play last summer. During the past few years a nucleus of ten or twelve horses for such a string has been maintained at Front Royal, Va. However, this year, in anticipation of a creditable showing in the Open Championship and in preparation for a probable invasion by the British Army team in 1929, more than a mere nucleus becomes imperative. With a view to mounting the team satisfactorily, the committee sought the aid of the Quartermaster General, who immediately coöperated by placing at the team's disposal a number of

high-grade prospects at the Remount Depot, Fort Reno, Okla. These remounts are being trained by Major E. G. Cullum, Q.M.C., and Captain C. A. Wilkinson, a member of last year's army team, and substitute forward for the American International Big Four. While it is realized the output of made mounts suitable for Open Championship play may not be considerable this year, it is thought that in future years this depot can be counted on providing approximately twenty top mounts for the team. To further round out the string, the Remount Service turned over to Captain Peter Rodes, last year's team captain, five young horses. These mounts are being trained at Fort Bragg, N. C., but how many of them prove to be of high caliber is yet problematical. In addition to the above sources, the committee has hopes of securing for the string outstanding horses from various garrisons and regiments where the game is played. As partial recompense for each horse thus obtained, organizations furnishing horses for the army team will be shipped four remounts in return. It, therefore, can be seen that the success of future army teams depends to no small extent upon organization commanders, the enthusiastic support of whom, so willingly given heretofore, is earnestly sought.

Only polo mounts owned by the respective governments or by officers are eligible to play in the British-American Military Tournament. And only the very best of these are fit for this tournament and National Championship polo. Such mounts require several years' continued training and care in the regiments and garrisons to arrive at the stage when they are suitable for army team polo. In the meantime, the regiment has had the benefit of the play of the mount in regimental and intra-circuit tournaments.

In the continued riding and training of mounts and in their care and conditioning lies the experience and training of mounted officers. This is one of the prime justifications for the maintenance of polo in the army. Polo demands great efforts from horses. They should, therefore, receive the most assiduous care and attention from the officers who train and use them. By this personal care and attention to the details of feeding, grooming, exercise, bitting and stabling, officers learn to be horsemasters as well as horsemen. That constitutes the real training benefit of polo to the army. The committee, therefore, feels that a most equitable arrangement has been made in the allotting to organizations of four top-class prospective polo mounts for each finished mount suitable for the army team furnished by a regiment or service school. This policy was inaugurated last season.

The army team has no reservoir of mounts to draw upon and only through the coöperation of polo-playing organizations in this manner can the army team be mounted or adequate preparations for

next year's Military International series be made. Accordingly, it is hoped that the request for assistance in the matter of supplying the best trained mounts for the army team will be met in the above spirit.

The committee expects to take a step forward this coming season in providing the army team with a manager, charged with administrative control of personnel, with supply, with the training of horses, with stable management and with necessary disbursing of funds. Heretofore these details have been left to the team captain and have taken much of his time. It is thought that the team captain should be freed from these executive duties by an officer devoting his entire time and attention to them. As a result, a better conditioned string should be made available for play and the army stables at Mitchel Field should benefit greatly. It is also believed that the team manager should be a player of sufficient skill to fill in when needed in practice games.

During the past year the United States Polo Association has spent $20,000 on the "Army Polo Center" at Mitchel Field. A new field has been built, as well as new saddle rooms, feed rooms, quarters, mess hall and kitchen. Since it is proposed to quarter visiting foreign teams at the Army Polo Center, this installation will always be a center of attraction in eastern polo circles and one of which the army can well be proud.

Indications point to an interesting season for regimental and garrison teams throughout the service. The army is well equipped to make a presentable showing wherever intra-circuit and twelve-goal polo is played, inasmuch as regimental polo in the army fits in with this general class of play more than in any other. In every geographic division into which the country is divided army teams can reasonably be expected to provide strong competition. The winter play of the Fort Bliss team in the tournament at Midwick and the fast polo of the San Antonio Winter Tournaments have given army teams further experience and have demonstrated the constantly increasing caliber of army polo. This year, as in the past, it is hoped that the army will be represented in the Inter-circuit, Twelve-goal and other championships on Long Island.

Major Adna R. Chaffee, General Staff, has been designated by the Secretary of War as chairman of the Army Central Polo Committee, to succeed Lieutenant Colonel Nelson E. Margetts, recently transferred to Chicago, Ill. Other members are: Lieutenant Colonel E. H. DeArmond, F.A.; Major Charles L. Scott, Q.M.C.; Major Cortland Parker, G.S.; Major R. E. DeR. Hoyle, G.S.; Major Robert E. O'Brien, Inf.; Major Willis D. Crittenberger, Cav., Secretary-Treasurer.

REGIMENTAL NOTES

ELEVENTH FIELD ARTILLERY SCHOFIELD BARRACKS, T. H.

Colonel Manus McCloskey, *Commanding*

Roster of Officers

Lieutenant-Colonel Augustine McIntyre
Major John E. Lewis
Major Chester B. McCormick

CAPTAINS

Albion Smith
Sidney F. Dunn
Steele Wotkyns
Wesley C. Brigham
Howard F. Long
Norbert C. Manley
Waldo E. Ard
John A. Chase
George H. Cushman
Peyton Winlock
Martin C. Walton, Jr.

FIRST LIEUTENANTS

Edwin S. Brewster, Jr.
Roy L. Dalferes
William L. Kay, Jr.
Clyde M. Hallam
Marion M. Pharr
Ernest A. Elwood
Charles A. Pyle
Leslie B. Dowing
Henry L. Ingham
Fay W. Lee
Clifford C. Duell
Walter J. Klepinger
Thomas E. Meyer
Frederick W. Watrous
Robert F. Hallock

SECOND LIEUTENANTS

Rex E. Chandler
Sheffield Edwards
Paul R. Covey
George W. Hartnell
Leonard J. Greeley
Raymond H. Coombs
Wellington A. Samouce
Francis M. Day
Charles L. Dasher, Jr.
Louis C. Freidersdorff
Robert C. Cameron
James B. Kraft
Howard J. John
Harold M. Manderbach
George L. Holsinger
George J. Deutermann
John F. Bird
Robert P. Clay
Lewis S. Griffing
Lindsey R. Wingfield

December 31, 1927, finds the regiment larger in strength and greater in achievement than any year since the World War. It has gained steadily in officers and men and as a result has been able to carry on more activities with greater success. It has become quite the thing to do for an officer to ask for an extension of his tour of foreign service and for many of the men to reënlist. Comments on the condition of service on the "Rock," as the Island of Oahu is locally described, have lost much of their luridness, and comparative peace reigns.

Professional activities have been many and the major portion of the year's work has been both interesting and instructive. The training year is, like all Gaul, divided into three parts; first the training of the individual, second the period of battery training, and third the period of maneuver training.

In the period of individual training the regiment qualified 454 gunners. The fact that there was little or no difficulty during the maneuvers with the automotive matériel speaks for itself from the

standpoint of both maintenance and operation. Over seventy-five miles of wire was laid by the regiment in the southern area maneuvers. This functioned night and day with little or no difficulty, definitely showing that this phase of instruction had not been wasted.

During the period of battery training the Regimental Commander made it a matter of policy that all possible instruction be carried on in the assumed battle positions of the regiment. This made for a much better understanding of terrain and the missions of the regiment.

The regiment operated in the southern and northern areas, the regiment, less 3rd Battalion, being in the southern area and the 3rd Battalion in the northern area. The battle positions in the southern area were situated in very difficult country. Roads are narrow and bad, highly crowned and of loose dirt. Grades are very steep and in general the country is broken and lightly wooded with mesquite and, in some portions, considerable cactus. An enormous outlay of wire is necessary for the maintenance of the communications net and, due to the difficulty of the country, much of it has to be laid by hand. The wire net was very successfully amplified by the use of radio, which was especially valuable in keeping in touch with first line infantry and with the light artillery regiments. Using improvised material, a very efficient camouflage was maintained. In the northern area the difficulties imposed by terrain and roads are not as marked. It was extremely gratifying that the Department, Division and Area Commanders were able to congratulate the regiment on its many activities and professionally excellent performances in both areas.

Following the area maneuvers the regiment moved to its annual summer rest camp. The area selected proved ideal for the purpose, being a series of beach lots on the north shore of the island, each lot being inclosed on three sides by trees of considerable height with the fourth side fronting on the ocean. Ocean bathing was excellent and the element of rest was very strongly stressed. A large proportion of the regiment qualified in swimming and so much interest was shown in this form of athletics that a very successful swimming meet and water gymkana was held just prior to the closing of the summer camp period.

During the months of September to December, inclusive, service practice was held and in connection therewith several very interesting tests of both shell and shrapnel fired on the water were made.

The regiment has participated with varying success in all forms of athletics during the past year. The basketball championship was won and very good showings were made in all other sports. Polo

was very successful considering the number of horses available and with the addition of several re-mounts recently received, a better year is in prospect.

TWELFTH FIELD ARTILLERY — FORT SAM HOUSTON, TEXAS

Colonel P. S. Golderman, *Commanding*

Roster of Officers

Lieutenant-Colonel J. A. Moss
Major Abbott Boone
Major J. A. Hoag

CAPTAINS

W. L. Bevan
P. G. Black
A. C. Stanford
J. J. Bethurum
R. V. K. Harris
J. B. Golden
R. C. Snyder
S. H. Needham
D. B. Rogers
C. A. Beaucond

FIRST LIEUTENANTS

F. J. Achatz
B. M. Fitch
C. B. Leinbach
H. L. Kersh
K. H. Sanford
F. H. Morse
W. H. Bartlett
R. O. Smith
J. G. Howard
P. A. Berkey
Hugh P. Adams
W. H. DeLange

SECOND LIEUTENANTS

N. C. Cureton
C. P. Cabell
J. L. Lewis
R. T. Finn
D. Dunford
A. R. Sewall
B. P. Heiser
T. Calhoun
J. P. Woodbridge
W. E. Dean
T. E. deShazo
M. H. Lucas
G. M. Lindsay
R. I. Pride
R. C. White

CHAPLIN

Captain W. R. Bradley

MEDICAL DEPARTMENT

Major B. P. Norvell
Captain R. H. Lewis

Fort Sam Houston is the military center of the southwest. As a part of the Second Division, we of the Twelfth Field Artillery come in daily contact with all branches of the service. Both technically and socially we are in constant touch with our brothers of the Infantry. We see the Tanks, the Medical Regiment, the Division Trains, the Division Air Corps, as realities before our eyes. The G's have a definite and logical meaning, and, although at times annoying, are tangible personalities rather than mythological companions of General A. Twice during the last year we have had an opportunity to observe the Cavalry from the border. We have maneuvered alongside the mule guns from Laredo. The Air Corps Training Center is at our front door. Nowhere in the service are there such opportunities to gather professional knowledge and experience, and nowhere in the service is the garrison and town life more attractive.

In reviewing the record of events of the past year, the amazing number and variety of duties which this regiment has performed

immediately strikes one. Not a month has past but one or more units of the regiment have participated in some interesting phase of artillery work.

On January 21st Headquarters Battery and Combat Train, 1st Battalion and Battery "D" marched to Camp Stanley, where they fired for the Air Corps during the remainder of January and the month of February. Quartered and stabled at Schasse Ranch, the animals suffered from exposure to the almost continuous rain and cold.

While these units were at Stanley, the rest of the regiment painted and polished for the annual Corps Area Garrison Inspection which came in the latter part of January. During February the firing batteries held sub-caliber practice on the banks of the Salado. This, with frequent tactical exercises, filled the time until March 1st when the Twelfth marched to Stanley in the teeth of a freezing norther.

The period from March 2nd to March 22nd was devoted to technical firing. From March 14th to March 27th, the officers of the 344th Field Artillery trained with us. March 28th to March 30th, the brigade held its annual tactical inspection of the regiment.

The inspection started with an advance guard problem in which a fleet and inconsiderate enemy suddenly appeared five thousand yards to the right rear of the advance guard battery. The action then passed rapidly to the deliberate preparation of a regimental sector by topographical methods and the night occupation of positions. Next day, when the battle seemed fairly won, our shifty foes unexpectedly attacked our left flank, causing a 1600 mil change of front and a rapid withdrawal. Defeated and wholly bewildered the Twelfth returned to camp and on the 31st marched back to Fort Sam Houston.

From April 11th to April 28th we maneuvered with the Fourth Brigade. These maneuvers consisted of a series of tactical exercises conducted by Brigadier-General Harold B. Fiske and included the passage of infantry through artillery in position, the attack, the defense, and the night occupation of positions preparatory to an attack at dawn. To say that the work of the Twelfth Field Artillery was completely satisfactory to the infantry and to General Fiske is as high praise as can be bestowed upon an artillery regiment.

During the month of April the 1st Battalion took part in the Fiesta parade. The regimental float which depicted an emplaced 75 under camouflage won the second prize, while "F" battery gave an exhibition drill in the stadium for the Tournament of Roses.

On May 3rd the Twelfth marched to the Division concentration area at Bullis preparatory to the attack launched by the Division on the morning of May 4th against an invading Red Army from the

north. As usual the enemy gave up his impregnable position and retired to the northern edge of the reservation where he counterattacked and drove the division back to Bullis.

May 9th and 10th the Corps Area held its annual tactical inspection of the Division. This problem consisted of the development of the Division into concealed bivouacs, a night occupation of position, and an attack at dawn.

May 17th to May 19th the regiment took part in the Air Corps maneuvers. This maneuver, the first of its kind ever held in the United States, brought to San Antonio the largest concentration of air forces gathered together since the war. With it came the Assistant Secretary of War, the Chief of the Air Corps, and many other notables. It was a thrilling sight to see a hundred ships pass overhead in battle formation. The part the ground troops played in this maneuver was a small one. In fact it almost looked to us lying in the mud at Camp Stanley as if they had allowed us to play in their backyard so that our feelings would not be hurt. One interesting feature of this maneuver to the ground troops, however, was a night withdrawal of the entire division which the Division Air Corps attempted to detect with their new flares. Next morning after the division had displaced some eight miles, the Air Corps reported that there had been no troop movement that night.

On the morning of May 20th the regimental headquarters and the second battalion returned to Fort Sam Houston. On the 21st the first battalion, attached to the Fourth Brigade, took part in an Air Corps demonstration of an air attack against a marching column, which lasted from 8:00 A.M. until 11:00 A.M., when the Battalion returned to garrison. The total distance marched that day was thirty-three miles, part of which was made cross-country at a trot and gallop, dodging low flying airplanes.

During the months of June and July, in addition to the usual details of administrative officers, cooks, and mess sergeants, to the Second Battalion fell the task of training the civilian components of the army. "D" Battery had the C. M. T. C., "E" Battery the R. O. T. C., and "F" Battery the reserve officers. All three batteries marched to Stanley to fire for their respective components during this period.

While the Second Battalion was thus engaged the rest of the regiment spent the summer repairing roads. The gravel train, composed of all available wagons in the regiment drawn by horses from the firing batteries, started daily for the gravel pit at 7:30 A.M. and worked steadily until 1:00 P.M. In addition to the gravel train other details spread the gravel and surfaced the roads. This work continued until after the first of November. The work done by the Twelfth gained high praise from the Division Commander.

On June 7th the regiment celebrated organization day with a formation and short talk by the regimental commander in the morning, and supper and boxing in the auditorium in the evening.

A slight relief from the constant labor of road repair came in the form of a short march by each battalion. These two marches were promoted by the respective battalion commanders and accomplished in spite of almost insurmountable obstacles.

On August 29th the First Battalion made a night march to Camp Stanley, and from there marched to Boerne, Texas, on the morning of August 31st. Here the Battalion took part in the Kendall County Fair. The Battalion gave a daily series of exhibition drills between races. The first event on the program was a two-horse bareback drill. This was followed by officers jumping over a course of five four-foot jumps. Next came a Roman race over a half-mile course. The exhibition closed with a nine-gun drill. The Roman racing proved to be the greatest attraction and soon became the feature race of the day. The behavior of the enlisted men of the battalion over a pay day period at the fair deserves the highest praise. Their appearance and deportment won the respect and admiration of the inhabitants of Boerne. The Battalion left Boerne at 7:00 A.M., September 5th, and arrived at Fort Sam Houston at 10:00 A.M., September 6th.

On September 12th the Second Battalion marched to New Braunfels, Texas, arriving about noon the 13th. Here it took part in the New Braunfels Fair, giving an exhibition review and drill. The Battalion returned to Fort Sam Houston September 15th and 16th.

The regiment devoted the months of October and November to pistol firing and gunner's examination when the men could be spared from road repair work.

The Headquarters Battery and Combat Train, Second Battalion and "A" Battery spent the period from December 2nd to December 22nd firing for the Air Corps at Camp Stanley. "C" Battery fired at Stanley from December 12th to December 20th for all officers of the regiment who had not already fired during the target season.

The athletic season opened with the Division basketball league, in which ten teams were entered. The Twelfth came out ninth, nosing out the 20th Infantry for last place. Due to the departure of the 1st and 20th Infantry and the Second Engineers, the baseball season was split into two leagues, with a week between. The Twelfth came out second in each half. In football the team showed a marked improvement throughout the season. Although we did not stand high in the league, we had the satisfaction of beating our old rivals, the 15th Field Artillery, by a score of twelve to six in a close game, won in the last minute of play by an intercepted pass

by Sergeant Gordon. In boxing, the regiment is well in the lead in the Division to date. The polo team was beaten in the Fall Tournament by the Eighth Corps Area, lead by Captain Huthsteiner. On the whole, athletics have been satisfactory and the number of men who turned out for the various sports most gratifying.

So the year has passed, on the whole a good year, with plenty to do and much real soldiering. Officers come and go in the Twelfth, but the regiment carries on.

The following changes have taken place since January 1, 1927: Joined: Lieutenant-Colonel J. A. Moss; Major A. Boone; Captains J. J. Bethurum, J. B. Golden, R. C. Snyder, A. C. Stanford, S. H. Needham, W. R. Bradley (Chaplain), R. H. Lewis (Veterinarian); First Lieutenants J. G. Howard, R. O. Smith, K. H. Sanford, Paul A. Berkey, H. P. Adams, F. J. Achatz; Second Lieutenants M. H. Lucas, B. P. Heiser, J. P. Woodbridge, J. L. Lewis, D. Dunford, H. McK. Roper, A. R. Sewall, G. M. Lindsay, N. C. Cureton, W. E. Dean, R. I. Pride and A. C. White. Departed: Lieutenant-Colonel C. H. Muller; Major F. K. Ross; Captains P. T. Quinn, J. Kennedy, L. M. Riley, L. F. Kosch, A. C. Wight (Veterinarian); First Lieutenants I. D. Yeaton, L. B. Bixby, J. J. Burns, J. V. Carroll; Second Lieutenants T. E. Lewis, J. G. Moore, A. R. Sewall, W. E. Dean, J. H. Leusley, E. B. Ely, J. Massaro, W. T. Moore, H. McK. Roper, W. J. Eyerly, J. P. Maher and P. Sather, Jr.

THIRTEENTH FIELD ARTILLERY — SCHOFIELD BARRACKS, T. H.

Colonel Oliver L. Spaulding, Jr., *Commanding*

Roster of Officers

Lieutenant-Colonel William H. Burt
Major Charles D. Daly
Major Louis E. Hibbs

CAPTAINS

Laurence V. Houston
Richard M. Wightman
Nathan E. McCluer
William McB. Garrison
Frederic H. Timmerman
Audley M. Post
Chauncy A. Bennett
Frederick T. Gundry
Elmer R. Block

FIRST LIEUTENANTS

Lawrence B. Bixby
John Hinton
Eric A. Erickson
Phil Cass
David D. Caldwell
Eugene McGinley
Allan E. Smith
Creswell G. Blakeney
Clayton H. Studebaker
George E. Burritt
David J. Crawford
Robert L. Taylor
William A. Wedemyer
John B. Horton
William R. Grove, Jr.

SECOND LIEUTENANTS

James L. McKinnon
Charles C. Blakeney
Raymond T. Beurket
Vonna F. Burger
Joseph R. Burrill
William H. Bertsch, Jr.
Charles L. Booth
Andral Bratton
James A. Channon
Hubert M. Cole
George R. Helmick
John A. McFarland

The opening of the year 1927 found the regiment busily engaged in the individual training season. This period was continued with

few interruptions until March 1st. On January 15th the regiment participated in a Brigade Dismounted Review and on February 26th, participated in a Brigade Mounted Review in honor of Colonel Hand, Field Artillery, who was representing the Chief of Field Artillery and making his annual inspection. On February 28th, the individual training season ended.

March 1st was marked by a Brigade tactical exercise for Colonel Hand. From this time until the annual Department inspection in June the time was devoted to battery, battalion and regimental training. The two battalions conducted numerous night marches, night problems and short marches at which time the battalions remained in camp for a few days. During these exercises the battalions functioned as independent units directly under the control of the separate battalion commanders. The regiment also conducted communication exercises in which the headquarters units, battalion and battery details participated. On April 8th, there was a Division Review in honor of the Secretary of the Interior, who was on an official visit to the Hawaiian Islands. On April 1st, there was a regimental tactical exercise in the vicinity of the National Guard woods. On April 25th, Batteries "D", "F", and Headquarters, Headquarters Battery and Combat Train, 2nd Battalion, marched to Kawaihapai for sub-caliber practice; they were joined on April 26th by Battery "E". On April 27th Battery "F", and Headquarters, Headquarters Battery and Combat Train, 2nd Battalion, returned to the post from camp and April 28th, Batteries "D" and "E" returned. On April 29th the 1st Battalion less "A" Battery marched to Waialua for an overnight camp. On May 23rd the 2nd Battalion marched to Kawaihapai, and returned by a night march on May 25th.

This period was also marked by numerous studies of the Ewa Sector, conducted on the map, and on the ground, the positions selected being inspected by all officers. The problems were an invaluable aid to the officers during the Department Commander's inspection.

June 1st was regimental day. The regiment was formed in hollow square, dismounted, the senior chief of section with his gun in firing position in the center. After a brief address by the Regimental Commander, all recruits who had joined since the last regimental day were massed about the gun, the oath of enlistment was read, and the Regimental Commander explained to them its significance. The band then played the "Star Spangled Banner," and regiment marched off the field, to the music of the "Caissons."

June 9th the regiment marched to Ewa for the Department Commander's annual inspection, which consisted of a simulated defense of the island; the distance marched was approximately

twenty-five miles and the regiment arrived at its position in midafternoon of June 9th. The 10th, 11th, and 12th were employed in establishing camps, preparing positions and laying wires. On June 13th the Sector Commander conducted a problem as a final test before the inspection. The inspection, which consisted of a defense problem, began June 14th and was over on June 16th. On June 18th the regiment returned to the post. The remainder of June and the first of July were spent in performing the usual garrison duties.

On July 12th the regiment moved by truck to Mokuleia for a month's rest camp. The camp selected was immediately on a beach and the regiment was particularly fortunate in its selection, for every evening a brisk breeze sprang up which ridded the camp entirely of the presence of mosquitoes. While in camp, one hour a day was spent in drill and the remainder of the day the men were free to amuse themselves as they saw fit.

August 10th the regiment returned from rest camp and immediately began preparing for the firing season which began on August 19th. The target season continued throughout the remainder of August and all through September and October. During September, Knox Trophy tests were conducted throughout the regiment. On October 27th there was a tactical problem, with service firing by the entire regiment. This marked the close of the firing season.

November 1st found the regiment once more engaged in the individual training season. November 12th, General Conner, the Division Commander, inspected the quarters and gun parks of the regiment. This inspection was the last formation of the year in which the entire regiment participated as a unit. Gunners' and pistol instruction took up the remainder of the time until Christmas holidays, which began on December 24th and lasted until January 2, 1928.

During the latter part of the summer the band suffered a 70 per cent. loss in musicians. Since then it has been recruited to full strength and has developed into an organization to be proud of. The orchestra has made wonderful advancement in the last few months and is now recognized as one of the best on the post.

Standing in athletics, 1927:

Boxing—fifth place—three champions.

Basketball—fourth place.

Baseball—fifth place.

Football—fourth place—lost four games by a score of 7-6. Four touchdowns were scored against us. Total score for season, regiment 70, opponents 31.

Polo—the 13th Field Artillery won the two following polo tournaments:

Junior Polo Tournament played on the flat. All officers eligible except officers who played in the Inter-Island Tournament. Trophy presented by Mr. Walter Dillingham. Trophy to be retained by the team that wins three times.

Lieutenant Robert L. Taylor, No. 1.
Lieutenant Hugh Cort, No. 2.
Lieutenant John B. Horton, No. 3.
Lieutenant Creswell G. Blakeney, No. 4.

William R. Smith Tournament played on the flat. All officers eligible. Trophy presented by Major-General William R. Smith. Trophy played for each year.

Lieutenant Robert L. Taylor, No. 1.
Lieutenant Eugene McGinley, No. 2.
Lieutenant Hugh Cort, No. 3.
Lieutenant John B. Horton, No. 4.

Lieutenant McGinley represented the regiment on the Army team in the Inter-Island Tournament.

The 13th Field Artillery played in the Theodore H. Davis handicap tournament which was won by the 8th Field Artillery. Officers playing used private mounts, otherwise the regiment could not have had a team.

FIFTEENTH FIELD ARTILLERY — FORT SAM HOUSTON, TEXAS

Colonel Ernest D. Scott, *Commanding*

Roster of Officers

Lieutenant-Colonel Joseph H. Barnard
Major Nathan Horowitz
Major Harold C. Vanderveer

CAPTAINS

Arthur S. Harrington
Edmond C. Fleming
Samuel D. Bedinger
Edwin A. Henn
John G. White
George E. Cook
Warren H. McNaught
Richard B. Willis
Channing R. Toy
Edmond H. Brown
Irvin B. Warner
Ralph E. Henry
Roy A. Stout
Claude F. Cox

FIRST LIEUTENANTS

Eugene G. Miller
Robert L. Allen, Jr.
Albert Brill
Seward L. Mains, Jr.
Boyce M. James
Hobart D. Reed
Tyree R. Horn
Esher C. Burkart
Millard Pierson
Roy P. Huff
James H. Dickie

SECOND LIEUTENANTS

Charles D. Daniel
Thomas G. McCulloch
Thomas A. Jennings
Frank F. Carpenter, Jr.
Conrad L. Boyle
Thomas A. Doxey, Jr.
Kenneth W. Treacy
Thomas E. Smith
Raymond C. Conder
John W. Black
Charles Cavelli, Jr.
Joseph K. Givson
John C. Strickler
Harold H. Hunt
Frank A. Lightfoot
John R. Pitman, Jr.

Generally, since its organization in 1917, the Fifteenth United States Field Artillery has had the reputation of being a splendidly efficient military organization. And during the past year, in addition, its morale has gone up, just why is not clear.

It could not have been because of new quarters, since there are no new quarters at Fort Sam Houston. It is true that the construction of new buildings is actually going on in the area near the Post Quartermaster, but the Fifteenth has no idea when any new buildings will be allotted to it and when it will leave the old wooden shacks it has occupied since it returned from France. Instead it goes on patching up the old shacks and covering the bare boards with any kind of paint it can lay its hands on.

It could not have been because of any outstanding victories in baseball or football. While Captain Brammell's baseball team stood first in one series, it was finally beaten for the Post Championship by the Ninth Infantry.

It could not have been for any great polo victories. While the Fifteenth has some excellent polo men, it was not able to turn out a really first-rate team because of injuries to its players and because of the heavy training schedule—this in spite of the fact that it had such men as "Long John" Smith, Dick Willis, "Cowboy" Reed and Burkart. Reed was badly hurt in September by a fall from his horse and was in the hospital for months. Of course John Smith was requisitioned to play on the Corps team.

It could not have been because of winning the Knox Trophy. While Henn's Battery did extremely well, some other battery apparently did a little better. "D" Battery of the Fifteenth represented the Fort Sam, Houston artillery brigade in the competition.

It could not have been because we got some especially good officers during the past year, since it is also true that we lost some especially good ones.

It could not have been because we got some especially good men, since we have always had good men—for example Tony Cone, first sergeant of "E" Battery and Sergeant Major Kelly in Headquarters. Schuyler Smith came from Hawaii to replace Amos Hutchison as regimental supply sergeant.

It must have been simply the result of several obvious factors. The post is really a part of a very delightful southern city—San Antonio, a city which is not too expensive for an army officer and where the civil population is extremely friendly and cordial. Furthermore the regiment has had a very interesting training year, strenuous in some respects but very interesting. And finally the

Fifteenth has been doing a good many things to promote its regimental esprit and the results are showing.

Some of the officers who had been longest with the regiment have left. "Doc" Brammell went to Sill for the battery officers' course. Generally he was very popular in this regiment and he may come back to it. Eugene McGinley got married and went to Hawaii. A group went to the First Field Artillery at Sill—Proctor, Wrockloff and Kirkpatrick. Kirk got married just before he left to a Miss Austin, of Austin, Texas. Major Sullivan went to Ohio State University R. O. T. C., and Colonel Bishop to the Sixth Field at Hoyle.

We picked up a few good ones. Bob Allen came to us from the Philippine Islands. He must have considerable ability of some kind or other because the Division or the Corps is constantly pulling him off on some special duty for months at a time. Pierson and Captain I. B. Warner joined us from foreign service.

Lieutenant-Colonel Barnard came from China, and Colonel E. D. Scott, who had been the corps inspector for four years, relieved Colonel Bishop as regimental commander.

The spring maneuvers of 1927 at Camp Stanley were good—not too strenuous but interesting. The Secretary of War lent his presence and lived at Schasse Ranch. The newspapers said that the maneuvers were the most pretentious since the Great War, and the Air Service was represented on the grand scale.

One of the most interesting features of the year has been a series of tactical conferences held twice a month in the evening under the direction of Colonel Scott. These conferences have treated some broad and interesting subjects such as "Artillery in the Great War," "The Strategy of the Civil War" and the "Battle of Jutland." Usually these conferences have been preceded by a dinner for all the regimental officers at the officers' mess. Incidentally this mess under Lieutenant Tyree Horn has been very successful. The price is ninety-eight cents a day, the food is exceptionally good and the mess makes some money each month.

"Slats" Harrington is remodelling the officers' club, and it is going to be very attractive. The club has always been successful since the days when Colonel Laurin Lawson rolled it into the area from somewhere or other and since the days that "Babe" Bryan and Sheffield Edwards ran their parties there—parties that to this day the girls, both army and town, pronounce to have been very, very good.

So generally things are going well with us from the Colonel down to the newest recruit—not neglecting to mention Eddie Henn, who is the new adjutant, and a good one.

SIXTEENTH FIELD ARTILLERY, FIRST BATTALION

FORT MYER, VIRGINIA

Major Maxwell Murray, *Commanding*

Roster of Officers

CAPTAINS

J. S. Tate
Jas. L. McIlhenny
John Nash
S. F. Miller
F. D. Sharp

FIRST LIEUTENANTS

G. C. Benson
L. W. Bassett
W. T. O'Reilly
T. A. Roberts, Jr.
L. W. Prentiss
M. McClure

SECOND LIEUTENANTS

C. D. Palmer
S. V. Krauthoff
H. Van Wyk
W. H. Barksdale, Jr.
G. D. Pence

During the past year, this Battalion has been busily engaged in the performance of the many and varied duties peculiar to service at the station of Fort Myer, Va.

Since the last report, changes in the officer personnel have been few. Captain Robert W. Hasbrouck, formerly in command of Battery "B", has been transferred to Princeton University. Second Lieutenant Douglas V. Johnson has been transferred to Fort Sill, Okla., as a student for the present course for battery officers. Captain James L. McIlhenny, Adjutant of this organization for the past two years, has been ordered to the Philippines and is being relieved as Adjutant by First Lieutenant Lowell W. Bassett. The turnover in the enlisted personnel has been slightly above normal, the replacements for the past year amounting to approximately 80 per cent of the enlisted strength. The recruits received as replacements have been of an exceptionally good type for field artillery and quite a number of the replacements have been reënlisted men from the West Coast and overseas organizations.

The batteries of this Battalion have been exceedingly active during the past year in complying with the large number of requests for demonstrations, parades, reviews, salutes for celebrities and exhibition drills. From January to April, 1927, all batteries of the Battalion participated in the weekly Friday afternoon exhibition rides at Fort Myer. These exhibitions were exceptionally good and were uniformly received with great enthusiasm by the distinguished guests who attended them.

The Society Circus, held at Fort Myer on April 2 and 3, 1927, for the benefit of the Soldiers' Athletic Fund, was successful beyond the fondest hopes of the command. Batteries "B" and "C" gave splendid performances; Battery "B" in the afternoon, and Battery "C" in the evening. The exhibitions of these two batteries contributed in no small part to the great success of the circus.

The spring training period which began in April and continued until June 15, 1927, was utilized mainly to train artillery gunners and to prepare the Battalion for the summer training period at Camp Meade, Md. On the latter date, the Battalion left Fort Myer for summer training and annual target practice at Camp Meade. Enroute the Battalion camped for one night at Beltsville, Md., and arrived at Camp Meade after a very successful two-day march over good roads during moderately warm weather. The training at Camp Meade was unusually profitable and beneficial to the members of this organization, due to the nature of the work required of the batteries and the circumstances under which the Battalion functioned. The officers of the 370th Field Artillery of Pittsburgh, Pa., spent their annual training period of two weeks with the Battalion. The work performed by these officers and the interest shown in matters pertaining to Field Artillery were most gratifying to the members of this command. While at Camp Meade, Battery "B", commanded by Captain Robert W. Hasbrouck, was chosen to compete for the Knox Trophy. This battery made a very commendable showing, having a score of 100 per cent. in firing, 100 per cent. in mobility, 92 per cent. in communications and 87 per cent. in interior economy, which score brought third place in the final award.

Batteries "A", "B" and "C" participated in the Army Relief Military Exhibition and Carnival held at The Army War College on September 30th and October 1st. During the afternoon performance, Battery "A", commanded by Captain John Nash, fired an artillery preparation in support of the infantry's realistic attack on Madelaine Farm. Following the artillery preparation, Battery "A" gave a fast, thrilling, eight-carriage drill which was received with great acclaim by President Coolidge and a large mass of enthusiastic spectators. Battery "C", commanded by First Lieutenant W. T. O'Reilly, drilled in the evening performance, giving a very spectacular drill amid fireworks and red flares which gave a very beautiful effect and showed the gray horses to great advantage.

The National Horse Show at Madison Square Garden, New York City, was entered this year by Battery "C", "The Gray Horse Battery," commanded by Captain J. S. Tate, where many honors were won by the Battery. The Battery, which included the firing battery, seventy animals and ninety men, was quartered in the Armory of the 104th Field Artillery at 68th Street and Broadway, where every possible comfort and convenience was provided during its stay. In addition to seven performances of the Battery drill, a section contest was entered, in which first place was won. For the third consecutive year, Battery "C" won first, second and third places for the class of Artillery Horse in Hand. In the Troopers

Mount Class, the Guidon Horse won first place. In the Polo Pony Class, Captain Tate's mare, "Virginia," won the open Heavyweight Class, the Military Heavyweight Class, was third in the Open Brood Mare Class, and was awarded the Championship Ribbon for the best pony in the show.

Great interest has been manifested in all forms of athletics during the past year. Each battery entered a team in the Post Basketball League during the winter of 1927. The splendid record of the Field Artillery is evidenced by the fact that Battery "C" won the championship, while Batteries "A" and "B" finished second and third, respectively.

A number of artillerymen qualified for the Post Soccor Team which played in the Washington Soccor League during the 1927 season and which won third place in the league tournament. Prospects for an artillery soccor team for the coming season are very promising.

The artillery polo teams took part in the War Department High and Low Goal Tournaments both in the spring and fall. In the spring the artillery entry in the high goal event was eliminated by the War Department while the low goal team, after eliminating the War Department and the 3rd Cavalry, was defeated in the finals by the Maryland Polo Club. In the fall tournament, the 16th Field Artillery high goal team was defeated in the semi-finals by the 6th Field Artillery. The 16th Field Artillery later won the low goal event by defeating the 6th Field Artillery and two War Department teams. The absence of Captain Tate and Lieutenant Benson was keenly felt by the artillery polo team. During the polo season Captain Tate and Lieutenant Benson were playing polo with the Army Juniors in New York.

Increasing interest is shown each year in all forms of athletics. Facilities and equipment are continually being improved. At present all firing batteries have basketball teams which are playing many more civilian teams than in any previous season. The prospects for polo and baseball are good and the coming seasons are awaited with interest.

SIXTEENTH FIELD ARTILLERY, SECOND BATTALION

FORT BRAGG, NORTH CAROLINA

Major John S. Wood, *Commanding*

Roster of Officers

CAPTAINS

Calvin S. Richards
Pierre Mallett
Bernard Sweet
Henry E. Tisdale
Peter P. Rodes

REGIMENTAL NOTES

Roster of Officers

FIRST LIEUTENANTS

Walter A. Metts, Jr.	Hugh G. Elliott
Royal L. Gervais	Roswell B. Hart
Herschel D. Baker	Wilbur R. Pierce

SECOND LIEUTENANTS

Thomas C. Wood, Jr.	Francis C. Foster
Thomas B. Whitted, Jr.	Mason F. Stober
Harry P. Storke	Stanley B. Bonner
Malcolm Faulhaber	Alex. N. Williams, Jr.
Claude A. Billingsley	Stuart Wood

The year 1927 brought many changes in units and personnel to this battalion and also other events of interest and importance.

In addition to the usual garrison training, this battalion assisted the Field Artillery Board in numerous experimental tests, made two practice marches, and did a lot of summer training.

The following experimental equipment and subjects have been or are being tested by units within the battalion under the supervision of the Field Artillery Board: jointed type wire pike for laying wire, mounted and dismounted; hold-up straps; service hats; hat cords made of rayon silk; travelling locks for 75-mm. gun; meter alternator for use with S.C.R.-109-A set; car fastener screw filler for 75-mm. gun; wheelwright's and carpenter's chest transported in battery wagon, M.-1917; water and ration cart combined; field telephones, type EE 8, with transmitter and receiver carried separately and type W.E. 1004A; canvas toilet kit pouch; hub caps, types T-1, T-2 and R.F.A., large and small models; pintles T-3 for caisson limber model 1918; forge limber M-1; store limber M-1902, M-1; and artillery reel M-1908, M-1; trotting horses on hard roads; shell and shrapnel firing tests; shrapnel and time shell when used against the same kind of target under the same conditions; draft test for 105-mm. howitzer; and firing tests for 105-mm. howitzer, models T-1 and T-2.

The results of the above tests may be found in reports of the Field Artillery Board, many of which are published in the FIELD ARTILLERY JOURNAL.

Shell and shrapnel tests were fired by Battery "F", commanded by Captain Tisdale, with Lieutenant Storke acting as executive. Three thousand rounds were fired, and from all reports, "F" Battery put "Them" in the right place. During this test the battery camped on the range for about two weeks.

On April 1, 1927, the battalion hiked to Pinehurst, N. C., for the purpose of taking part in the Pinehurst annual spring horse show. Headquarters Battery and Combat Train, commanded by Captain Pierre Mallett, with First Lieutenant H. D. Baker as officer in charge of Department "B", and Sergeant W. C. Wolfe, Stable

Sergeant and acting chief of section, carried off most of the honors in artillery classes by winning first place for the best artillery gun and team; first and second places for artillery pairs in hand; and first, second and third ribbons for the artillery horse in hand. Battery "F", with Sergeant U. Ulevizch up, won first and second places in the enlisted men's jumping class. Major J. L. Collins, on his private mount, "Tommyrot," won the championship for the best hunter in the show, after taking the blue ribbon in the light hunter class. Many blue, red and yellow ribbons were won by other officers from this battalion and Fort Bragg in the saddle and polo pony classes.

Pinehurst is a noted golf resort thirty-five miles from Fort Bragg in the North Carolina sand-hill country. Most of the route to Pinehurst lies across the Fort Bragg reservation, which is about twenty-eight miles long. The march each way took two days and the battalion was in camp at Pinehurst three days.

A ten-day hike, involving daily occupation of positions under simulated war conditions and service practice, occupied our time in the latter part of September. The weather was ideal. The missions assigned to the batteries were successfully accomplished and the officers fired many problems, the most of which were satisfactory, although the old non-solution got some victims. It is interesting to know that during this ten-day period the battalion never left the reservation or hiked over the same route or occupied the same positions.

During the summer the battalion was used to give the R. O. T. C. and the C. M. T. C. their artillery training. Headquarters Battery and Combat Train was organized into a gun battery and trained the R. O. T. C. from the Virginia Military Institute. Batteries "D", "E" and "F" trained the C. M. T. C. All batteries were equipped with the 3-inch gun.

At the present time, with Major Wood to stimulate us, we are getting more men out for drill than we thought possible. More attention is being paid to the basic drills and physical exercises, with excellent results. And it is a fact that a few waist lines are actually diminishing.

New quarters for this battalion, the first to be constructed at this post, are nearing completion. These quarters consist of one building, large enough to house the entire battalion.

The First Battalion, Second Field Artillery, was redesignated Second Battalion, Sixteenth Field Artillery, at Fort Bragg, N. C., September 6, 1927, per letter AG 320.2.

Headquarters Battery and Combat Train, 1st Battalion—1st Battalion Section Service Battery, Batteries "A", "B" and "C", 1st Battalion, 2nd Field Artillery, were redesignated Headquarters Battery and Combat Train, 2nd Battalion—2nd Battalion Section

Service Battery, and Batteries "D", "E" and "F", 2nd Battalion, 16th Field Artillery, respectively.

Organization day exercises for the 2nd Field Artillery were held on May 30, 1927. The battalion was formed on the parade ground in a hollow square. The Battalion Commander addressed the officers and men, commending them on their work, and then gave a very good account of the history of the 2nd Field Artillery.

After this formation the batteries were dismissed to take part in field sports such as relay races, shot put, jumping, etc. Each battery mess then served an excellent dinner.

Major J. L. Collins, who commanded our battalion for over a year, was ordered to Rome, Italy, as Military Attaché, December 30, 1927, and Major Wood was transferred from the 17th Field Artillery and assumed command.

The entire battalion regretted to see Major and Mrs. Collins leave. They have our best wishes. A regimental dinner dance, in honor of the old and new battalion commanders and their wives, was given by the officers of the battalion at the Winterlaken Inn, located just outside of Fayetteville, N. C. General Bowley, the Post Commander, honored us with his presence, and by request of the regimental adjutant, gave an after dinner speech which was enjoyed by everyone. After dinner the dancing continued. Several singers and a violinist were present to entertain us between dances.

Although regretting to see Major and Mrs. Collins leave, the battalion is glad that the "powers that be" selected Major and Mrs. Wood to take their place.

Much credit is due Captain C. S. Richards, our present Battalion Adjutant, for organizing Sunday morning breakfast rides. Captain Richards laid out a bridle path, with jumps for those who are so inclined, which runs in a roundabout manner through the fields and long-leaf pine woods of the reservation to McKellar's Pond, where breakfast awaits the hungry flock.

These rides are now given by the officers of a battery or any individual and furnish the ladies and officers of the entire post, who like the saddle, a pleasant morning ride.

The following officers were transferred during the year: Captain J. S. Winslow and Lieutenant G. P. Privett to the Field Artillery School; Captain C. B. Cole and Lieutenant F. C. Holbrook to Philippine Islands; Captain D. O'Keefe to 13th Field Artillery Brigade; Lieutenant J. F. Powell to Coast Artillery Corps; Lieutenants R. W. Mayo, S. P. Collins and J. F. Fiske to 5th Field Artillery; Lieutenants R. K. McMaster and O. W. van den Berg to 17th Field Artillery.

The following officers were assigned during the year: Captains

H. E. Tisdale and P. P. Rodes, First Lieutenants R. B. Hart and W. R. Pierce, Second Lieutenants F. C. Foster, S. Wood, T. C. Wood, M. F. Stober, S. B. Bonner and A. N. Williams, Jr.

Each battery and the battalion entered teams in the basketball and baseball leagues, with very good results.

Battery "F" distinguished itself in basketball by winning the championship of the 16th Field Artillery, the championship for the best battery team on the post, and then by representing the battalion as a battalion team, they carried off the post regimental championship.

In baseball, Battery "D" won the battalion championship.

At the present time the battalion basketball team is leading the regimental league, having won every game.

A boxing team is in training. In order to aid them we are fixing up good training quarters, with a hand ball and squash racket court.

Polo is played the year round at Fort Bragg. Each regiment and the staff have a team. The 16th Field Artillery team is represented by the following officers: No. 1—Lieutenant Pierce. No. 2—Lieutenant Billingsley. No. 3—Lieutenant Baker (Captain). No. 4—Lieutenant Elliott. Subs.—Lieutenants Stober, Williams and Storke.

With this team we have so far been able to hold our own, but expect much opposition from the staff team.

Captain C. B. Cole and Lieutenant Baker were members of the post polo team last year, which made a good showing in the southern circuit championship and won the Pinehurst tournament in December.

Lieutenant Elliott won the golf championship of the post in a recent handicap tournament.

We feel that our battalion has improved during the year and with the present high morale and coöperation of every officer and man we are striving to be the best in the Army.

SEVENTEENTH FIELD ARTILLERY — FORT BRAGG, NORTH CAROLINA

Colonel Conrad H. Lanza, *Commanding*

Roster of Officers

MAJORS

George R. Allin*
Harold W. Huntley*
William A. Pendleton

CAPTAINS

Clifford H. Tate
George R. Rede
Dale M. Hoagland
Sidney J. Cutler
Dover Bell
Oliver F. Marston
Lloyd S. Partridge
Howell R. Hanson
James C. Patterson
Andrew R. Reeves

* Not yet joined.

REGIMENTAL NOTES

Roster of Officers

FIRST LIEUTENANTS

Dan B. Floyd
Henry E. Sowell
Charles H. Day
Raynor Garey
Alexander S. Bennet
Francis O. Wood
Wilbur S. Nye
Francis W. Crary
Louis L. Lesser
William D. Williams
William L. Carr*

SECOND LIEUTENANTS

Ernest V. Holmes
Richard K. McMaster
Maurice M. Condon
Oliver W. van den Berg

The training in this regiment during the past year has been very interesting and highly instructive, possibly the two events of outstanding importance being (*a*) a war strength maneuver which consisted of a test of war strength headquarters units, and (*b*) high angle firing with the 155-mm. howitzer in connection with the destruction of the Swift Island Bridge crossing the Yadkin River near Albemarle, N. C.

In connection with the War Strength Test, the following organizations of this regiment were mobilized on a war basis and conducted a series of maneuvers and marches during the period 24th to 29th of October:

Headquarters
Headquarters Battery
Service Battery
1st Battalion Headquarters
1st Battalion Headquarters Battery
1st Battalion Combat Train.

The necessary personnel and matériel required to undertake this test were obtained by temporary transfers within the regiment and from other regiments on the post. A total distance of fifty-eight miles was covered during series of marches which practically encircled the Fort Bragg Reservation.

A Regimental Headquarters Staff consisting of seventeen officers found the planning of their duties very interesting, this possibly due to the fact that most of the officers had never seen an actual full strength Regimental Staff function before. Each performed enthusiastically the special mission he was ordered to carry out and on one occasion it took only twenty minutes from the time a field order was initiated until it was drafted, mimeographed and ready for distribution.

The rear echelon of Regimental Headquarters remained in the vicinity of Fort Bragg and supplies were ordered by troops in the field by means of radio and messenger. Several typewriters, a mimeograph machine and a hectograph machine were brought into the field, the latter proving a very practical time-saving device.

* Not yet joined.

HIGH ANGLE FIRING

Having been directed by the War Department to fire on the Swift Island Bridge near Albemarle, N. C., for experimental purposes, this regiment was confronted with the problem of figuring out new range tables. Being limited in range and required to obtain an angle of fall of about 60 degrees or greater, the present 155-mm. howitzer tables had to be extended to obtain elevations greater than 45 degrees. So far as is known such firing had not previously been conducted with this caliber of piece.

The range tables were calculated by First Lieutenant L. L. Lesser and First Lieutenant F. O. Wood by first obtaining the ballistic coefficient and working backwards from existing tables subsequently corrected for altitude and coefficient of form.

The ballistic coefficient having thus been obtained, range tables were constructed for Zones I and II by means of Ingalls' Circular. To verify the tables, Battery "D", commanded by Captain Marston, fired five rounds each at 55 degrees, 60 degrees, 65 degrees and 70 degrees in each Zone I and II. Most of the shell holes were identified and ranges carefully measured by an accurate survey.

Ranges thus obtained were corrected for density, loading, position, wind, temperature, barometer and ballistic density. The maximum and minimum difference between calculated and stripped ranges were as follows:

	Calculated Ranges (Yards)	Stripped Ranges (Yards)
Zone I 55°	3918	3904
Zone II 60°	4182	4268

For the above-mentioned firing two guns were implaced in pits 8½ feet deep—this in order to obtain an elevation of 70 degrees. Some little difficulty was encountered in loading the powder charge, as the guns at their maximum depressions showed an angle of elevation of about 800 mils. This, however, was quickly remedied by wedging surplus cloth in the chamber with the powder charge in order to prevent it from sliding out.

Another difficulty was encountered with the percussion hammer; for at excessive elevations used the leverage was so reduced that the hammer would not strike the firing pin with sufficient force to ignite the primer. By rearranging the system of pulleys and substituting a wire lanyard for the rope one used, this difficulty was also eliminated.

Several rounds were fired with Mark IV fuses, but in each instance the shell failed to detonate. Mark III fuses were resorted to and the remaining rounds all burst upon impact.

Profiting by the above experience, the 1st Battalion, less Battery "B", marched 114 miles to the Swift Island Bridge near Albemarle,

BATTERY "A", 17TH FIELD ARTILLERY, SWIFT ISLAND BRIDGE FIRING NEAR ALBEMARLE, N. C.

24TH FIELD ARTILLERY STABLES

SERVICE PRACTICE, 24TH FIELD ARTILLERY

N. C., emplaced their guns and fired. One of the guns was on a platform four feet above ground, and another along the side of a sunken road—it not being necessary in the latter case to dig a pit for the trail.

To prevent any danger of the piece travelling backwards, a log was buried in the ground parallel to the axis of the piece and guy ropes were fastened from it to the draft hooks. The maximum rate of fire was one round per each 2½ minutes—this including the time necessary to take cover.

Captain S. J. Cutler, in command of Battery "A", conducted the Swift Island firing and was responsible for the emplacement of the guns. Lieutenant F. O. Wood was the executive.

Advantage of high angle fire is to obtain a greater angle of fall than is obtainable with angles of elevation below 45 degrees. This might be required occasionally in peace times to prevent ricochet and during war to clear an obstacle or to obtain better penetration.

During the last summer training period seven regiments of reserve officers were attached for training. These officers were assigned to actual duties within the command, Regular Army officers stepping aside and acting in the capacity of instructors only. Part of the instruction was theoretical, but the most of it was of a practical nature, consisting of marches, camping, field exercises and firing.

During the period September 1, 1927, to December 31, 1927, the regiment succeeded in qualifying 50 per cent. of its men as gunners with only 4.9 per cent. of the above number second class. Battery "B", which represented the regiment in the Knox Trophy competitions, qualified 94.3 per cent. of its men with only 4.7 per cent. second class.

EIGHTEENTH FIELD ARTILLERY, FIRST BATTALION

FORT SILL, OKLAHOMA

Major Francis W. Honeycutt, *Commanding*

Roster of Officers

CAPTAINS

William F. Daugherty
Clyde C. Alexander
George P. Hays
Ralph J. Canine
George H. Duff

FIRST LIEUTENANTS

William W. Murphey (Ord. Dept.)
William J. Epes
Stuart M. Bevans
M. Milton Potter
Walter L. Kluss
Leonard S. Arnold
William R. Schaefer
Lee V. Harris
Jefferson C. Campbell
Harold T. Molloy
Blackshear M. Bryan, Jr.

SECOND LIEUTENANTS

John E. Adkins
Dalies J. Oyster
Glenn B. McConnell

On January 1, 1928, the 1st Battalion, 18th Field Artillery, began its sixth consecutive year of association with the Field Artillery School, as one of the organizations of the school troops.

Duties in connection with the Academic Division make the work here varied and extremely interesting. It gives the true soldier an opportunity to learn thoroughly his chosen profession and to practice it to a greater degree than at most stations in the Army. This undoubtedly accounts for the number of officers who are requesting assignment to school troops and the number of enlisted men returning to the battalion.

Organization Day, July 15th, was celebrated by the entire battalion going on a picnic, to which all families and friends of the battalion were invited. The picnic grounds were ideally located on the banks of Medicine Creek. After dinner, the remainder of the day was devoted to games and stunts of various kinds, which furnished considerable amusement for everyone. Prizes, which were awarded to winners of the different events, were donated by the Post Exchange and merchants of Lawton.

Major Francis W. Honeycutt, formerly head of the Tactics Department, Academic Division of the Field Artillery School, was assigned to the battalion and assumed command during the summer, relieving Major Fred C. Wallace. A number of other changes have taken place in the officer personnel.

The battalion has been well represented on the athletic field. The football, baseball, and polo teams, although not being winning teams, have played hard and well, and have given their opponents stiff and clean competition. Our basketball team is playing well. We are working and hoping for the championship; but win or lose, the team will have put forth all they have.

EIGHTEENTH FIELD ARTILLERY, SECOND BATTALION

FORT DES MOINES, IOWA
FORT RILEY, KANSAS
FORT SNELLING, MINNESOTA

Lieutenant-Colonel Fred C. Doyle, *Commanding*

Roster of Officers

CAPTAINS

George D. Wahl
Louis W. Hasslock
Guy H. Dosher
Duncan T. Boisseau
Charles C. Knight, Jr.

FIRST LIEUTENANTS

Lloyd M. Hanna
Harry Crawford
William N. White
Herman J. Crigger
Edward C. Gillette, Jr.
James P. Barney, Jr.
Selby F. Little
Walter D. Webb, Jr.
James M. Callicutt
John L. Graves

During August, 1927, the designation of the First Battalion, 9th Field Artillery, was changed to Second Battalion, Eighteenth Field Artillery. Batteries "A", "B", and "C", 9th Field Artillery, became Batteries "D", "E", and "F", respectively, of the 18th Field Artillery. Battalion Headquarters and Battery "E" are stationed at Fort Des Moines, Battery "D" at Fort Riley, and Battery "F" at Fort Snelling.

TWENTY-FOURTH FIELD ARTILLERY (P.S.)

CAMP STOTSENBURG, P. I.

Colonel D. W. Hand, *Commanding*

Roster of Officers

Major Norman P. Morrow
Major Stafford LeRoy Irwin

CAPTAINS

Charles W. Gallaher
Hendy D. Jay
James G. Coxetter
Edward H. Brooks
Buhl Moore
Edward R. Roberts
Ben C. McComas
William J. Egan
Clifford B. Cole
Alston P. Rhett
Frank L. Thompson
Howard G. Brenizer
Richard J. Sothern
Fidel V. Segundo
Salvador F. Reyes

FIRST LIEUTENANTS

John H. Lewis, Jr.
Doyle O. Hickey
Joseph P. Donnovin
Lloyd R. Garrison
Charles K. McAlister
Lonnie O. Field
Charles P. Jones
Richard T. Bennison
Ellis V. Williamson
Edmund E. N. Savageau (Chaplain)
Mariano S. Sulit
Amado Martelino
Victor Z. Gomez
Nemesio Catalan
Thomas E. Lewis
William E. Watters
Allen L. Keyes

SECOND LIEUTENANTS

Dan Chandler
Joseph A. Cella
Frank Dorn
Alejandro D. Garcia
Eugene B. Ely
Howard W. Kessinger
George W. Vaughn
Willey T. Moore
John L. Chamberlain, Jr.
Norman H. Smith
John M. Willems
Raymond K. Quekemeyer
William P. Ennis, Jr.
Frank C. Holbrook

On May 15, 1927, the 24th Field Artillery had its sixth birthday. Previous to 1921—in 1918—provisional field artillery of Philippine Scouts had been organized, but it was in that year that the regiment was finally initiated as a beginning of what we know to-day. Its excuse for being and its proficiency are best learned by a perusal of numerous reports of inspectors. The fact that it is now the only complete regiment of "jack ass artillery" makes it at least interesting to an observer.

Fatigue and work outside the realms of the regiment itself have, during the past year, been heavy, yet accomplishments have been multiple. During the hot season, from January to June, the work has been on pistol firing, gunners' instruction and examinations, and individual training. From the first of June until the last of September

(the rainy season), the men attended various service schools maintained by the division at Fort William McKinley and by the post and regiment, were trained in athletics and did such work with the animals and marching as the weather permitted. In this period the officers attended schools of gunnery and tactics and during the few day drills between rain, started their service firing.

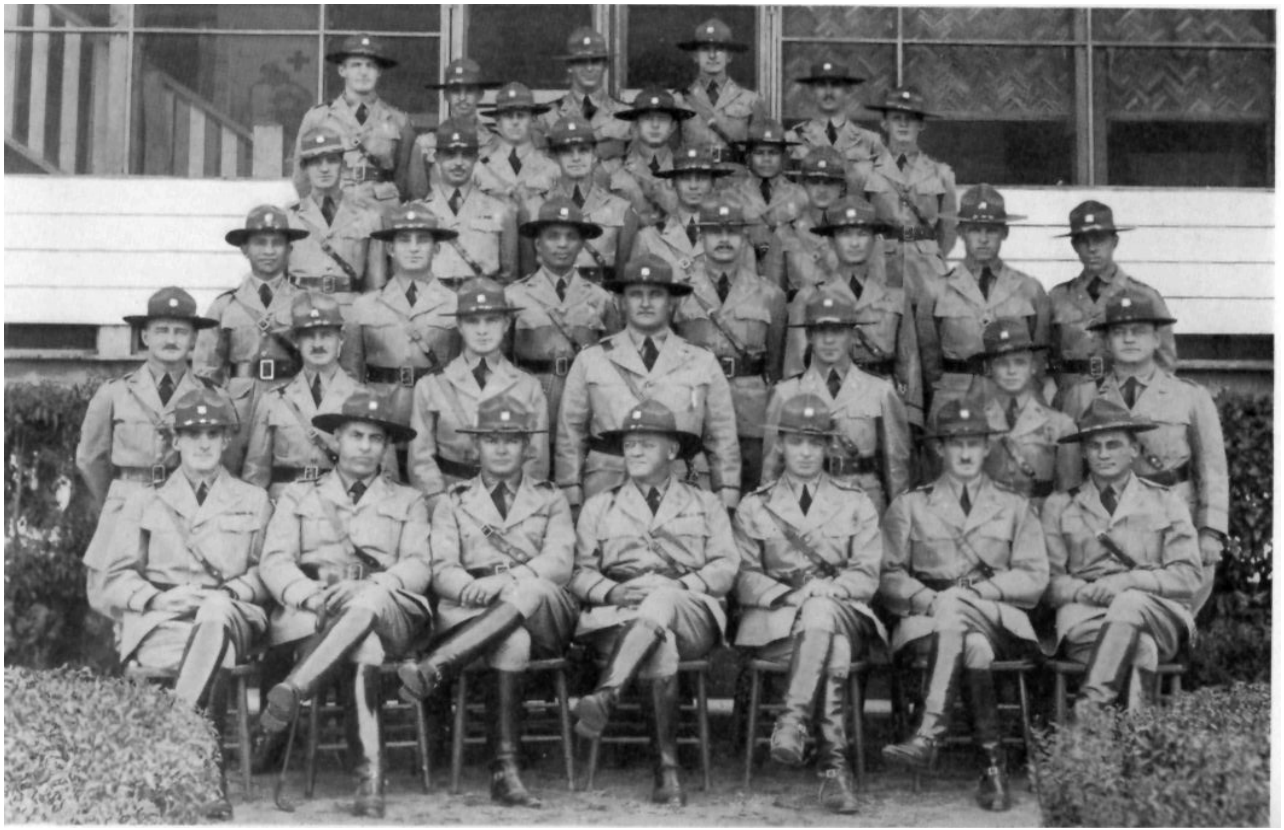
In October and November the two battalions marched at separate times to O'Donnell, at the northern end of the post, for battalion maneuvers and firing. December was largely devoted to preparations for the Annual Maneuvers and two weeks of January were spent in the field in a most victorious war against imaginary foes. The regiment made marches totalling around ninety miles in this period.

It should here be mentioned that Colonel H. W. Butner completed his two-year tour with the regiment, sailing for the States on December 5th to take over the duties of President of the Field Artillery Board at Fort Bragg, N. C.

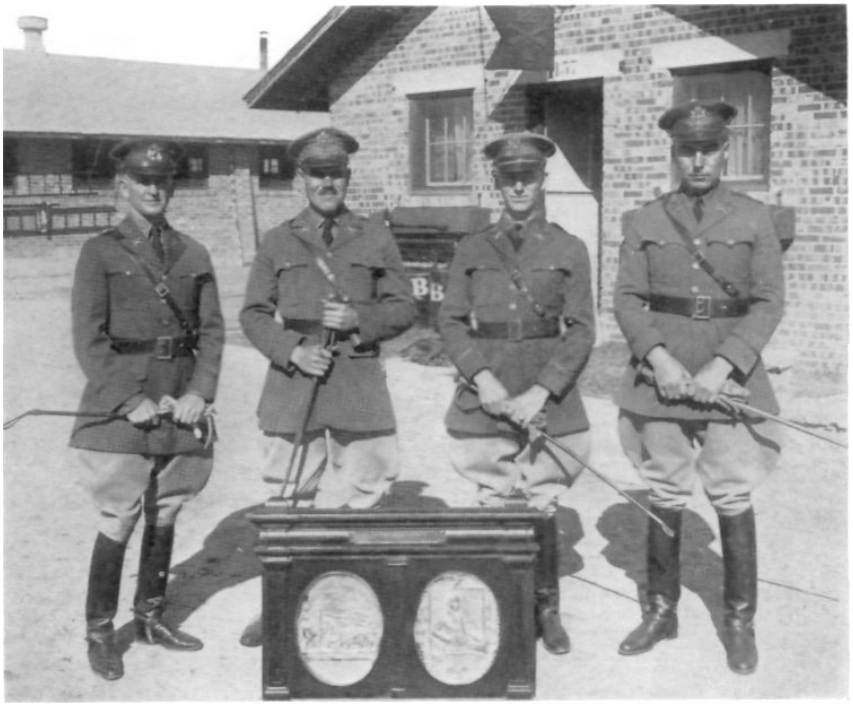
Colonel D. W. Hand assumed command of the regiment on December 5th after completing a tour in the office of the Chief of Field Artillery.

In athletics we have been singularly able or lucky—according to the individual point of view. A number of men took part in the Far Eastern Olympics at Shanghai and made most creditable showings. In swimming a regimental team literally swam circles around the 26th Cavalry, the only opponent with whom a meet could be arranged. In soccer the results were as successful. With a very wide margin we were champions of the Pampanga Baseball League, consisting of an American team from the Air Corps, the 26th Cavalry and a number of civilian agricultural and schooling institutions in the province. In the track and field meet the results to us were even more gratifying. The polo team was handicapped by a lack of well-trained ponies, and perhaps players, so its showing was not as brilliant as it might have been. However, we have hopes for this year.

The usual Stotsenburg Carnival was not held this year, due to the incident fatigue for men and heavy expenses. In its place was substituted a series of week-ends devoted to each branch of the service stationed here. They were apparently enjoyed by many guests. From December 23rd to January 5th the regiment ran a "rest camp" at the foot of Pinatubo. The altitude of the camp is about 3500 feet. In this two weeks about seventy guests visited the camp. This is a continuation of an idea inaugurated last spring and will continue from year to year. Its popularity warranted its permanent establishment.



OFFICERS OF THE 24TH FIELD ARTILLERY



OFFICERS OF BATTERY "B", 82ND FIELD ARTILLERY, WITH KNOX TROPHY

NON-COMMISSIONED OFFICERS OF BATTERY "B", 82ND FIELD ARTILLERY

Large numbers of negritos live on the reservation. Rumors of a war between two rival tribes gave us a momentary thrill during the Christmas holidays, but these turned out to be completely false, so we have again settled down to the usual routine.

SEVENTY-SIXTH FIELD ARTILLERY (Less Second Battalion)

FORT D. A. RUSSELL, WYOMING

Colonel Fred E. Buchan, *Commanding*

Roster of Officers

Lieutenant-Colonel Wm. H. Peek
Major Orlando Ward

CAPTAINS

Ray H. Lewis
John G. Cook
Claude A. White
Russell H. Dixon
John H. Milam
Leslie M. Skerry
Frank G. Chaddock

FIRST LIEUTENANTS

Norman J. Eckert
Elmer C. Ringer
Charles R. Mize
Newton W. Jones
Housan W. Duncan
Leon V. Chaplin
Henry L. Love

SECOND LIEUTENANTS

Perry W. Brown
Frank J. Hierholzer
Archer F. Freund
Harry J. Harper
Jeremiah P. Holland
Harold S. Isaacson
Arthur E. Solem
Meredith D. Masters
John M. Moore

This regiment has seen many changes in commissioned personnel during the past year. Lieutenant-Colonel Wm. K. Moore, who commanded the regiment a year ago, is now in the Command and General Staff School at Fort Leavenworth. He was succeeded by Lieutenant-Colonel Wm. H. Peek, who in turn was followed by Colonel Fred E. Buchan in December. During the past summer we also received Captains Cook, Dixon, and Milam; First Lieutenants Mize, Duncan, and Love; and Second Lieutenants Brown, Holland, Isaacson, Solem, Masters, and Moore. We have lost, besides Lieutenant-Colonel Moore, First Lieutenant Charles P. Holweger, who was recently assigned to R. O. T. C. duty at the University of Utah, and Second Lieutenants Warren C. Stout and Harvey K. Palmer, who are students at Fort Sill.

During the past six months the favorite in-door sport of the officers of this regiment has been that of buying wedding presents for one another—or so it seemed to some of them when their club bills came out. Our three veterans, Captain Lewis, Lieutenant Eckert and Lieutenant Jones, along with the youngsters, Lieutenant Hierholzer and Lieutenant Freund, are now patronizing the furniture stores more than the confectionery shops.

Those who enjoy "panning" the inhabitants of Fort Russell because of the energetic atmospheric circulation in this locality are soon (?) to be denied that pleasure. A great campaign of tree

planting is being carried on, for the double purpose of beautifying the post and for service as a wind-break; so it is expected that within fifty years or so the famous winds of Fort Russell will be but a sad memory. This work is being done under the supervision of Major Ward. The necessary funds are being provided partly by the War Department and partly by our good friend, Mr. George Brimmer, of Cheyenne. A detail of thirty men, with Captain Skerry in charge, recently spent four weeks in the Pike's Peak region digging and shipping trees for this purpose.

Our new schoolroom, now nearing completion, will be a most valuable contribution to the training of the officers of the regiment and of civilian components. A large squad room in one of the barracks buildings has been refinished and equipped with a large electric smoke puff terrain board, a sand table, blackboards, and map tables. This room is already proving its worth in training the officers in tactical problems and in artillery firing. It is expected that reserve officers and R. O. T. C. students will make extensive use of it during the coming summer.

The entire regiment made an extended march into the mountains of Wyoming and Colorado from the sixteenth to the twenty-sixth of August. The route was over the Sherman Mountains, thence southwesterly into Colorado and over Sand Creek Pass to Diamond Tail Bar Ranch on the Laramie River. One day was spent there in policing up and in hunting and fishing. The return march was over nearly the same route. The total distance marched was about 180 miles, and practically every man and horse that started on the march returned on a duty status. Two or three of the batteries were not compelled to take a horse out of draft during the entire trip.

A renewed interest in polo is being manifested by the officers of the regiment. Due to an unusually mild winter, practice has been carried on with little interruption. Some excellent ponies are being discovered and trained under the general supervision of Captain Cook, and with the interest that is being shown and the hard work being done by the players, it is expected that a first-class team will be turned out this season.

This regiment seems to be held in high regard by the enlisted men of Field Artillery, as indicated by the number of soldiers retiring here. First Sergeant William T. J. Ryan of Battery "A" was retired January 11, 1928; Technical Sergeant Michael Driscoll of the Regimental Headquarters and Band Section on January 30, 1928, and First Sergeant Robert L. Underdown of Battery "C" on February 13, 1928. Several others are to be retired in the next few months.

Experiments have recently been carried out under the direction of Lieutenant Chaplin, in mounting the service rifle in the 75-mm.

gun for use in place of the standard sub-caliber tube. The purpose of this change is to permit the use of gallery practice ammunition, which gives a higher trajectory than the standard .30-caliber ammunition. Four of these rifles have been remodeled and are ready for service. Results so far have been very satisfactory and the arrangement promises to be far superior to the present sub-caliber tube and ammunition.

SEVENTY-SIXTH FIELD ARTILLERY, SECOND BATTALION
PRESIDIO OF MONTEREY, CALIFORNIA

Major John R. Starkey, *Commanding*

Roster of Officers

CAPTAINS

John O. Hoskins
Morrill Ross
Sumner M. Smith
Stanley Richardson
LeCount H. Slocum

FIRST LIEUTENANTS

Grant Heninger
Albert R. S. Barden
Henry E. Sanderson
William D. McNair
Richard M. Costigan
Charles H. Swartz
Lee R. Woods, Jr.
Rox H. Donaldson

SECOND LIEUTENANTS

Cecil W. Land
Gerald F. Lillard
Laurence S. Kuter
Reynolds Condon
Harold J. Coyle

The Second Battalion of the Seventy-sixth Field Artillery is stationed at the Presidio of Monterey, Calif., in "The Circle of Enchantment," as one well-known author has called the Monterey Peninsula. This peninsula is 125 miles south of San Francisco and 364 miles north of Los Angeles. It is made a peninsula by the great Bay of Monterey on one side, the open Pacific at its end and the Bay of Carmel on its south side. The Circle of Enchantment is neither "north" nor "south." It is tempered by the warm breezes of winter that blow in from the ocean and by the cool winds of summer that find their origin somewhere out on the vast Pacific.

The Presidio of Monterey is garrisoned by the Eleventh Cavalry and the Second Battalion of the Seventy-sixth Field Artillery. At the Del Monte polo fields are held the summer training camps for citizens and reserve officers from all parts of California. Near here is the Gigling Reservation, which is the largest military reservation in the state and is used for artillery firing.

Of the officers who were on our roster at this time last year, Captain William E. Kneass is National Guard Instructor, stationed at Denver, Colo.; Captain Arthur Wilson has been ordered to Schofield Barracks; Captain Russell C. Snyder, after visiting with the Air Corps at Brooks Field, Texas, is now in command of Battery "E", Twelfth Field Artillery, Fort Sam Houston, Texas; Second Lieutenant Bruce R. King was assigned to the First Field

Artillery at Fort Sill, Okla., and later resigned; Second Lieutenant George A. Grayeb has been ordered to Schofield Barracks; Second Lieutenant William N. Gilmore has been ordered to the Philippines. Officers who have come to the battalion to replace those leaving are Captains Morrill Ross from Instructor in Gunnery at the Field Artillery School, Fort Sill, Okla.; Captain Sumner M. Smith from R. O. T. C. duty at the University of Oklahoma, Norman, Okla.; First Lieutentant Lee R. Woods, Jr., and Rox H. Donaldson from students at the Field Artillery School, Fort Sill, Okla. Five second lieutenants, graduates of the 1927 class at West Point, have been assigned to us. They are Cecil W. Land, Gerald F. Lillard, Laurence S. Kuter, Reynolds Condon and Harold J. Coyle.

Our summer training season the past year was a very strenuous one. Battery "D" worked with the first group of field artillery reserve officers here on the post and at the Gigling reservation during the first part of the season and during the latter part was taken over by the R. O. T. C. unit from Leland Stanford University. Battery "E" worked with the second group on the post and at the Gigling Reservation during the first part of the season and during the latter part was in charge of the C. M. T. C. at the Del Monte polo fields. Battery "F" spent practically the entire summer assisting in training field artillery reserve officers, there being four distinct camps in addition to the C. M. T. C. and R. O. T. C. Headquarters battery furnished the range guards and necessary details on the post, relieving the gun batteries as much as possible.

The Presidio furnished four members of the West Coast army football team which tied the Navy at San Francisco, Calif. Lieutenant Gilmore was one of the best quarterbacks on the team. He also played a short time in the Shrine East-West game for the benefit of crippled children. "Chief" Moore, a full-blood Indian, was one of the team's best defensive ends. Private Cerviello was one of the best guards on the squad, but he had the misfortune to break his hand early in the season and was in the hospital most of the time until the season was over. Private Morgan was a team trainer. All of these men, including Lieutenant Gilmore, are from Battery "F".

We furnished two of the players on the Presidio of Monterey polo team which won both the Pacific Northwest and the Ninth Corps Area polo championship at Vancouver Barracks, Wash., during August and September, 1927. Lieutenants Albert R. S. Barden and William D. McNair with Major William W. Erwin and Lieutenant George W. Read, Jr., from the Eleventh Cavalry, made up this team. The Boise Polo Club, Portland Hunt Club, Tenth Field Artillery and Seventh Infantry were in turn defeated. Nine officers

of the battalion are playing polo at the present time and we expect to enter a battalion team in the low goal tournament to be played on the Del Monte field during February.

Battery "F" won the post bowling championship during a series of athletic contests held during the Christmas holidays.

We are furnishing two members of the Presidio of Monterey basketball team which is at San Francisco entered in the tournament for the championship of the Ninth Corps Area.

The battalion is, at the present time (February), preparing for the annual tactical inspection which is to be held during the month of March.

EIGHTY-SECOND FIELD ARTILLERY BATTALION (HORSE)

FORT BLISS, TEXAS

Major Alfred L. P. Sands, *Commanding*

Roster of Officers

Major Milton W. Hall, M.C.

CAPTAINS

John M. Jenkins, Jr.
Lewis B. Hershey
Harry B. Berry
Irving D. Offer
John M. Reynolds
Phillip H. Riedel, V.C.

FIRST LIEUTENANTS

Winfield S. Roberson
Thomas S. Gunby
Albert P. Barnes
Charles R. Carlson
Thomas O. Foreman
William C. Price
Walter R. Hensey, Jr.

SECOND LIEUTENANTS

Bjarne Furuholmen
Gerald J. Reid
John H. Sampson, Jr.
Burgo D. Gill

About ten years ago an artillery regiment was stationed in Texas to assist the 7th and 8th Cavalrys in maintaining discipline along the Mexican border. This regiment differed from other artillery units in that its personnel rode horses instead of wagons. These horsed gunners immediately gained the respect and confidence of the two cavalry regiments by proving that although they were not wagon soldiers they could still "deliver the goods." In fact they delivered their goods so efficiently that the War Department considered the regiment had too much artillery, so they cut it down to a battalion. This small unit immediately took up the duties of the old regiment and through its own efforts has maintained the high standard of efficiency traditional to the Field Artillery. Its morale is expressed by the following verses:

You may have served in many regiments
  And served in many lands,
But you'll never see the equal for esprit
Of a bunch of hard-boiled soldiers
  In this dusty Texas land
Call the 82nd Horse Artillery.

For you'll hear a rolling song
As the guns go rumbling on.
We're coming to position fast as Hell.
For to help the Garry Owen and the Good
Old Eighth along,
With a mighty burst of shrapnel and of shell.

Anticipating the need of conditioning horses and men and the testing of matériel under varied conditions prior to taking part in the Marfa Maneuvers, the battalion started early in January, 1927, to prepare for the year's work by sending each battery once a week on a road march which embodied march discipline, feeding and watering, care of animals and matériel in the field, camp arrangements, sometimes bivouacing for the night and sometimes halting for noon meal only. Marches were made to San Loranzo Ford, on the Rio Grande, Texas; Courchesne Bridge, New Mexico; Dona Ana, New Mexico; El Paso Dairy Ranch. These marches continued until June, and proved invaluable to training for the coming maneuvers.

Extensive maneuvers with the Air Service were held throughout the year at Fort Bliss and many favorable comments were received from the fliers, on the manner in which the artillery maneuvered against the attacking planes.

Battery "B", commanded by Captain John M. Reynolds, 82nd Field Artillery Battalion (Horse), took the Knox Trophy Test this year and won the trophy for 1927 with a score of 387 out of 400.

It is the first time the trophy has been won by the 82nd Field Artillery.

The battalion qualified 293 gunners during the year, 262 of which were experts and 24 first class, and out of the 429 enlisted men in the battalion 206 are reënlisted.

During July and August the battalion engaged in training 20 reserve officers and Battery "A", 158th Field Artillery National Guard. The reserve officers conducted service practice, using National Guard personnel with excellent results.

The battalion left on September 10th for the Marfa Maneuver Area and averaged 20 miles a day at a rate of march of 4⅓ miles per hour during the maneuver period. Once during the maneuvers Battery "C" with the advance guard travelled 26 miles in four hours, and two days later made a forward displacement of 5 miles in twenty minutes, over the roughest ground encountered during the entire maneuver.

The battalion marched from Fabens to Fort Bliss on October 12th, marching alone at 2:00 A.M., and arrived at Fort Bliss five hours later. Distance marched 27 miles (5 2/5 miles per hour).

The night was moonlight. Going was good on hard roads, 18 miles of which was concrete. No difficulty with animals was encountered.

During the maneuvers all observers commented enthusiastically of the great mobility of the battalion.

The type of artillery horse which made these rapid movements possible weighed from 1250 to 1350 pounds, and was about 15.2 in height, with which the battalion was equipped throughout.

During November the battalion took part in the Division Horse Show, with the following results:

Major Sands on "Dexter" won firsts in both the Novice Jumps and Light-weight Hunters and second in Open Jumping, and on "Buster" placed third in Heavy-weight Polo Ponies. Private Schrimsher won first for Headquarters Battery with "Pete" in the Model Artillery Horse Class.

The 82nd Field Artillery Polo Stables won second in Groups of Twelve Polo Ponies. Thirds were won by: Sergeant Betz, Headquarters Battery, on "Centaur" in Light-weight Polo Ponies; Lieutenant Gunby with "Patagonia" in the class for ponies suitable to become polo ponies; Private Banks, Headquarters Battery, in the Light Wagon class; Major Sands, Lieutenant Gunby, Sergeant Baxton and Private Constant in Team Jumping; Major Sands, Lieutenants Roberson, Gunby and Reid in Four Men Hunt Teams.

First, second and fourth in Two-horse Reel Carts went to Battery "B" (Corporal Ferriers), Battery "C" (Private Wyche), and Battery "A" (Private Pyles), respectively. In the Escort Wagons class, the battalion won third and fourth. Private Rush of Battery "C" won fourth place with "Mabel" in the Model Pack Horse class. Lieutenant Gunby placed fourth for the American Remount Association Cup.

The battalion put in two polo teams, one senior and one junior, consisting of: Senior—Major Sands, Captains Jenkins, Sumner and Lieutenant Roberson. Junior—Captain Hershey, Lieutenants Gunby, Hensey and Reid.

The Senior team was beaten in the first game of the series by Division Headquarters (Jingle Wilson's team) and the Junior team lost the final game of their tournament to the 7th Cavalry.

The battalion football team, coached by Captains Sumner and Berry, won every game played and again are the Division Champions. The baseball team took second place in the Division League, coached by Captains Offer and Reynolds.

After resting up from a strenuous horse show season the battalion again took part in maneuvers with the Cavalry Division and Air Service. The tactics involved, included airplanes attacking Cavalry and Artillery marching through a defile, in bivouac, just at dark and in an attack.

The battalion rounded out the year with an inspection by General George Van Horn Moseley, the new commander of the 1st Cavalry Division, and he informed the battalion that he was proud to command a division a part of which is the 82nd Field Artillery Battalion (Horse).

EIGHTY-THIRD FIELD ARTILLERY BATTALION

FORT BENNING, GEORGIA

Major Lloyd E. Jones, *Commanding*

Roster of Officers

CAPTAINS

Charles A. Wickliffe
Everett C. Busch
Solomon F. Clark
George P. Winton
William B. Weston

FIRST LIEUTENANTS

Harold J. Guernsey
Paul A. Reichle
Harry M. Schwarze
Ernest T. Hayes
Ivan L. Foster
Shirley R. Hurt
Edward L. Strohbehn
John B. Murphy
Wray B. Avera
Michael Buckley, Jr.*

SECOND LIEUTENANTS

Hayden Y. Grubbs
Claude F. Burback
Julian H. Baumann
James T. Dawson
Thomas F. Plummer

"First Secshun—stand tuh 'orse!!" and the response is a unified click of heels and champing of bits. Ten months ago such a command would have aroused no more response than had it been "pollice verso," for the Eighty-third Field Artilllery Battalion was then motorized.

The Eighty-third is stationed at Fort Benning, Ga., as a demonstration unit with the Infantry School. When it came there in 1920, it was a battalion of 75's, motorized, with few worries but for the idiosyncrasies of the Georgia weather. Two of the batteries—"A" and "C"—were later equipped with 2½-ton tractors, the Holt T-35, while Headquarters and "B" Batteries each had the Holt 5-ton tractors. The T-35's of Battery "C" were, in addition, geared to a higher speed than those of Battery "A" so that no two gun batteries travelled on the road at the same normal speed. Naturally, moving the battalion as a unit was something more of a problem than that of merely keeping the traces taut, and hence, for the most part, movement of it on and about the reservation was under more or less of a centralized decentralization of command.

Being stationed as a demonstration unit at the Infantry School, the battalion is called upon during the school year to perform demonstrations embracing all phases of the functions of divisional artillery with the infantry. Whenever the classes inspected the

* Not yet joined.

formations taken by the artillery during these demonstrations, the remarks of the instructor conducting them were always accompanied by the reminder that "The Eighty-third to the contrary notwithstanding, divisional artillery with an infantry division is horse-drawn." Further, in the approved solutions of their problems, computations for road spaces, travel rates, etc., for artillery were based on horse-drawn organizations. A healthy imagination is a marvellous attribute to one's ability.

Beginning about the first of the year 1927, rumors would appear here and there, flourish, and gradually become accepted as local gossip, that the battalion was soon to trade its motors for horses. Nothing stronger than talk developed until about the first of March, when copies of letters sent by the Adjutant General of the Army to the Quartermaster General and the Chief of Ordnance were received, from which pertinent extracts follow:

> "Effective May 1, 1927, the 1st Battalion, 83rd Field Artillery, Fort Benning, Georgia, will be changed from a battalion of Field Artillery, 75-mm. gun, tractor-drawn, to a battalion of Field Artillery, 75-mm. gun, horse-drawn, organized in accordance with Tables of Organization No. 36½ P. For the present no change is authorized in the enlisted strength, grades, or ratings of this battalion."

There followed in each letter instructions governing the conversion. This corroborated the contention of some that there was "no foolin'" about the scandal.

The next move was on the part of the Post Quartermaster, who conducted a Cook's Travel Tour among the pine trees on the reservation and pointed out where the new stables were growing. The Infantry School is fortunate in that most of the 98,000 acres comprising the reservation consists of pine timber. The Quartermaster, in collaboration with the U. S. Forestry Service, operates a logging camp and saw mill, thereby insuring a supply of lumber large enough to keep every one busy on the post.

Trains of logs began to arrive at the mill almost immediately thereafter and construction commenced on the stables, the plans for which had been approved by the Quartermaster and turned over to the battalion.

All the labor of the construction was performed by artillerymen with the exception of one civilian carpenter loaned to each of the batteries by the Utilities. Each battery was responsible for the building of its own stables and corrals and competition was keen as construction seemed to grow almost over night. Except for an occasional red-leg smashing the wrong nail with a hammer, the entire program sped along without casualties. The schedule of

work with the school was not interrupted despite the importance of the stables.

As practically none of the enlisted personnel of the battalion had ever ridden horses before, a course in equitation for the noncommissioned officers was started about the middle of March with the twenty-odd goats assigned to the battalion for polo, riding and plowing. The course included grooming, feeding and care of animals and the teaching of non-commissioned officers to overcome their inherent fear of horses before the new lot arrived.

About May 1st word was received that the horses had been purchased by the Remount Depots at Front Royal, Va., and at Fort Reno, Okla., and that the first shipment could be expected in about a week. The stalls were not yet completed. A rush was made upon the clay banks and gravel beds to provide floors, and enough mangers and partitions built to take care of them. Three carloads of animals came shortly from Front Royal, followed by a train from Reno. And then the fun began, and so on, far into the night.

Aside from a few bruises and hoof-cuts and a few cases of coryza, which were promptly isolated, the shipments came through in excellent shape. They were beautiful horses—all young and keen-looking. The draft horses, especially, were an ideal type for field artillery.

The work of gentling and acclimatizing the animals proceeded parallel with that of completing the stables and shops. By the time the second shipments arrived the construction was about finished, but isolation camps had to be established in which to quarantine the newly arrived animals for the prescribed period.

Both horses and mules were purchased with a view to having all of one color in each battery. Lots were drawn to assign the colors. Battery "A" drew the bays, and running through their draft horses is a strain of Clydesdale blood. Battery "B" drew the grays and many of their teams look like blooded percheons. The blacks went to Battery "C". It was intended to procure all chestnuts for Headquarters Battery, but the bays predominated. The markets must have been scoured in order to procure these animals for they proved to be as fine a lot in appearance as any organization could wish for and all of them young. Very few of them were schooled; some had never been ridden before.

As scarcely any of the enlisted personnel of the battalion had ever ridden a horse, the few weeks of equitation given the non-commissioned officers before the arrival of the horses was about the limit of knowledge of horsemanship among them. Hence with the task of gentling, breaking, and schooling green horses and getting

them over their fear and distrust of men, there arose the equally difficult one of shaking the men loose from their fear of horses and teaching them to ride.

Our comrades-in-arms, the doughboys, looked on during all this time with insatiable curiosity. But had it not been for the new horses the medicoes would have been forced to invent a new epidemic in order to keep their practice in shape. Needless to say, the vocabularies of the soldiers rapidly developed to a point of pride.

The motors had not, up to this time, been turned in as the battalion was called upon to furnish two motorized batteries for the R. O. T. C. camp and a large number of men for the summer training of Alabama Polytechnic Institute students and naturally horses were not available.

The initial training of the battalion covering the summer period was conducted by battery. When the school year commenced—about the middle of September—it had progressed to the point where the battalion appeared as a real red-leg outfit. From then on the training became a function of the battalion as a whole, the weekly schedule including all-day road marches, problems in draft over difficult terrain, occupation of positions, etc. Along with this were the required demonstrations and firing for the school.

The first big problem of the year came about the middle of November. This was a combined maneuver of infantry, artillery, tanks and air service extending over a period of three days. A real combat situation was developed, including attacks by hostile airplanes while the units were marching on the roads. The performance and management of the horses and the firing were quite to the satisfaction of the school.

Thus, in eight months the battalion had the varied experience of constructing stables, of replacing its motor equipment with green remounts, of training the horses and men, of operating an R. O. T. C. camp during the summer period, and finally in November enjoyed the satisfactory sight of seeing the battalion roll along behind the doughboys as a mobile unit.

It was expected that some of the enlisted men would evidence an aversion for the change by going over the hill at the first signs of horses. Surprisingly few did. Instead they flock out on mounted pass whenever a spare moment comes to hand until even the soldiers in the infantry, at Benning, will consent to groom a mule after an afternoon's ride in order not to be outdone by a red-leg.

BOOK REVIEWS

AERIAL PHOTOGRAPHS, CHARACTERISTICS AND MILITARY APPLICATIONS. By Lieutenant D. M. Reeves, Air Corps, U. S. A. Cloth, 5½″ × 8¼″. 307 pages, 123 illustrations. 1927. The Ronald Press Company. $5.

The old warfare game of alternate advantages of armor *versus* guns continues with minor ramifications. The advent of long-range weapons deprived commanders of the privilege of personal inspection of a prospective battlefield. Now, science comes in its turn to offset that handicap in the form of powerful eyes of special cameras that are carried in aircraft far behind the enemy lines; these bring back accurate records of vast extent—and far more reliable than the hasty visual impressions of staff officers of a generation or more ago.

Almost everyone has seen a photograph taken from an aircraft, but to the uninitiated it is merely a picture showing how the earth looks to an aviator. Every dot and shadow on the print conveys information of value to one who has studied aerial photographs with the assistance of a trained instructor. The author who formerly was instructor in aerial photography at the Advanced Flying School, Kelly Field, Texas, has contributed a valuable text on a subject which heretofore has been little covered. It would be impractical to instruct anyone in the subject of aerial photographs without numerous examples showing the appearance of each ground feature. That has been well provided for in this book.

The author has prepared the book in two parts, the first of which (about one-third of the total) deals with the general characteristics of aerial photographs such as orientation and scale, causes and effects of distortion, light and shade, comparison of maps and photographs, accuracy for mapping, relief of ground, identification of crops, determining height of objects, effects of weather, appearance of roads, railroads, bridges, buildings, and similar information that is essential for a beginner.

In Part II on the "Military Applications of Aerial Photographs," the information is arranged in separate chapters covering the special problems of each arm. The author endeavors to point out the various situations where aerial photographs furnish valuable aid in carrying out military missions, even down to a squad engaged in scouting and patrolling, or a machine-gun crew.

Photographs give the information along the route as it was perhaps only a day or two earlier, with overflowed streams, broken bridges, dry stream-beds or other information of considerable importance for mounted troops. The symbols on a map may have been prepared years before during quite a different season of the year. Much information, not obtainable from a map, may be obtained from aerial photographs particularly if overlapping pictures

are made that can be viewed in a mirror stereoscope to bring out the ground relief clearly.

Perhaps the most impressive lesson learned from an examination of the pictures in this book is the extreme difficulty—almost impossibility—of concealing anything like a battery position from the searching eye of the aerial camera. The use of the same path by a surprisingly few men will indicate on a print the route to a battery position. However, a study of these photographs should be of great assistance to officers who are charged with concealment precautions.

In the chapter "Artillery Operations" the author states: "Among the sources of terrain information, aerial photographs have a high rank, and are extremely valuable when their use is understood." "In general, photographs are used in a manner similar to maps, except that they possess some advantages over maps, as well as certain limitations. In situations where maps are lacking, photographs are indispensable." "Future situations may arise in which operations must be carried out in poorly mapped areas, and in such cases familiarity with the use of photographs will be of the greatest importance." A number of typical uses of photographs of interest to the field artilleryman are given.

The employment of gridded photographs instead of maps for firing, is one of the practical applications of this new service that holds considerable promise.

Other chapters are those on Infantry Combat, Machine-gun Operations, Scouting and Patrolling, Circulation, Communications, Field Medical Operations, Field Engineering, Intelligence, and Naval Operations. The Chemical Warfare Service, with its problems of gas flow into depressions, and the chaplains, with advice as to the use of aerial photographs for the accurate identification of field burials, are included.

The technique of taking photographs from aircraft and the special types of cameras are not described by the author, presumably because that is of interest only to certain specialists of the Air Corps who are already informed.

The reviewer is glad to commend this book to officers of all arms who desire to keep abreast of progress in this important military subject.

TACTICS AND TECHNIQUE OF FIELD ARTILLERY, A TENTATIVE TEXT. Paper, 6″ × 9″. 218 pages, 15 illustrations, 22 plates. 1927. The General Service Schools Press. Fifty cents.

The earlier publication, "Tactics and Technique of Artillery," in two cloth bound volumes has been superceded and out of print for some time.

The purpose and scope of this volume is indicated in the preface, quoted in part as follows:

> "This text is designed to afford a basis for conferences and problems at the General Service Schools, Fort Leavenworth, Kansas, on field artillery. The text is primarily an amplification and explanation of present training regulations, and is subject to change to conform to training regulations now in course of revision.
>
> "In the preparation of the text, an attempt has been made to present only so much of purely technical matters as the students should understand in order that they may appreciate the powers and limitations of field artillery, and thereby be prepared to approach the study of the rôle this arm plays in the employment of the combined arms in battle. Stress is placed on the desirability of unity of control of the artillery with the field forces, and on the fact that field artillery is an auxiliary arm whose sole mission is to furnish effective fire support to the other arms, particularly the infantry."

The text contains a glossary of field artillery terms and chapters on the following subjects: Weapons and Transport, Ammunition, Organization and Command, Ammunition Supply, Reconnaissance and Dismounting, the seat, and the Reins; The Aids; The Gaits; Artillery Fire, Artillery Information Service, Tactical Employment of Field Artillery, Artillery Plans and Orders; Appendix A, Characteristics of Field Artillery; Appendix B, Numbers of War Department Tables of Organization for Field Artillery Units.

MANUAL OF EQUITATION. By the Academic Division, The Cavalry School. Paper, 6″ × 9″. 130 pages, illustrated. 1927. Book Department, The Cavalry School. $1.

The object of this manual is to present the elementary principles of riding and horse training in a form that will serve both to enlighten the beginner and guide the instructor. The occasional discussion of subjects relating to more advanced equitation—such as "the mechanics of the gallop depart," or "the change of lead"—are included largely as matters of interest to point the way toward further study on the part of the beginner.

To serve the requirements of both military and civilian horsemen, matters of a purely military nature have, as far as practicable, been excluded.

No claim is made to originality. The manual consists in part of theories and facts gathered through study and experience at The Cavalry School and throughout the cavalry service. It presents no new principles, and is thus directly or indirectly indebted to the vast field of allied literature that precedes it. In the preparation of this

manual, free use has been made of the following publications: Manual of Equitation of the French Army, 1912; Notes on Training of a Colt, by Lieutenant (now Major) E. L. Gruber, F.A.; T.R. 50-45, Instruction Mounted, Without Arms; T.R. 360-10, Training Remounts.

The text is in two parts. Part I relates primarily to the training of the rider and consists of the following sections: Preliminary Considerations; Articles of Equipment and Their Use; Mounting and Dismounting, the Seat, and the Reins; The Aids; The Gaits; The Suppling Exercises; Guidance and Control; Jumping Obstacles; Riding Hall Customs.

Part II relates to the training of the horse, and comprises sections on the following: Preliminary Considerations; Breaking; Training.

Materially more space is devoted to Guidance and Control than to any other section. Under jumping is included a table of common errors to be guarded against, with their causes. To the text is appended a chart giving the structural details of the Hitchcock Pen.

THE MATHEMATICS OF ENGINEERING. By Dr. Ralph E. Root, Professor of Mathematics and Mechanics, Post-graduate School, U. S. Naval Academy. Cloth, 6″ × 9″. 550 pages, 115 line cuts. 1927. Williams and Wilkins Company. $7.50.

This book, intended as a complete introduction to the mathematics of engineering, is an outgrowth of the efforts of the author, during about thirteen years, to meet the mathematical requirements of student officers at the Post-graduate School of the Naval Academy. For several years mimeographed texts have been used in the form presented in this book.

While the book is written for the student and for the engineer, and is planned to be convenient and useful for reference, it is not in any sense a handbook. The usual mathematical tables indispensable to the engineer are not included.

Knowledge of the matter contained in Chapter V, Solution of Equations, and in Chapter VII, Certain Standard Curves, Equations and Transformations, might be assumed for students prepared to pursue other portions of the book. They are, however, included as helpful in covering, in a minimum of time, certain essential reviews. The idea of a condensed restatement also extends, in a lessor degree, to the earlier chapters on differentiation and integration.

FREE AND CAPTIVE BALLOONS. By R. H. Upson and Lieutenant-Colonel C. deF. Chandler, U. S. A., Retired. Cloth, 5¾″ × 8½″. 331 pages, 83 illustrations. 1926. The Ronald Press Company. $5.

Part I of this book, by R. H. Upson, relates entirely to the

spherical types of free balloons that are used for contests of a sporting nature and the training of balloon and airship pilots. The author points out the advantage of voyaging in free balloons as the best means of acquiring practical knowledge of air current directions at various altitudes; also that captive balloons must be maneuvered like free balloons in case the holding cable breaks accidentally. Similarly, airships of the dirigible balloon class become in fact free balloons whenever the motive power fails. The structural features of free balloons are first described technically; this information is followed by interesting accounts of national and international balloon races in which the author participated as a contestant; these accounts are intended to illustrate the means of controlling travel of a drifting balloon by changing altitude into air currents of a favorable direction. Finally there is a chapter devoted to the organization of balloon races.

Lieutentant-Colonel C. deF. Chandler is the author of Part II which describes and illustrates the types of captive balloons that have been developed in Europe and America for military and naval observation purposes. The equipment is considered technically and includes the essential accessories such as winches, holding cable, etc. The altitude that can be attained by certain types is shown by a comparative chart.

In time of peace the armies of the larger nations devote little attention to the captive balloon, presumably because ground or airplane observation can so easily be provided for the adjustment of artillery fire during practice. The World War brought out the need for elevated observation positions in captive balloons that could maintain surveillance over extensive areas of enemy terrain for long periods, while the observer in the balloon basket was in constant telephonic communication with battery commanders. The more recent campaign of the French Army against the Moors in North Africa, even in a mountainous region where good ground observation positions might be expected, demonstrated again the need for captive balloons as an auxiliary service for artillery. It seems improbable that there ever will be a sufficient number of observation airplanes available to comply with all the calls for the adjustment of artillery fire in time of war, hence it is of interest to artillery officers to know about the characteristics and limitations of captive balloons. One section of Part II describes the smaller types of captive balloons that have been developed for defensive use against enemy bombing planes.

Part III, also by Colonel Chandler, is entitled "Fabrics for Gas Envelopes." The information herein is of interest only to the designers of balloons and airships, and to persons responsible for the repair and maintenance of these craft.

AMERICAN METHODS OF HORSESHOEING. By Frank G. Churchill, Senior Instructor in Horseshoeing, The Cavalry School. Cloth, 5″ × 6¾″. 120 pages, illustrated. 1926. Republic Press. $1.50.

This little volume contains chapters on: Discussion on Care of the Feet and Shoeing; Anatomy and Physiology of the Horse's Foot; Normal Shoeing; Diseases of the Feet, and Pathological Shoeing; Shoeing for Gaits.

The author is a recognized authority on the subjects treated. Due to his connection with The Cavalry School, contact with the many officers graduating from that school, and his work on instructional publications, it is believed that he has contributed to a large extent to the present army thought on this subject. Under these conditions it is not surprising to note in this volume a considerable similarity to the present official regulations.

FOREIGN MILITARY JOURNALS A CURRENT RÉSUMÉ

ENGLAND

"The Journal of the Royal Artillery," January, 1928

"Duncan, Commended Essay, 1926-1927," by Major W. P. J. Akerman, D.S.O., M.C., R.A.

"'THE day will come when the present aspect of war will dissolve; when forms, customs and opinions will again be altered. Looking forward to the future, we seem to feel the coming of a time when the armed millions of the present will have played out their part. A new Alexander will arise also who, with a small body of well-equipped and skilled warriors, will drive the impotent hordes before him.' This quotation is taken from 'The Nation in Arms,' by Von der Goltz, published in 1883, thirty years before either the armoured car or tank had been developed as tangible examples of the means by which the aspect of war could or might eventually become radically changed, and the author says that he 'feels' the coming of such a time."

One of the things which makes British journals always interesting is the background of reading and study which they always present. In the matter of field artillery, for example, we may feel perhaps that the French have a greater flair for the use of this arm, and particularly in the logical exposition of the proper methods to employ. We may take credit to ourselves, perhaps, for greater mental agility, for ability to improvise, which is characteristic of a young and virile people. But when we come to the British, we can always count on finding a background of classical and contemporary study which always prevents the Englishman from going very far wrong.

England is passing through the throes of theoretical mechanization which has already attacked our Army. Even the most conservative British soldier seems to see a necessity for some movement in this direction. What saves them from folly is that they let shine behind them the light of past experience, and look before they leap. The following quotation from this article, by who must be a comparatively young officer, is perhaps typical:

> "Rome was not built in a day: the invention of gunpowder took more than a thousand years to revolutionise war; but nowadays events seem to move more rapidly; the internal combustion engine is reaching such a pitch of efficiency that we cannot bury our heads in the sand, refuse to see and merely pray 'Not in our time, O Lord!'"

The subject of the essays for this "Duncan" prize was that of the post-war reorganization of the British artillery. Naturally Major Akerman goes over much the same ground which has been traversed by other contributors whose essays have been treated of in the FIELD ARTILLERY JOURNAL before. His conclusions as to the present status of British field artillery, in comparison with that of other continental nations, is as follows:

> "So much for the inventions and developments of the last few years. We have allowed ourselves a period of grace during which to try our new inventions and adapt them to our use. We have refrained from hasty adoption of unproved material and have set ourselves instead to thorough trial and adoption only after proof. We find ourselves now with a divisional artillery including in its composition all the improvements found desirable during the Great War, and which is on the threshold of modification by gradual adoption of the material tried out by way of army field artillery brigades, and by the introduction of similar material for the pack brigade. To our great discomfort we have taken part in the amalgamation of the regiment for its own eventual benefit and that of the army at large. We have been ready for war throughout this post-war period and have yet considered the nation's purse in our programme of re-equipment. We regret the absence of a field howitzer with a range equal to or better than the German 4.2″ howitzer, but otherwise our comparison with the continental divisional artilleries leaves us content with our own organisation. If we take into consideration the programme of mechanisation and allow ourselves the equipment and composition foreshadowed for the year after that in which India is able to receive mechanised artillery brigades in place of horse-drawn brigades, then we may claim that the divisional artillery will be well balanced and equipped to carry out its rôle."

"Shrapnel and H. E.," by Captain K. V. B. Benfield, D.S.O., M.C., R.A. This article is a short reply to a previous discussion of this subject which appeared in the April number of *The Journal of the Royal Artillery,* and which has been previously reviewed in the FIELD ARTILLERY JOURNAL.

This article is, of course, interesting to us as we also have undertaken certain experiments to determine the relative efficiency of shrapnel and high explosive shell. Captain Benfield takes issue with some of the conclusions which were reached by the previous author, and his comments are pertinent, although it must be acknowledged that they serve generally to confirm the conclusions which most practical artillerymen have arrived at, that there is much to be said on both sides.

Captain Benfield's résumé of his own conclusions is well stated and can stand repetition:

> "A study of all the changes that have taken place on the battlefield since 1914 must lead to the conclusion that opportunities for the use of shrapnel have greatly decreased. The days of massed riflemen are gone; the tendency is to replace men by machines. For their destruction H. E. is required. If these deductions are correct then it is clear that the proportion of shrapnel to H. E. carried by our artillery to-day is too high. There may be many weighty reasons, both technical and tactical, for the proportions laid down at present, such as difficulties in obtaining the necessary raw materials in war-time for H. E. filling, large reserve stocks of shrapnel that must be used up, and also the need for providing for a war against an ill-trained enemy, say in Asia, where opportunities for the use of shrapnel might be great."

"A Beginner after Big Game," by Lieutenant J. Hendley, R.A. This is another one of those articles by a British artilleryman stationed in far away and fascinating places which serve to lend so much color to this magazine.

In reading such articles, a middle-aged field artilleryman who has served in the Philippines and in Mexico, and has had many opportunities through his military service to venture to unusual parts of the world, begins to realize how many opportunities he has lost. To a young field artilleryman stationed in the Philippines, the pleasures of garrison life and the allurements of a still picturesque Manila may be sufficient to keep him pretty much at home, but he will always reproach himself in later life unless he takes the opportunity of such a God-given tour to extend his acquaintanceship further into the amazing beauty of the Philippines, and if possible to see something of the rest of the Orient.

The growing use of the Marines in overseas expeditions has largely restricted the opportunities of young officers for foreign service in connection with their military career, and every opportunity should be taken to develop the advantages of such foreign service as still remains to us. The question of cost is of course ever present, and perhaps the junior officer in the Army has never been so badly paid as he is to-day.

However, this is a situation not peculiar to our own Army. Lieutenant Hendley says:

> "One often hears in India that big game shooting is not what it used to be, that the difficulties of securing a block are too great, that the necessary outfit, stores and preliminary organisation are so extensive, that above all, the expense is so prodigious, that it is no longer a sport within the scope of an impecunious subaltern.

It is in the hope of controverting this very generally accepted idea that I venture to submit this plain unvarnished tale, mainly extracts from a diary, of how last year a Second Lieutenant—a greenhorn, an absolute beginner, who had hitherto never shot with a rifle anything bigger than a rabbit, or even seen a jungle, alone and with nothing but a good stock of optimistic keenness behind him, stumbled on to a two months' time in the jungle which surpassed his wildest dreams. When I say that the bag was I elephant, I bison, I sambhur, 2 chital, I barking deer, I bear; that another elephant and bison were unfortunately lost wounded and that with a little more luck two tigers might, one certainly should, have been added to the bag; add to this the fact that the cost of the trip was 450 rupees (about $165) a month, and I think I ought to succeed in convincing some, at any rate, that big game shooting is still very much worth while and not beyond anyone's reach."

This issue of *The Journal of the Royal Artillery* also contains the following articles:

"The Tactical Handling of A. A. Units in the Field," by Captain K. M. Loch, M.C., R.A.

"'N' Battery, R.H.A., at the Battle of Hyderabad, Scinde," by Bt. Lieut.-Col. G. M. Spencer-Smith, D.S.O., R.A.

"The Foundations of War Control," by Colonel J. F. C. Fuller.

"The Impatience of an Infantryman," by Colonel T. N. S. M. Howard, C.B., D.S.O.

"The 75-mm. Field Gun as a Close Support Weapon," by Colonel E. Pagezy, *Revue Militaire Française,* March, 1927. Translated by Captain C. T. Beckett, M.C., R.A.

"The Problem of Disarmament," by Lieut.-Col. H. de Watteville, C.B.E., R.A. (retired).

"Patriotic and Military Societies in Germany," by Brig.-Genl. W. Evans, C.M.G., D.S.O.

FRANCE

"Revue D'Artillerie," August, 1927

In his article **"Counterbattery,"** General Faugeron presents an extensive and detailed study of the subject. Most studies approach the problem from the standpoint of a single battery and end by demanding the expenditure of such enormous amounts of ammunition that the solution appears practically impossible. General Faugeron, however, believes that valuable results may be obtained in spite of the difficulties involved.

Although counterbattery in general during the war was based on

destruction and although the same idea still prevails in the present regulations, the enormous amounts of ammunition involved and the uncertainty of securing adequate results lead to the conclusion that the better plan is to seek neutralization, accepting such destruction as the neutralization fire may chance to obtain.

Destruction did not prevent the steady and tremendous increase of all artillery during the war. Wear of the pieces and premature bursts destroyed more cannon than counterbattery fire. The important factor in decreasing enemy artillery is the capture of his guns by our infantry, but to allow infantry to get forward, neutralization of the enemy batteries must be provided.

The present regulations prescribe adequate and excellent rules for the conduct of neutralization fire but, unfortunately, the instructions cannot be carried out if the rules for zone fire, given in the same regulations, are closely followed. Under these rules the expenditure of the amount of ammunition required becomes a practical impossibility. However, by following certain rules outlined below, it is believed that a solution of the problem may be obtained.

As the personnel of enemy batteries will certainly seek shelter as soon as a concentration begins, it can be expected that the fire placed on them will have little effect after about three minutes. Also, a long concentration will expend a quantity of ammunition that precludes a repetition of the fire when the enemy has returned to his guns. Hence the necessity for a series of sudden and violent concentrations against each enemy battery with cessations of fire timed so as to allow the enemy an opportunity to return to his emplacements, say fifteen minutes in open warfare and thirty minutes in stabilized situations.

The concentrations must be as dense as possible, therefore the maximum rate of fire must be used, which fixes the maximum duration of fire at two minutes and the maximum ammunition expenditure at:

24 rounds for the 75; 288 rounds per battalion
16 rounds for the 105; 192 rounds per battalion
6 rounds for the 155; 72 rounds per battalion.

Concentrations of one battalion will be placed on each enemy battery. From a consideration of the area occupied by a battery and the probable errors at various ranges, the zone to be covered by a single concentration is calculated to be about 180 meters wide and 150 meters deep. At all except the longer ranges, the zone should be covered in depth by fire at two limiting elevations three-fourths of a fork apart.

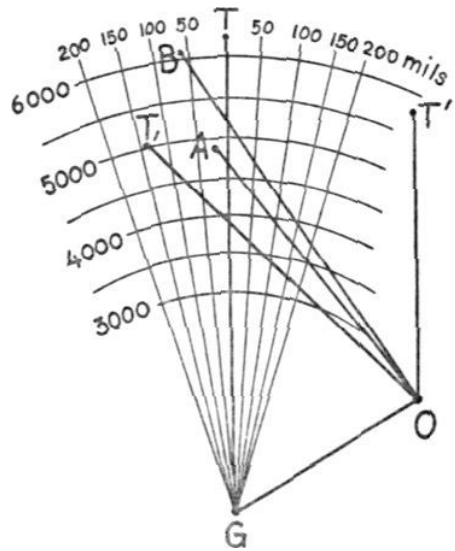
To increase both the material and moral effect, concentrations from battalions of different caliber and from different battalions of the same caliber should be fired against a single objective. In

general, if a battery does not change position, a series of four concentrations should be enough to neutralize it for a sufficient length of time—sometimes for several hours. Assuming that each enemy battery will be fired against by two battalions, eight or ten batteries may be assigned to one light battalion and five or six batteries to one medium battalion.

In general, counterbattery fire has only relatively feeble effects. However, the effect of the 75, within the limits of its range, is markedly superior to that of the other calibers. Hence, in any situation, it is indispensable that a portion of the light artillery be assigned to counterbattery missions. In open warfare a counter-battery groupment should support each division, working in close liaison with the divisional artillery.

Captain Guillemain writes on **"The Rapid Determination of Deflection Shifts at a Lateral Observation Post."** He gives a graphic method, using the chart here shown.

The chart is drawn to a scale of 1/50,000. The line *GT* represents the line gun-target or the base-line. The observer's position is plotted on the chart at *O,* the angle *TGO* being equal to the difference between the *Y*-azimuth of the line *GT* and the *Y*-azimuth of the line *GO*. The distance *GO* is measured from the map.



The line *OT'* is drawn parallel to *GT,* its *Y*-azimuth is measured and an aiming circle is set up at *O* with its zero on the line *OT'*. Measurements are then taken to any other point on the terrain, such as T_1, and the point is plotted on the chart. The angle to be used and the range are then read at once from the chart.

The method becomes subject to large errors when *O* is too far in advance of *G*. Its precision when it can be used depends principally on the exactness of the determination of the distance OT_1.

Captain Courau in his article, **"Terrestrial Observation in Broken Terrain,"** discusses the problem of exactly locating objectives when observation from three points becomes difficult or impossible

on account of inequalities in the terrain. In this case, the site determination becomes an important factor and the author gives various methods for its use in connection with observation from two points or from a single station.

Two very technical articles are included in this number:

"A Method for the Use of Copper in the Preparation of Decay-resisting Cloth."

"An Electrical Method for Measuring the Speed of Detonations."

September, 1927

Major Gautsch in his article, **"The Automobile in the Sahara,"** states that two general types are required, one for following the trails, the other for cross-country use. The peculiar difficulties encountered in the desert, such as the steep slopes and the variety of footings, necessitate certain characteristics for the vehicles used.

A car possessing a high clearance, a mean speed of 25 km. an hour, and balloon tires should satisfy the requirements for the first type. It should have a very low gear ratio available. Many of the ordinary commercial vehicles should prove satisfactory with only slight modifications. A 10-H.P. car of this type has recently covered 15,000 km. in the Sahara.

The cross-country type indicated is a four-wheel or six-wheel drive vehicle steering on four wheels, with a high road clearance, a very low gear ratio available when needed, a short body, and balloon tires.

Large size low-pressure tires on single wheels are considered better than double wheels for both types. Condensers should be provided on account of the heat, the constant use of low gear, and the lack of water in the desert. Air, gas, and oil filters are a necessity, also an air pump operated by the motor. A complete set of spare parts must be carried. The gasoline capacity must allow a radius of action of 1000 kilometers.

Major Morel describes **"The Hotchkiss 13.2-mm. (.53-inch) Anti-aircraft Machine Gun."** The weapon is a piston-operated gun, of the usual Hotchkiss type, which fires a bullet weighing 52 grams at a rate of 450 rounds a minute. The muzzle velocity is 800 meters a second.

Although intended particularly for use against aircraft flying at altitudes below 3000 meters, the gun should be very useful against light armored vehicles, such as armored machine gun cars, as it will penetrate their armor at ranges of 500 to 600 meters.

The gun weighs 71 pounds. It has a small number of parts and is easily disassembled by hand. Loading is accomplished by means of a rigid band containing 15 cartridges or a 25-cartridge magazine. Armor-piercing bullets of two types are provided, one equipped with a tracer.

All-around fire mounts carrying one, two, and four guns have been constructed. All are provided with seats for the gunners and with special anti-aircraft sights which correct automatically for displacement of the target in site, range, and direction during the time of flight.

M. Lartier contributes an article on the subject dealt with by Colonel Buchalet in the July number, **"The Armament of the Divisional Artillery."** He reviews a German article in which the author states that a mixed battalion of two 105-mm. howitzer batteries and one 77-mm. gun battery is desirable. If the howitzer can reach 16 km., it should entirely replace the gun. The difficulties of mobility and ammunition supply can be met by motorization. A secondary advantage of motorization lies in the fact that the machine is not sensitive to gas.

The German idea for the employment of corps artillery is rather different from the French conception. The German corps artillery is a reserve to be allotted to the divisions for reinforcement. It should be composed of a light motorized regiment, a heavy regiment (150-mm. guns, 150-mm. howitzers, and 21-cm. mortars) and an anti-aircraft regiment.

In war of movement, the German division is independent of the corps in that the corps allows full latitude to such divisions as can advance, contenting itself with reinforcing and supplying them. Counterbattery in such cases is a function of the reinforced divisional artillery. Only in the case of an attack against a stabilized front is a corps counterbattery organization visualized.

M. Lartier believes that the difference in the contemplated employment of the corps echelon in the two armies is due primarily to the fear of the German Staff that an artillery hierarchy of command would usurp some of its functions of command, or rather, "direction." We are familiar with the results of German Staff direction during the war. The prejudice against higher artillery chiefs has been criticized by Colonel Bruchmüller, who organized the artillery arrangements for great German offensives of 1917 and 1918 and who was the chief sufferer from the system. He says, "It is undoubtedly correct to do as the French do and to give artillery officers a rank comparable to the duties. In this way much friction and lost motion may be avoided."

The present German regulations, however, maintain the *status quo ante bellum*.

Other articles are "The Standard Temperature for Measurements in Industry" and "Empirical Formulas for the 75-mm. Gun Range Table Functions."

October, 1927

In this month's number, Colonel Pagezy begins an interesting series of articles, **"Notes on Unilateral Observation,"** which will be reviewed later.

The development of a motor fuel other than gasoline is of great importance to France and many articles on the subject are appearing in French military journals. Major Oudet in his article, **"The Diesel Motor for Automobiles,"** gives a history of oil engine development and describes one of the most successful of the recent Diesel motors, a German one, made by the Augsburg Nurnberg Machine Works. It has been used to a considerable extent in Germany for trucks, busses, and tractors. The cost of the fuel employed (heavy oil) per horsepower developed is about 25 per cent of the cost of gasoline. The radius of action for an equal volume of fuel carried has been increased 40 to 50 per cent. Also the motor has the advantage of being more easily cooled than the gasoline engine.

The article, **"Portable Circular Platforms,"** describes three such platforms developed by the Germans for use with light guns and howitzers. The Bofors 75-mm. guns sold to the Brazilian Government in 1922 are equipped with metallic platforms, as are the Bofors 105-mm. howitzers.

The platforms are demountable and are carried on the limbers. They are quickly assembled and anchored to the ground by means of stakes. The piece is then run onto the platform and held rigid by braces which fasten on each side of the trail.

A 360° traverse is thus provided by means of an easily transported and rapidly assembled platform weighing about 320 pounds.

"Revue Militaire Française," November-December, 1927

"Mountain Troops in the German Army" appears in the November number. In 1914 the German Army was not prepared for mountain warfare and did not have any troops equipped and trained for this special type of work. It was only through very painful experience that the Germans discovered that mountain warfare could not be carried on with improvised organizations and equipment.

The author describes the present organization of the German

mountain troops and also the organization planned for war. The peace-time organization assigns all these troops to the 7th Bavarian Division. Their garrisons are close enough to mountainous regions to permit facility of training. The Germans distinguish between "high mountain" troops and "medium mountain" troops. The latter differ from ordinary troops only in their transportation, which is pack rather than wheel.

There are two mountain batteries in the German Artillery. The guns are 75-mm. Skoda, model of 1915, which replaced the Krupp guns of the same caliber which were less powerful. The gun is carried in seven loads, averaging 220 pounds. Provided with shafts it can be drawn by two horses in tandem.

Each battery has its own combat train as well as its sanitary and veterinary personnel and equipment. The battery is equipped with both telephones and radio. Communication in the mountains presents a very difficult problem, and the ordinary means of communication is by radio. Telephone lines from the valley to the heights are used only in case of absolute necessity. Pigeons and dogs give good service.

Although the treaty of Versailles defined the rôle of the German Army as that of a police force, the German Government has war plans for a modern army. In this army the mountain troops are organized into divisions and brigades.

The plans for a mountain division provide for: three regiments of mountain infantry, each regiment having three battalions, one company of minenwerfers and one communications company; two regiments of artillery; one company of infantry on skis; one company of mountain climbers; and a company of guides.

In the November number Colonel Lucas continues his article, **"The Qualities of a Chief."**

Having discussed the essential qualities of a higher commander, Colonel Lucas enumerates the qualities most necessary to an officer of the lower grades. He emphasizes two qualities essential to officers who are in immediate contact with troops: initiative and knowledge of men.

Initiative does not include the right of a subordinate commander to modify an order received because he thinks that he knows better than his chief. Intelligent initiative should act to complete and develop an order, when intentionally or otherwise the higher commander has remained silent on certain matters of detail which he intends to leave to the judgment of the subordinate. Initiative should act where necessary in the absence of an order and in the face of an unexpected situation, or in a situation which has changed since

the order was issued. In all such cases the subordinate should make decisions consistent with the mission, the intentions of his chief, and without fear of responsibility.

A troop officer should continually study the temperament of his men, the state of their morale, and their capabilities. He must never demand the performance of impossible tasks. To do so will kill discipline. "The moment that subordinates cannot do all that is asked of them, they will thereafter do only what they want to do." Throughout his article Colonel Lucas has stressed the importance of this quality which he calls "the sense of possibilities."

"To Learn the Art of War," by General Camon, is the second of a series of articles on this subject. In the November issue he studies the campaigns of Napoleon. In introducing the article he remarks that all features of the art of war can be found in these campaigns.

General Camon believes that the military student will learn more by studying the mental processes of a commander than by confining his study solely to details of troop movements.

In concluding his article, General Camon attributes Napoleon's success to the following causes: "a system of maneuver on the enemy rear; an incomparable ability to analyze the general situation; a fertile imagination which helped Napoleon to adapt the proper maneuver to the situation; an ability to foresee the enemy's reaction to his maneuver and thereby guide him to take the necessary precautions to assure the success of the maneuver; a strong will power which sacrificed everything to the success of the maneuver; a courage which was not shaken by any unexpected accidents; and above all an absolute confidence: confidence in his system of maneuver and in his foresight." This confidence was of extreme importance since Napoleon could not consult anyone about his projects because of the necessity of secrecy.

"Study of Defensive Methods," by General Brossé, appears in the December number. General Brossé points out that the defense as well as the attack is a maneuver in which the element of surprise is extremely important. The commander of the defensive forces must try to mislead the enemy as to the position of the line of main defense, and cause him to err in the disposition of his attacking troops.

In **"Infantry and Tanks,"** Colonel Velpry attempts to clear up certain points now under discussion concerning the mechanics of the combined combat of these two arms. Although the necessity of close liaison is generally admitted, many theories are advanced as to the manner and means of realizing the liaison.

Apparently there is much discussion as to just how close this liaison should be; at what distance should the tanks precede the attacking infantry. Colonel Velpry believes that this distance is fixed by the range of the enemy automatic weapons, and by the nature of the terrain. He believes that the proper liaison can be obtained by designating successive objectives common to the infantry and the tanks.

This is the basis of liaison between the two arms, since it fixes at each instant the objectives upon which the tanks and the infantry orient their combined action and the lines on the terrain upon which they will again come into direct contact before pushing ahead again. The depth of the terrain of attack of the infantry battalion is thus divided by successive objectives into areas in which the infantry and tanks work simultaneously. By having successive objective relatively close together, the tanks cannot draw away from the infantry to conduct a separate combat. These objectives should be marked by successive military crests since they mark the extreme limit of the enemy emplacements occupied by the defensive arms which are firing on the attacking infantry.

"The Automobile Show of 1927" leads Lieutenant-Colonel Doumenc to criticize French manufacturing methods. He found at the show a multitude of new models of beautiful designs. He found, however, no attempt toward standardization of manufacturing methods, such as is found in the United States.

He points out that in the United States there is an automobile to each five persons, while in France there is only one car to each fifty persons. This condition exists because the price of the American car, calculated in terms of American daily wages, is very much less than the price of the French car calculated in the same manner.

To copy American methods and to improve the situation in France, Lieutenant-Colonel Doumenc advocates:

(1) Stabilization in types of cars, with every effort made to reduce the number of models.

(2) The manufacture of standard parts in special factories. This is a system similar to that employed by the General Motors Corporation, where motors, bodies, accessories, etc., are sent from their respective special factories to the various automobile factories which act largely as assembly shops.

"In French Morocco in 1925," by Captains Loustaunau-Lacau and Montjean, begins in the December number. They introduce their subject with a discussion of the political and commercial situation

in 1925. They defend French occupation and point out the beneficial results of a century of French rule.

The authors then go on to explain the psychology of Moroccan revolt. The various tribes were forced into the Riff Army through fear of punishment by Abd-el-Krim. A description of the terrain and the climate then follows, explaining the necessity of a special type of warfare. The authors explain, however, that though the tactics employed in Morocco were of a special type, they were merely the adaptation of the broad principles of modern warfare.

The succeeding issues will give a detailed account of the various offensives.

"The Centenary of the Battle of Navarin," by Colonel de Nerciat, is written upon the occasion of the celebration to commemorate this battle. The Greek Government held the celebration in the vicinity of the locality where the Turco-Egyptian fleet was destroyed on October 20, 1827, by the English, French, and Russian fleets. This battle freed Greece from Turkish rule.

Other articles that appear are: "Douamont during the German Occupation"; "Serb Victories in 1914"; and "The 2nd Division of Infantry of the Prussian Guard on August 21st and 22nd, 1914."

CURRENT FIELD ARTILLERY NOTES

Field Artillery Troops to Leave Fort McIntosh

IN AN endeavor to utilize as far as practicable all permanent accommodations by fitting organizations into available barracks and quarters, the War Department has directed the following troop movements, effective May 11, 1928:

The Fourth Field Artillery Battalion (pack artillery), commanded by Lieutenant-Colonel William F. Morrison, from Fort McIntosh, Texas, to Fort Robinson, Nebraska;

The Eighth Engineer Combat Battalion (mounted) commanded by Major Charles F. Williams, from Fort Bliss, Texas, to Fort McIntosh, Texas;

The Third Field Artillery Headquarters, Headquarters Battery, Service Battery, and Band, commanded by Colonel Robert C. Foy, from Fort McIntosh, Texas, to Camp Knox, Kentucky.

Not only have troops stationed at Fort McIntosh been in part overcrowded, but due to the lack of sufficient ground very little opportunity has been afforded for the proper training and movement of the pack type of artillery.

A careful study of various places to which pack artillery could be sent for development under favorable conditions for training has indicated the selection of Fort Robinson, Neb., as a desirable station for the Fourth Field Artillery Battalion. In this respect, Fort Robinson offers unusual opportunities. Originally constructed as a cavalry post, it was last occupied in 1916 as a regimental garrison by the Twelfth Cavalry. The post is now occupied by a Remount Depot, which comprises approximately five officers, one-hundred enlisted men and forty civilians. Annually, about 800 horses pass through this station. By using all available space as barrack accommodations, regardless of the purposes for which buildings were constructed, it will be possible to install the Fourth Field Artillery Battalion in Fort Robinson without dislodging the Remount Depot. The Fourth Field Artillery Battalion has been stationed at Fort McIntosh since October, 1924.

The movement of headquarters units of the Third Field Artillery to Camp Knox, Ky., will establish them in close proximity to the remainder of the regiment, the First Battalion of which is stationed at Fort Benjamin Harrison, Ind., and the Second Battalion, less Battery "F", at Fort Sheridan, Ill. These units of the Third Field

Artillery have been kept at Fort McIntosh due to crowded living conditions at Fort Benjamin Harrison which did not permit their transfer to that station.

The transfer of the Eighth Engineer Combat Battalion (mounted), a unit of the First Cavalry Division, from Fort Bliss, Texas, to Fort McIntosh, Texas, will somewhat relieve the crowded conditions at Fort Bliss and will reduce the contemplated building program at that place.

The above transfers are in keeping with the War Department's policy of moving troops temporarily to some other location until such future time as the congested conditions may be relieved by new construction in accordance with the War Department Housing Program.

Advanced Horsemanship Course

The War Department has authorized the establishment of an advanced course in horsemanship at the Field Artillery School, Fort Sill, Okla., in order to further improve riding and draft in the Field Artillery by the training of a limited number of experts to be instructors at the Field Artillery School and in field artillery organizations. There is being conducted at the Field Artillery School this year a trial course in advanced horsemanship which, according to the Chief of Field Artillery, has proven a decided success. Based upon this, recommendations have been made and approved that the instruction be authorized as a regular course at the school beginning the coming year.

For several years it has been the custom to send two selected officers from the Field Artillery School to the Cavalry School at Fort Riley. At the Cavalry School a much greater proportion of the time is devoted to equitation and the training of horses, than at any other school in our service. On the other hand, the Cavalry School does not provide the thorough instruction in draft required in a Field Artillery course. The practice of sending field artillery officers to the Cavalry School has made available as instructors, a number of officers conversant with the instruction at both schools.

Officers' Mounts May Be Returned from the Philippines

New regulations which have been issued by the War Department, upon the recommendation of Major-General Fred W. Sladen, Commanding the Philippine Department, will permit horses of the Army, including officers' private mounts, to be returned to the United States upon the certificate of an officer of the Veterinary Corps of the Army that the animals have not been exposed to such diseases as glanders and surra during the preceding sixty days. In addition, they must

show negative reaction to the mallein test for glanders, and blood examinations for surra. Upon arrival in the United States, the horses will be subjected to a twenty-one day quarantine and the tests for glanders will be repeated.

From the time of our occupation of the Philippine Islands to the present time, the shipment of horses from the islands to the United States has been forbidden by the regulations of the Department of Agriculture as a precaution against the introduction of diseases which exist in the Philippine Islands such as glanders, surra, farcy, and epizootic lymphangitis.

This regulation worked a hardship, particularly on officers who owned horses and who were ordered to the Philippines for duty. They either were forced to leave their horses in the United States and thus be deprived of their use during the period of their tour of duty or, if they elected to take their horses with them, they were forced to dispose of them upon completion of their tour of foreign service, regardless of sentiment and financial loss.

12th Field Artillery Wins Boxing Honors

The 12th Field Artillery won the first Annual Second Division Inter-regimental Boxing Tournament with a total of 920 points to their credit, the 9th Infantry obtaining second place with 715 points.

The 12th Field Artillery boxers have been under the direction of Captain R. V. K. Harris with Sergeant Hartley as coach of the squad. Corporal Red Foster also rendered valued assistance in making the 12th squad a winner, not only by assisting in the coaching, but by winning several of the events himself.

Colonel P. S. Golderman, Commanding Officer of the 12th Field Artillery, has backed the boxing squad and helped greatly in the success of the team. He took a great deal of interest in the bouts, went to all of them himself, and gave the men every possible assistance.

At a meeting of the Fort Sam Houston Athletic Association, it was decided to present the 12th Field Artillery with a trophy for winning the first inter-regimental tournament. It was also decided to present gold medals to the winners of the Class I and II events.

Field Artillerymen to receive medals are as follows: Class I—Foster, 12th Field Artillery, and Tatro, 15th Field Artillery; Class II—Shingola and Kaiser, 12th Field Artillery.

Tactical Training Exercises for Higher Commanders

Since the World War the War Department has been faced with the problem of finding ways and means to train its higher commanders

and other staffs. On account of the present wide dispersion of the troops of the Regular Army, made necessary in connection with its duties with civilian components of the Army, and the resultant cost of transportation, it has not been possible, nor will it be possible in the future, to assemble large bodies of troops for maneuvers for the purpose of training higher commanders and their staffs.

In order that corps area and division commanders and their staffs may obtain this training which is so necessary for the handling of large units such as divisions, corps and armies, the War Department proposes to hold in the summer of 1928 in two corps areas, the Second and Eighth, command post exercises, which will involve in tactical scope, the functioning of an army or of an independent corps. These exercises are conducted without troops but the command posts of all units are set up and function as they would in actual combat. The directing staff draws the initial situations and requires the plans and orders of subordinate units. The exercises include reconnaissance of all or part of the theater of operations by ground and by air. In order to bring out the realism of the exercises and to demand the actual functioning of staff sections and services, command posts are established with as complete communications as possible, and, if practicable, at the actual distances from each other which they would occupy in combat. Orders and messages are prepared, transmitted and acted upon as under service conditions. Changes are introduced in the situation at various times in a realistic manner, which require further decisions and orders of subordinate commanders, the functioning of all means of communication and the corresponding movement of troops on the map. By this means, the actual operation of headquarters under service conditions can be closely simulated.

In the proposed exercises, the corps area commanders will be the directors and the corps area staffs will function in a directing capacity. The personnel, which will participate, will consist of division commanders and possibly brigade commanders with their staffs of such Regular Army, National Guard and Organized Reserve Divisions as are located within the corps area.

Based on the experience gained from the 1928 command post exercises, the War Department contemplates holding similar exercises annually in all corps areas. When brought to this stage, it is believed that the exercises will represent one of the most valuable steps undertaken in recent years in the training of the Army of the United States. It is further hoped that they will be comparable with the grand maneuvers of European armies, without the attendant expense, and that they will go far toward giving adequate training in peace-time to our senior commanders.

Specifications of a Good Horse, Version of 1496

"A good horse should have three propyrtees of a man, three of a woman, three of a foxe, three of a haare and three of an asse.

"Of a man—Bolde, prowde and hardye.
Of a woman—Fayre breasted, fair of hair and easy to move.
Of a foxe—A fair taylle, short ears, with a good trotte.
Of a haare—A grate eye, a dry head and well ronnynge.
Of an asse—A bygge chynn, a flat legge and a good hoof."

Wynkyn de Worde (1496).

New Coast Artillery Matériel

Three-inch Antiaircraft Gun and Mobile Mount Adopted.—The War Department has adopted and approved as standard for manufacture and issue a new three-inch antiaircraft gun and mobile mount.

The three-inch antiaircraft mobile mount (T-1) is the latest design of mobile and antiaircraft artillery produced by the Ordnance Department, and represents a marked advance over previous types. The questions of stability, mobility and maneuverability are of the greatest importance in a mobile gun carriage, and all three of these points appear to have been successfully accounted for in this carriage. The carriage is stable under all conditions of firing; it may be emplaced from the travelling position in readiness to fire in about fifteen minutes, and is so light in weight that it can be towed across country by a standard four-wheel drive truck.

The gun is 50 calibers in length and is made up to two parts; an outer tube and an inner removable liner. The removable liner represents a marked advance in gun construction, as it does away with the necessity for sending a worn-out gun to an arsenal for retubing. The cost of the liner is a small fraction of the cost of a new gun, and it can be installed at the firing front in a few minutes by battery personnel using simple hand tools. The use of loose liners in antiaircraft guns is of the greatest importance since it reduces the importance of the question of gun erosion, and thereby permits the use of higher muzzle velocities.

The gun fires a standard three-inch projectile at a muzzle velocity of 2600 feet per second. The vertical range is about 5000 yards and the maximum horizontal range 11,000 yards. The gun is equipped with a semi-automatic breech mechanism which closes when the round is pushed home, and opens automatically and ejects the case when the gun is fired.

A continuous fuze setter is provided with this carriage. In this fuze setter the time fuze is set continuously at the proper fuze range of the target as long as it remains in the instrument. This type of fuze setter decreases the dead time (the time interval between the

computation of date and the firing of the gun on that data), and has materially increased the efficiency of antiaircraft fire.

The gun may be fired at a rate of about twenty-five shots per minute.

The indirect method of fire control is used with this gun. In this method the firing data is transmitted continuously by electrical means from a central station computer to the gun, and the gunners have only to keep the gun laid on the future predicted position of the target by matching pointers.

105-MM. Antiaircraft Gun and Carriage Adopted.—The War Department has adopted and approved as standard for manufacture and issue a new 105-mm. antiaircraft gun and carriage.

This gun and carriage are a recent development of the Ordnance Department and the most powerful antiaircraft weapon yet tested by our services. It is not expected that this gun will replace the standard types of three-inch antiaircraft artillery, but it will be of great value as an auxiliary weapon providing as it does, for a substantial increase in size of zone of effective antiaircraft defense.

Two antiaircraft guns of this caliber have been built and tested. Both are 60 calibers in length (the longest guns in calibers ever built in this country) and the latest model is equipped with a loose liner to permit replacement in the field in a few minutes by the battery personnel using simple hand tools.

The gun is designed for a muzzle velocity of 3000 feet per second and will fire a 33-pound projectile to a height of 12,000 yards with a maximum horizontal range of 20,000 yards. The increased weight of the shell, as compared with the three-inch 15 pounder projectile, provides a large increase in the danger space, or effective area of the burst. The high muzzle velocity and greater weight of projectile considerably reduce the time of flight at all ranges.

An automatic rammer system is provided to load the complete round of ammunition, which weighs about 65 pounds and is too heavy to load by hand. The rammer mechanism is so constructed that it is thrown to the rear during the recoil of the gun, compressing the air in the rammer cylinder. To load the gun it is only necessary to place the complete round on the loading tray and pull the rammer lever. The gun is equipped with semi-automatic breech mechanism which closes as soon as the round of ammunition is pushed home, at the same time locking the rammer head out of position. Upon firing the breech block opens automatically and ejects the empty shell case.

The rate of fire so far attained with this gun is about 15 shots per minute.

Like the three-inch antiaircraft gun, the 105-mm. is equipped with a continuous fuze setter, and is also similarly laid.