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**THE  
FIELD ARTILLERY  
JOURNAL**

**EDITED BY**

**ARTHUR F. CASSELS**

**LIEUTENANT-COLONEL (FIELD ARTILLERY), UNITED STATES ARMY, RETIRED**

**THE UNITED STATES FIELD ARTILLERY ASSOCIATION  
WASHINGTON, D. C.**

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## THE FIELD ARTILLERY JOURNAL

Edited by

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SAINT BARBARA  
Patron Saint of Artillery

# THE FIELD ARTILLERY JOURNAL

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## Saint Barbara

PATRON SAINT OF ARTILLERY

*Ital.*, Santa Barbara; *Fr.*, Sainte Barbe. Patron saint of armorers and gunsmiths; of firearms and fortifications. She is invoked against thunder and lightning, and all accidents arising from explosions of gunpowder. Patroness of Ferrara, Guastala, and Mantua. Dec. 4, A.D. 303.\*

The legend of St. Barbara was introduced from the East, about the same time with that of St. Catherine. She is the armed Pallas or Bellona of the antique mythology, reproduced under the aspect of a Christian martyr.

"There was a certain man named Dioscorus, who dwelt in Heliopolis; noble, and of great possessions; and he had an only daughter, named Barbara, whom he loved exceedingly. Fearful lest, from her singular beauty, she should be demanded in marriage and taken from him, he shut her up in a very high tower, and kept her secluded from the eyes of men. The virtuous Barbara, in her solitude, gave herself up to study and meditation; from the summit of her tower she contemplated the stars of heaven and their courses; and the result of her reflections was that the idols of wood and stone worshipped by her parents could not be really gods—could not have created the wonders on which she meditated night and day. So she condemned in her heart these false gods; but as yet she knew not the true faith.

"Now, in the loneliness of her tower, the fame reached her of a certain sage who had demonstrated the vanity of idolatry, and who taught a new and holy religion. This was no other than the famous doctor and teacher, Origen, who dwelt in the city of Alexandria. St. Barbara longed beyond measure to know more of his teaching. She therefore wrote to him secretly,

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\* Extract from "Sacred and Legendary Art," by Mrs. Jameson.

## THE FIELD ARTILLERY JOURNAL

and sent her letter by a sure messenger, who, on arriving at Alexandria, found Origen in the house of the Empress Mammea, occupied in expounding the Gospel. Origen, on reading the letter of St. Barbara, rejoiced greatly; he wrote to her with his own hand, and sent to her one of his disciples, disguised as a physician, who perfected her conversion, and she received baptism from his hands.

"Her father, Dioscorus, who was violently opposed to the Christians, was at this time absent; but previous to his departure he had sent skilful architects to construct within the tower a bath-chamber of wonderful splendor. One day St. Barbara descended from her turret to view the progress of the workmen; and seeing that they had constructed two windows, commanded them to insert a third. They hesitated to obey her, saying, 'We are afraid to depart from the orders we have received.' But she answered, 'Do as I command; ye shall be held guiltless.' When her father returned he was displeased; and he said to his daughter, 'Why hast thou done this thing, and inserted three windows instead of two?' And she answered, 'Know, my father, that through three windows doth the soul receive light—the Father, the Son, and the Holy Ghost; and the Three are One.' Then her father, being enraged, drew his sword to kill her, and she fled from him to the summit of the tower, and he pursued her; but by angels she was wrapt from his view, and carried to a distance. A shepherd betrayed her by pointing silently to the place of her concealment; and her father dragged her thence by the hair, and beat her, and shut her up in a dungeon, all the love he formerly felt for his daughter being changed into unrelenting fury and indignation when he found she was a Christian. He denounced her to the proconsul Marcian, who was a cruel persecutor of the Christians. The proconsul, after vainly endeavoring to persuade her to sacrifice to his false gods, ordered her to be scourged and tortured horribly; but St. Barbara only prayed for courage to endure what was inflicted, rejoicing to suffer for Christ's sake. Her father, seeing no hope of her yielding, carried her to a certain mountain

## SAINT BARBARA

near the city, drew his sword, and cut off her head with his own hands; but as he descended the mountain there came on a most fearful tempest, with thunder and lightning, and fire fell upon this cruel father and consumed him utterly, so that not a vestige of him remained."<sup>1</sup>

In the devotional pictures, St. Barbara bears the sword and palm in common with other martyrs; when she wears the diadem, it is as martyr, not as princess; she has also the book, and is often reading, in allusion to her studious life; but her peculiar, almost invariable, attribute is the tower, generally with three windows, in allusion to the legend.

St. Barbara, as protectress against thunder and lightning, firearms, and gunpowder, is also invoked against sudden death; for it was believed that those who devoted themselves to her should not die impenitent, nor without having first received the holy sacraments.<sup>2</sup> She therefore carries the sacramental cup and wafer, and is the only female saint who bears this attribute. She is usually dressed with great magnificence, and almost always in red drapery. The tower is often a massy building in the background, and she holds the sword in one hand, and the Gospel or palm in the other; occasionally, in early pictures, and early German prints, she holds a little tower in her hand, merely as a distinguishing attribute; or she is leaning on it as a pedestal.

The most beautiful of the single figures to which I can refer is the *chef-d'œuvre* of Palma Vecchio (see frontispiece), placed over the altar of St. Barbara in the church of Santa Maria Formosa at Venice. She is standing in a majestic attitude, looking upwards with inspired eyes, and an expression like a Pallas. She wears a tunic or robe of a rich, warm brown, with a mantle of crimson, and a white veil is twisted in her diadem and among the tresses of her pale golden hair. The whole picture is one glow of color, life, and beauty. I never saw a combination

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<sup>1</sup>Legenda Aurea.

<sup>2</sup>In the early days cannon had a habit of bursting when discharged, with more or less fatal results to those serving them. Artillerymen, therefore, were considered to be in constant danger of sudden death from their own weapon. As Saint Barbara was invoked against sudden death, it may be that this was one of the reasons, if not the principal one, why she was selected as the patron saint of artillery.—EDITOR.



## THE FIELD ARTILLERY JOURNAL

of expression and color at once so soft, so sober, and so splendid. Cannon are at her feet, and her tower is seen behind.<sup>3</sup> Beneath, in front of the altar, is a marble bas-relief of her martyrdom; she lies headless on the ground, and fire from heaven destroys the executioners.

There is a very fine single figure of St. Barbara, holding her cup and wafer, by Ghirlandajo.<sup>4</sup>

As patroness of firearms and against sudden death, the effigy of St. Barbara is a frequent ornament on shields, armor, and particularly great guns and field pieces.

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<sup>3</sup>This is the most celebrated of the numerous portraits of Violante Palma, Titian's first love, according to the well-known tradition, and whose beautiful face and form are to be traced in some of his early pictures, as well as those of Palma and Giorgione. Her portrait by Giorgione is in the Manfrini Palace; she is holding a guitar. Her portrait by her father is at Dresden; and her portrait by Titian, as Flora, in the Florence Gallery.

<sup>4</sup>Berlin Gallery.

# **Being a Tactical Study of the Field Artillery Group in Retreat.\***

BY LT.-COL. W. H. F. WEBER, C.M.G., D.S.O. PSC., R.F.A.

(In three parts; Part I, March, 1918; Part II, April, 1918; Part III, Conclusion and some Platitudes.)

[EDITOR'S NOTE.—*This study of Field Artillery in retreat contains much of interest to our Field Artillerymen, as it will call to mind some of their own difficulties in transportation and with communications, though fortunately we were never in a retreat.*

*A few notes on the latest British Field Artillery organization are given as an aid to the reader, as their organization differs materially from ours.*

*Batteries are commanded by majors, each with a captain, second in command, and have six guns, except heavy field batteries, which have only four.*

*Brigades, commanded by lieutenant-colonels, usually have three batteries, though horse artillery and howitzer brigades have only two batteries. Heavy gun batteries are not brigaded.*

*The Divisional Artillery (D.A.), commanded by a general officer, contains four brigades (one equipped with howitzers) and one heavy gun battery. Howitzer brigades are now being increased to three batteries, which will give seventy-six guns and howitzers to a division.*

*A cavalry division has two brigades, with a total of twenty-four guns.*

*In this article, the writer's Second Brigade, R.F.A., had four batteries (three guns and one howitzer).*

*The term "group" refers to a convenient grouping of batteries, varying in number, to cover an area. At first the writer had three batteries in his right group, while later he had seven.*

*The "bury" so frequently mentioned is a buried telephone cable.*

*As this study will appear in serial form, it is suggested that numbers of the JOURNAL containing the different installments of the "Study" be preserved in order that the whole may be read when leisure permits. Back numbers of the JOURNAL are not always on hand.]*

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\*Reprint from *The Journal of the Royal Artillery*, February, 1920.

## THE FIELD ARTILLERY JOURNAL

### PART II.—"A SALIENT IN DANGER"

#### CHAPTER I.

##### Preliminary.

On the 4th and 5th April, after a hasty reconnaissance conducted during the last part of our march north, the 2nd Brigade entered the Line in support of the 71st I.B. on the front J. 16. c. 8 9—J. 5. d. 9. 7, taking over guns *in situ*, and forming the nucleus of the Right Group 6th D. A., which was composed as follows:

2nd Brigade, R.F.A.

110th Battery, 24th Brigade, R.F.A.

A detachment of 113th Brigade, R.F.A. Headquarters at Westhoek.

The outgoing group, themselves strangers, could hand over only their predecessor's defence scheme, which already needed numerous amendments.<sup>1</sup> Within the next few days a revised scheme was issued; it is not reproduced here, as, owing to our withdrawal from the Passchendaele salient, it was never put into effect; nevertheless its existence assisted the outposts to put up an effective delaying action between 15th and 26th. Roughly, the scheme, recognizing the need of deeper defence, provided five lines (Front system, Divisional Support and Reserve systems, Corps Support and Reserve systems), for each of which the artillery had positions, O.P's, and zones of responsibility; the artillery had detached active, and silent main, positions; there were various stages of alarm, of which the first was "Precautionary Measures" and the second "Battle Stations."

It must be remembered that at this time we held the Wytshaete-Messines ridge<sup>2</sup> away to the right (south), but the enemy held Houlturst Forest (which the great Duke of Marlborough is alleged to have christened the "Key of Flanders")

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<sup>1</sup>These constant modifications of frontage are no doubt unavoidable, but involve an enormous amount of extra work and a temporary loss of efficiency; in the infantry area they sometimes affected the whole plan of the trenches and occasioned demand for a definite trench authority—an officer permanently in charge of a certain length of forward area.

<sup>2</sup>The geography is sufficiently known to dispense with description.

## TACTICAL STUDY OF F. A. GROUP

on our left; this flank appeared to be the more exposed one, but a salient still existed.

It is not within the powers of the writer properly to describe the surroundings. The surface of the ground was like that of an Alpine glacier; no vestige of vegetation had as yet appeared to relieve the brownish tints of the tortured earth; the woodlands were but groups of blackened stumps standing or lying at every conceivable angle. In each crevasse lay some relic of the terrible autumn struggle—most were half-full of a crimson-brown oily liquid which our M.O. described as containing "organic matter"; wherever one looked, it was to see broken ordnance, derelict tanks, huge dumps of abandoned stores, piles upon piles of gun ammunition; sprinkled freely over the country were human relics, British or German; and dotted about this ugliest of landscapes were famous pill-boxes which had cost so much human life to attack and defend and which now occasioned bitter strife at each relief<sup>3</sup> as to who should shelter in them from shell, gas, and weather. Under each knoll, wherever its height above water-level was sufficient, were dug-outs, which afforded indifferent head-cover against heavy shells and were only kept reasonably dry underfoot by frequent pumping. All accommodation was crowded to the last degree and work had to be done under conditions which might have disturbed the mental balance of (say) "Mr. Britling" when "seeing it through" (at home). The gun-positions were under cover from direct observation, but the tracks necessary for supply must have made them obvious to airmen. Communications were of two kinds only—the log-road and the duck-board track; along either side of each log-road lay a profusion of broken vehicles, damaged harness, and skeletons of animals, souvenirs of the Boche "road-strafe." No lunatic in his mania could have imagined such hideous desolation, rendered doubly trying by the distant view of green fields and church-towers peeping from foliage in those parts of a once prosperous Flanders still held by the enemy. The truth

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<sup>3</sup>It was a common plaint in the infantry the gunners gained something every time.

## THE FIELD ARTILLERY JOURNAL

was forced upon us of the German version of the autumn fighting—"We have left the crater area to the enemy."

The conditions of fighting, so different from those of Picardy, necessitated, for Field Artillery at any rate, quite different procedure. Whereas a few trenches and some belts of wire had formed the only obstacles on the Somme, here by Ypres movement off the roads was impossible<sup>4</sup>; the single rider being thus confined to the roads, the bicycle was preferable to the horse; in general one's own feet were better than either. There camouflage had been almost impossible without a heap of material which was not available, while here<sup>5</sup> in old gardens, along ditches, amongst ruins, it was easy to conceal a battery so long as the flashes were not exposed to Hill 60, Wyttschaete or Kemmel. Alternative observation was usually to be found in the Bapaume district—the difficulty lay in the maintenance of long air-lines; between Ypres and Popperinghe it was limited to a few well-known spots which were frequently shelled, but there existed a good "bury." The undulations of Picardy could screen large formed bodies of troops from ground observation; when Kemmel was in enemy hands it was difficult to hide a dozen horses, and, until summer in its mercy brought foliage, wagon-lines were hard put to find a home and were always, even in July, 6 to 10 miles away. The highly populated Flanders provided innumerable good cellars for accommodation of personnel, which were few and far between further south. What with poor observation, good maps, and a minimum of movement by day on either side, no wonder that the artillery turned to the map rather than to its field-glasses.

One condition at any rate was in our favor; the second Army policy must have laid stress on buried communications in the past; from the neighborhood of Vlamertinghe right forward to our autumn gains of ground, there existed an elaborate buried system which seldom failed when the exchanges were properly handled and which proved invaluable as regards artillery support

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<sup>4</sup>At any rate in April.

<sup>5</sup>Speaking now of the less damaged country west of Ypres.

## TACTICAL STUDY OF F. A. GROUP

during the critical period in 1918. Compare the value gained from labor so expended with that of elaborately dug rearward gun-positions!

### CHAPTER II.

From April 5th to 07.00 April 15th.—The Creation of the Bailleul Salient

On April 7th B/113 left the Right Group, which was, however, increased by the emplacement of two anti-tank guns by C/113. On April 8th a section of B/113 rejoined the group.

On April 9th the new Right Group Defence Scheme was issued, but was never used, for the enemy attacked the same day between Fleurbaix and Bethune and preparations had to be made for firing at the very shortest ranges S. and S.E.

April 10th was a most anxious day. At 03.30 there was counter-preparation and "Precautionary Measures"<sup>1</sup> were ordered. At 03.45 we were examining a frightened prisoner who brought intelligence of a forthcoming attack. At 06.10 and again 07.20, counter-preparation; at 09.32 we put up a Group Concentration on a report of enemy massing on the Menin Road. At 09.45 came an order to withdraw our most advanced section (42nd). Soon after, as nothing occurred, it was possible to visit O.P.'s, battalion headquarters, and trench mortar positions to discuss the situation. At 16.15 orders were received to withdraw three 18-pr. sections to First Reserve positions; to avoid difficulty of control, the *detached* sections of 21st, 110th, and 42nd batteries (the latter had but just completed its first move) were selected, which selection made the main positions "active" instead of "silent"; these three sections on getting into position were ordered simply to reinforce the barrage on their battery frontages, but certain (S.O.S.) readjustments became necessary.<sup>1</sup> At 17.00 counter-preparation, and again at 18.00, when "Battle Stations" were ordered. At 23.15, 18th I.B. had relieved 71st I.B. and it had been confidentially explained

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<sup>1</sup>It is unnecessary to enter into detail.

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that, though both the Wytshaete ridge and the Bluff were solidly held by us, parties of the enemy had penetrated the interval and that there was a shortage of troops available to clear the area.

We stood to at 03.00 on April 11th and got rid of all possible kit; C.P.N.<sup>2</sup> at 05.00, 06.00, 17.15, and 21.15. The items of principal interest during the day were the news of the evacuation of our old friends "Ahmentears" and "Plugstreet" Wood and considerable gas-shelling of 42nd Battery, whose officers' mess staff suffered. At 23.00 an order was received to withdraw the whole 110th Battery (which subsequently left the group), a second section of 21st and 42nd batteries, and one section of 53rd, to First Reserve positions; what with carting of ammunition (500 rounds per gun), this move extended into daylight on 12th and left 10 18-prs. and 6 4:5" hows. (whole 87th Battery) to support the Front System.

It is possible the enemy observed the move, for on the 12th the First Reserve positions were shelled; the 21st and 42nd had to shift after dusk, while one more section of each of 21st, 42nd and 53rd batteries was withdrawn, and B/113 left the group for good, leaving 2 18-prs. (53rd) and 87th for the defence of the Front System. During the day the withdrawal of all wagon-lines complicated matters, but a quiet 13th gave opportunity for settling in, inspection, organization of O.P's, and registration.

April 14th provided occupation to pass the time. After the usual C.P.N., the Group Commander met the C.R.A. and was taken by him to reconnoitre a rearward area west of Ypres to which we might have to withdraw to-night. The four Captains were collected from the wagon-lines to assist. After the reconnaissance, the Group Commander returned through Ypres, met the B.C's by arrangement, and explained procedure. During this conference, a message was received to come at once to D.A. with battery representatives; with one set of officers doing

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<sup>2</sup>Counter-preparation.

## TACTICAL STUDY OF F. A. GROUP

observation and another studying routes of withdrawal, it was difficult to complete a third set, but at last we reached D.A. and found ourselves with three-fourths of an hour of daylight to choose quite a different brigade position which was to be occupied that night. Orders were dictated to the representatives at 21.00, and were taken by them personally to their batteries, a special D.R. taking copies to group headquarters (still at Westhoek) and OC. 87th; these orders were (a) for the immediate withdrawal to the area west of Ypres of Group Headquarters and Batteries, less 1 section each, (b) allotment of routes for withdrawal, (c) a rough statement of infantry dispositions, (d) orders for concentration of wagon-lines about Busseboom, (e) appointment of O.C. 87th Battery to control the four sections<sup>3</sup> left behind and making him responsible for liaison as regards this detachment with 18th I.B.

At 06.30 on 15th April, the Brigade Commander (The Right Group now consisted of only the 2nd Brigade, R.F.A.) visited the new position along the Grünen Jäger (H.16.d.)—Cafe Belge (H.29.b.) road and found the four batteries settling in. Having reported progress to D.A. (H. 22. a.) he met his headquarters at their wagon-lines (in the immediate neighborhood) in time for a welcome breakfast.

\* \* \* \* \*

### COMMENTS.

It was obvious from the first that the importance of increased depth had been realized, both for infantry and artillery; as regards tactical lessons, divisions coming in from the South brought their own lessons and applied them without asking. The emplacement of artillery in the salient, which had been the source of many an argument in the Ypres area in 1915 and 1916, had again become a question of the first importance; the problem had now been solved by the decision to withdraw the bulk of the guns while there was still time, so as to afford them

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<sup>3</sup>These four sections were distributed more or less in depth, with their limbers close by them (E. of Ypres).



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opportunity to arrange good support of the line it was intended permanently to hold—leaving the while a detachment to support infantry which remained in the salient. The composition of such a rearguard artillery detachment merits further discussion, but the solution is similar to that suggested in Part I, Chapter VIII.<sup>4</sup>

### CHAPTER III.

April 15th to 26th.—Outposts Delaying Action.

The initiation of the Outpost Artillery has been noted; we will trace its development from four detached sections controlled by a senior liaison officer into a detachment commanded by an Outpost Artillery Commander acting as C.R.A. to the Outpost Commander and composed of what was practically one complete (his own) 18-pr. battery reinforced by a section or two of 4.5" hows.

On the 15th, attack from the east was still daily expected. The sections of 53rd and 87th were withdrawn and it was necessary to arrange for a possible rearguard action by the sections of 21st and 42nd. The controlling-and-liaison officer had much trouble with his communications due to the hurried nature of the arrangements made by the signal service to man some test-boxes E. of Ypres while destroying others; it took some time to organize these communications on to a satisfactory basis. During the night 15/16 our Infantry evacuated the Front (1) System and occupied the Corps Support (4th) System.

On the 16th the enemy crossed our front line, but met with an effective check, suffering considerably; he withdrew to the Divisional Reserve (3rd) System, where he was bombarded by all available guns. On this day the O.C. 87th Battery became "Rearguard Artillery Commander" instead of "Controlling and Liaison Officer."

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<sup>4</sup>It will be remembered that the whole group of 3 brigades was withdrawn several miles on the night 24/25 March; that it found itself at least 8,000 yds. from behind the infantry in the morning; and that the Group Commander was expected to be able to fight his group from alongside the Infantry Brigadier who was close behind his front line.

## TACTICAL STUDY OF F. A. GROUP

On the 17th April Divisional Headquarters went further back, being replaced in H.22.a. by Headquarters 18th I.B., while a special officer was nominated to command the Rearguard; by this time it seemed doubtful if the enemy meant to occupy the "crater area" at all and the talk was of re-occupying it in force ourselves.

On the 18th April a section of 87th (Howitzer) Battery was ordered forward to reinforce the Rearguard Artillery.

On the 21st April the "Rearguard" was reorganized into "Outposts"; its headquarters moved from Westhoek to Hooze Craters. The reorganized force consisted of the whole battalion 2/D.L.I. plus one company 11/Essex Regt., supported by whole 21st Battery (minus one section, but reinforced by one section 42nd<sup>1</sup>), one section 87th and one extra section of 4.5" Howitzers from elsewhere; the Outpost Artillery was commanded by O.C. 21st Battery.

It needed pressure on 22nd to get Outpost Artillery Headquarters properly housed at Hooze Craters, where there was the usual scramble for accommodation; it had not been properly realized by either the Outpost, or the Outpost Artillery Commander that the latter was a local C.R.A. with a scattered command, requiring a clerical staff and good communications—for which purpose a detachment had to be made from the 2nd Brigade Signal Subsection.

Very little occurred on 23rd and 24th; even the fighting of the 25th and 26th scarcely affected the quiet, but with the decision to evacuate Hill 60, the outpost position became untenable. Towards dusk this day the outpost artillery was very quietly withdrawn and occupied the positions into which the 2nd Brigade was about to move, and where they would therefore be reunited into the normal organization. They had a most disagreeable time passing through Ypres, the enemy doubtless guessing what would happen as the result of the fighting on

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<sup>1</sup>The object of this was to equalize work between batteries, for it was expected that the outpost artillery would get all the work.

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the Kemmel—Bluff front, but they got back with few, if any casualties.

\* \* \* \* \*

### COMMENTS.

It is curious how slow people were to realize that we had formed an Outpost Force; the very word had become forgotten; yet the moment they were called "outposts," the mind went back to Aldershot, and all pre-war soldiers were quite clear as to the functions of this detachment.

The composition of the artillery detachment merits study; it is an integral part of the Outposts and not of its own trunk formation; it needs a separate commander and staff, and should be composed as far as possible of complete units. A battery reinforced by a howitzer section seems to be a suitable force for Outposts consisting of the greater part of an infantry brigade.

If the Heavy Artillery is so disposed as still to be able to lend assistance, an officer must represent them at the Outpost Artillery Headquarters. In this case a Heavy Artillery F.O.O. observed from alongside one of the F.A. F.O.O's but communications were difficult for him to make use of the guns at his disposal.

Great disappointment was expressed on all sides at our failure to "booby-trap" the enemy; we had had a liberal experience of such methods of warfare when the enemy retired through Bapaume early in 1917; his methods were not only ingenious and humorous, but extremely effective—and never more so than in the early autumn of 1918. Of course at the last moment we were tied by the need to conceal our withdrawal, but, the fact is, such methods were rather foreign to our pre-war training and need the most careful preparation. Nevertheless, taking the fine dug-outs at Hooge Craters as an example, one felt it was not necessary to have rebuilt them and pumped them out for his benefit—to leave him our best pump with printed directions how to use it!

## TACTICAL STUDY OF F. A. GROUP

### CHAPTER IV.

From 07.00 April 15th to 00.01 April 25th.—The Enemy Widens His Salient and the Allies Prepare to Defend Theirs

The 2nd Brigade was now in action<sup>1</sup> about where the Grünen Jäger—Café Belge Road crosses the Vijverbeek with headquarters close by Divisional Headquarters at H.22.a.2/5,<sup>2</sup> where was also located the commencement of the "bury." At 10.00 a conference of B.C's was held at which arrangements were made regarding ammunition, alternative and reserve positions, observation, camouflage, wagon-lines, etc. After that the day was spent by all hands in reconnaissance, the Brigade Commander himself doing the "Segard Ridge" from which the whole country is under view North-West of a line drawn from the Northern end of the Wytschaete Ridge to The Bluff and thence to Hill 60. Another conference was held at 17.00 after the reconnaissance, as a result of which an operation order was issued at 21.15. In this O.O. a German attack about Bailleul was prognosticated for the morrow; the 18th I.B. line was given as I.21.d.5/0—S.W. corner of Zillebeke Lake—along the Western edge of the lake—I.15.d.6/0—I.15.d.9/3 on the Warrington Road; the lake was treated as an impassable obstacle; observation was to be from Ypres Ramparts and Kruisstraat, relying on convenient test-boxes; registration would be impossible with our outposts still on Hill 60; Wytschaete believed still in our hands. Beyond an unfortunate shell in the 42nd advanced wagon-lines, the day was uneventful; at night rear wagon-lines moved back towards Popperinghe.

Divisional Headquarters moving back on 16th, 2nd Brigade occupied D.A. accommodation; there was heavy firing towards Wytschaete.

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<sup>1</sup>21st Battery H.23 c 2/8

42nd Battery H.23 c 9/4

53rd Battery H.23 d 2/1

87th Battery H.23 C 0/5

<sup>2</sup>Known as "Pioneer Farm."

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It is now advisable briefly to describe the future theatre of operations. A single ridge<sup>3</sup> runs from Ridge Wood through Scottish Wood, Chateau Segard, Swan Chateau, and comes down to the Ypres-Comines Canal near Doll's House in I.19.d. *On our left*, in the angle formed by the Ypres-Comines Canal and the Ypres-Menin Road the ground was quite flat and swampy until one got to the line of heights from the Bluff (I.34.c.) through the famous Hill 60 (I.29.c.) to Observatory Ridge (I.24.c); the lowest part of these swamps form Zillebeke Lake, so that from the ramparts of Ypres an excellent view can be obtained from South to East. *On our side* (N.W. of) Ridge and Scottish Woods lay Dickebusch Lake, still an impassable obstacle dividing up either attack or defence. *On our right*, in prolongation of the line Segard Ridge—Scottish Wood—Ridge Wood, approximately three miles S.W. of Dickebusch Lake, towered Mount Kemmel from which the country in every direction is in full view; flanking Mount Kemmel in the low ground lay the villages of Dranoutre (S.W.) and Kemmel (N.E.). *In front* (S.E.) of the Segard Ridge there was low ground in which was situated Voormezele; beyond this low ground lay a row of heights from the northern end of the Wyttschaete Ridge to The Bluff. This row of heights apparently joining the Wyttschaete crest to Hill 60 is broken by the Ypres-Comines Canal, but the break is not easy to see, and the canal lies north of a feature called Spoil-Bank in I.33.a. but south of the Bluff.

The Segard Ridge was of the utmost importance; for, though one could never afford to forget them, it screened the whole Vlanmertinghe plain from Hill 60 and the Wyttschaete Heights. But from Mount Kemmel was nothing hid—or so at least it seemed to us crouching for months in the plain.

On April 17th the firing on our right grew so heavy after 05.30 that an officer's patrol (an officer and orderly on horses) was sent out and returned with information collected from

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<sup>3</sup>This will in future be spoken of as the "Segard Ridge."

## TACTICAL STUDY OF F. A. GROUP

Headquarters 9th Division.<sup>4</sup> The day ended in the fixing of First Reserve Positions and the establishment of forward and rear wagon-lines; O.P.'s were located at Ypres Ramparts (53), looking south, at Swan Chateau (42nd, looking S.E.) and at Segard Chateau (87th, looking S.) while another one was reconnoitred in the Ecole (1.9.c.) E. of Ypres: "visual" was initiated from every O.P., but we were suffering from a pronounced shortage of Lucas Lamps, by far the best visual equipment. A provisional S.O.S. Line was fixed in consultation with 18 I.B., who joined us at H.22.a. Headquarters Left Group also arrived, though only for a few days; there was good "speaking" to Outpost Headquarters.

The 18th and 19th brought nothing more than the now constant noise away to our right; the official news from the French, from the First Army on the south, and from the Belgians up north, was good—indeed of strategic importance; it began to be doubtful if we had been wise in evacuating the Passchendaele Ridge. Second and Third Reserve Positions were reconnoitred and allotted to meet immediate attack, forward "sniping" positions were found, and liaison effected with our right-hand neighbors (49th D.A. supporting 21st Division Infantry). Further experience led to a decision to occupy permanently only Ramparts and Segard O. P's, and a particularly good one on the top of a test-box in the western bank of Zillebeke Lake when occasions demanded; this decision took into account neighborhood of test-boxes, available dug-outs, enemy-shelling, facilities for visual, the economy of officers, as well as providing observation along our immediate front and over the ground where we knew the trouble would soon come—*i.e.*, the Vormezeele area could be well seen from Segard.

On the 20th, although our provisional S.O.S. Line remained the same, the greater part of 2nd Brigade was allotted night-lines in support of 21st Division—*i.e.*, firing south; on our own

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<sup>4</sup>These patrols would have given us early warning of need to move, even if as a rule they brought back only negative information. Their news was often most valuable to us and the infantry, and arrived many hours before the fragments doled out from official sources.

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lines we were next to one group 49th D.A., on our night-lines next the other group. We were closer the British front line on the south than to our own "front line" to the east, and although our true task lay in the latter direction, all our daily and nightly work and all the danger came from the south. This was the most interesting tactical situation that has occurred within the writer's limited military experience; there were actually no less than *nine* possible, even probable, operations for which preparation had to be made. They were:

(i). Permanent reoccupation of the Rearguard (later called Outpost) Positions.

(ii). Withdrawal under pressure through Ypres of the Rearguard; withdrawal occurred on 26th, but fortunately not under pressure.

(iii). Support of our proposed front line along the Western edge of Zillebeke Lake; we held this line all through the summer.

(iv). Support of another front line, should it be decided to include Hill 60; this actually occurred on the 26th.

(v). Support of 21st Division Infantry on our southern lines; an S.O.S. occurred nearly every morning and evening just about now.

(vi). Participation in a possible operation to recapture the Wytschaete Ridge.

(vii). Action should the enemy attack Mount Kemmel, which occurred on 25th.

(viii). Withdrawal under pressure should the enemy capture Mount Kemmel; he did not press his advantage on the 25th, so we hung on.

(ix). Defence of the next line after such withdrawal.

On 21st April the Rearguard was definitely organized as an Outpost Force, see Chapter III. At night the whole 18th I.B. sidslipped nearly a brigade front to the right, entailing a change of the S.O.S. Line, but not necessitating any material change of position. The main body of the Brigade was now 10 18-prs. and 4 4:5" Howitzers strong, the Outpost Artillery totalling 6 18-prs. and 4 4:5" hows.

## TACTICAL STUDY OF F. A. GROUP

The 22nd April was much like its predecessors. Some good registration was carried out to the south, which proved valuable on the 25th. The Reserve positions were by now fairly clearly defined, though, had it come to withdrawal under pressure, there would have been "*some* hustle"; for the salient was pronounced and all roads led to Popperinghe! We had arranged:

- (a). To support the front line of the battle-zone from our present or alternative positions.
- (b). To support the rear line of the battle-zone from First Reserve positions.
- (c). For "intermediate positions" should it come to a running fight between the battle-zone and the (at that time so-called) Vlam Line.
- (d). For positions to support this Vlam Line.
- (e). For positions to support the G.H.Q. Line—these positions were west of Popperinghe.

On April 23rd, a change of policy was announced. It was decided to include Hill 60 in our Front system, which entailed considerable advance on the part of the whole 18th I.B. (less the Outposts) and therefore on 2nd Brigade supporting it. Reconnaissance took place at once and on April 24th single guns from each battery moved forward to "warm" the new positions; a conference was held to discuss the usual questions of observation, communications, etc. The move was decidedly unpopular—and not without good reason, as will be seen in the next chapter.

It should be remembered that all this time the outposts were well forward, and from the east we got few worries and fewer shells; everybody's mind was occupied with the situation growing hourly more alarming about Kemmel—Dranoutre—Bailleul. We were all delighted to know that a French division was well established on Mount Kemmel.

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### COMMENTS.

It is not only that one gets more than one's fair share of shells in a salient, but that work is so much harder on the occupant



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artillery; it is called upon to fire in several different directions entailing a proportionately increased amount of observation and frequent change of positions hard to find. It is obvious that the more guns there are in it, the harder it is to supply them or to get them away. The list of possibilities to be contemplated on 20th April, as given in this chapter, fairly illustrates the point; they arose from the configuration of our front line at the moment, and the 2nd Brigade happened to be at a busy corner.

### CHAPTER V

#### From 00.01 25th to Midday 29th.—The Enemy Attacks from the Flank of His Salient Widened by the Capture of the Wyttschaete Ridge

Hostile bombardment began at 02.40 on 25th; at 03.15 a prisoner stated enemy intention to attack at 05.00 after gas shelling; at 05.00 there was undoubtedly much gas about. The enemy shelling went no further east than roughly a line from Swan Chateau to Grünen Jäger—evidently a flank barrage to include the Vlamertinghe Grünen Jäger—Café Belge Road; it was severe. The noise on our right was very heavy and at 09.30 one of our aeroplanes had reported being fired at from the lower slopes of Mount Kemmel; at 10.30, 18th I.B. had news that the enemy held Vierstraat, upon which the single guns sent forward yesterday were withdrawn to rejoin their batteries; at 11.15 came official news that the enemy held Mount Kemmel and Kemmel Village. This was the limit of his advance for the day; firing died down without ever stopping, all roads being barraged by the enemy, especially after dark.

Information had come in better to Brigade Headquarters, officers being sent to neighboring groups and the neighboring Infantry Brigade, while Ramparts and Segard<sup>1</sup> O.P's gave valuable news from time to time; an officers' patrol was out a long time towards Ouderdom with orders to gather all possible information, but to return at once if there was anything to indicate

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<sup>1</sup>The F.O.O. was unfortunately hit.

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the necessity of withdrawal; in addition, one of the batteries waylaid and questioned a Corps Mounted Troops patrol, whose officer had been killed; from so many and varied sources can news be gleaned *if troops are trained to glean*.

It was a surprise when, at 16.35, in spite of the loss of Mount Kemmel, the order was received *to advance* in consequence of a decision still to include Hill 60 in our front system in view of the French intention to retake Mount Kemmel. Troops had been busying themselves rather in preparing for a withdrawal! A brigade position to meet all conditions had by now become much harder to select. The batteries had worked hard all day to assist 49th D.A. on its southern front—with good effect, one hopes, for they had had an unpleasant time; everything pointed to our principal task being still in that direction and the only area which admitted of this task (while still being able to put up a good S.O.S. in support of the Zillebeke—Hill 60 line) had already been, and *was still being*, "crumped to blazes." However, it had, like a lot of other things in peace as well as in war, to be done. By 23.00 most of the guns were "in" and the Brigade Commander had met B. C's on the new position and discussed the situation. Brigade Headquarters remained with 18th I.B. in H.22.a.

42nd Battery (inclusive of section 21st) was at H.24.b.2/4.

53rd and 87th Batteries were about H.24.b.6/7.

The 26th April was still more exciting. Early in the morning there was an S.O.S. at The Bluff. Before long we heard that the enemy had captured Voormezele and the Brasserie (N.6.a), but it is doubtful if the enemy ever occupied Voormezele solidly; the Brasserie was recaptured by our neighbors. Information was again coming in well—through stragglers collected by an artillery officer and guided to Infantry headquarters, by batteries questioning wounded men, by two officers' patrols, and from Segard O.P.

At 13.00 batteries of 49 D.A. had been somewhat withdrawn and some were in action close round 18th I.B. Headquarters

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(H.22.a.). At 13.15 the first intimation was received that the Outposts were to be withdrawn.

At 14.20 a 6th D.A. order timed 13.25 corroborated this news, adding that ammunition left on positions was to be rendered unfit for use,<sup>2</sup> that 18-pr. primers and 4:5" cartridges were to be brought back, and that no fires or explosions were to be caused—so that the withdrawal should be concealed from the enemy. The 14.20 order also announced that the Hill 60 line was to be abandoned in favor of the line along the Western edge of Zillebeke Lake, but doubts were cast upon this decision by a second message timed 13.30; it was an order timed 20.00 (received 23.45) which announced the "line of resistance" would run through Doll's House (I.19b.) and Ypres (Ramparts) while the line through Bedford House along the western edge of Zillebeke Lake would be the Outpost Line.

At 14.50 a 2nd Brigade Order was issued for reoccupation of the H.23. positions (April 15–25)—"forthwith" by the Outpost Artillery—"on receipt of orders (probably after dusk) by the main body of the Brigade; but the situation must have appeared threatening at Divisional Headquarters, for at 15.05 an order was received that the new positions must be further north—*i.e.*, further away from the exposed southern flank of the salient; the previous orders to batteries had therefore to be amended.

Between 15.40 and 17.15 information from our officer's patrol and a message from an Infantry Company commander combined to clear up the situation and established our line as from Hallebast—Ridge Wood—Brasserie—Voormezele—Lock 8—Spoilbank—Ravine Wood to Hill 60.<sup>3</sup>

The difficulty now was to find a set of positions complying with the 15.05 order from D.A. (see above), but at 17.45 it was ascertained that the Left Group was shifting further north, which made their area (H.17) available—the range was suitable

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<sup>2</sup>It is to be feared that there were certain difficulties in the way of meticulous obedience to this order.

<sup>3</sup>The moment at which The Bluff fell into enemy hands was never ascertained by the writer.

## TACTICAL STUDY OF F. A. GROUP

both east and south, while it was screened by trees from Mount Kemmel.<sup>4</sup> The following order was therefore issued (cancelling previous orders) and the Captains, whom the Brigade Commander had summoned to Brigade Headquarters, were sent to take over and prepare the new positions:

21st Battery<sup>5</sup> to drop 42nd Section at H.23.c.2/8 and to take over a main 4-gun position from 111th Battery at H.17.d.5/1.

42nd Battery to send 21st Section to H.15.d.3/3 and to take over a main 4-gun position from 112th Battery at H.17.d.5/5.

53rd Battery to go complete to H.16.c.2/6.

87th Battery (outpost section) H.15.b.6/0.

87th Battery (main portion) to take over position from 43rd Battery at H.17.d.5/3.

The object of detaching sections from 21st, 42nd, and 87th Batteries was to avoid too many eggs in one rather shaky basket; the design of the whole scheme was the treatment of the H.17.d. group (3 batteries, less 1 section each) as the main body of the brigade, with the 53rd battery rather drawn back so as to be able to cover a withdrawal, from whatever direction danger came. The positions were considerably modified during the month of May, but the general design remained; the reason of this modification was that the area H.15.b. and d. and H.16.c. proved "unhealthy."

At this juncture the situation became complicated by the enemy concentrating a violent fire on the H.24 area where our (and other) batteries were; it broke all lines joining the batteries to the test-boxes and threatened to destroy every gun; of course, it interfered with the arrangements for the move. It was calculated that the fire of 3.h.v. guns, 1 battery 77<sup>m/m</sup>, 2 105<sup>m/m</sup> batteries, with some 5:9's and even perhaps 8", had been concentrated on this unfortunate area, to which was added

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<sup>4</sup>In later days, the danger of ground observation was from Hill 60 and Observatory Ridge.

<sup>5</sup>It will be remembered 21st battery (including 1 section 42nd) formed part of the Outpost Artillery.

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an attack by low-flying aircraft; it seemed for a time as if nothing could escape; however, our fire in a southerly direction went steadily on in spite of some casualties, and by 19.45 the trouble was over. Our pessimism of yesterday as to the warmth of this area had not remained unjustified.

At 20.00 the Outpost Artillery was back, a little breathless after the passage through Ypres, the western exits from which were receiving attention which reminded one of 1915.

At 21.30 the 53rd was in its new position; the 42nd was still in H.24.b. keeping up fire as necessary during the change.

At 23.00 an operation order had been issued giving infantry lines, S.O.S., etc., for the morrow; at 02.55 on 27th the Brigade Commander was able to inform the C.R.A. that he had visited the whole brigade in its new position, that communications were established, that though casualties enough had occurred there was no gun out of action, that the group of guns in H.24.b. had fired over 5000 rounds in support of 21st Division Infantry,<sup>6</sup> and that a quantity of ammunition had been salvaged. It had been a trying day, perhaps the most trying of all during the period covered by this book, and the batteries were very tired; between 25th and 27th three complete brigade positions had been occupied, stocked with ammunition, and heavily used in battle—not to mention the share taken in the outpost operations.

The early morning of the 27th was blessedly quiet, for we were not yet allowed to register our real S.O.S. line, lest we should disclose the withdrawal of the outposts; however, at 10.30 the enemy were advancing about Verbranden molen (I.28.d.). From 15.00 to 20.00 there was considerable fighting about Voormezele and soon after 20.00 every gun was firing on enemy advancing about Manor Farm (I.22.c.). The 149th Brigade R.F.A. (30th Div. Artillery) had become our neighbors. From 03.30 till 03.40 on 28th the brigade took part in a raid by the 11/Essex R. from the new "outpost line."

Before dawn on 28th an officer had been detailed to go forward to Zillebeeke O.P. as "brigade sniping officer"; special

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<sup>6</sup>Detached brigades of 30th Div. were fighting under the 21st Div.

## TACTICAL STUDY OF F. A. GROUP

arrangements had been made as regards communications, including direct lines to certain batteries and a direct line to a Heavy Artillery F.O.O., and the party was plugged through to Brigade Headquarters. The venture was very successful; from 06.00 at intervals throughout the day this officer was engaging with effect the numerous targets which offered themselves as the enemy felt his way forward.

At 09.00 the enemy had unexpectedly attacked and captured Lankhof Farm (I.26.d.1/1) and our line ran Lock 8—Iron Bridge (I.26.c.)—Hazelbury Farm (I.26.d.)—Gunners Lodge. A prisoner prophesied a further big enemy attack on the morrow.<sup>7</sup> At 10.00 we were informed 2nd Brigade R.F.A. would be under 49 D.A. for tactical purposes from dawn 29th; at 11.00 a B. C's conference was held without undue enemy interference.<sup>8</sup> At 16.00 the enemy showed signs of advance from the east, but by 16.30 our artillery fire completely broke up this first effort and he made no further ones. At 21.50 we were again assisting 49th D.A. to the south; from 21.00 till 04.00 on 29th we were harassing, and from 04.30 to 05.15 C.P.N. was on the books.

At 03.00 on 29th a terrific enemy bombardment started; at 05.58 there was an S.O.S. at Voormezele; by 06.00 every airline in the place was "dis," but the bury served us well, officers from each battery being kept at the local test-boxes. We had an extra O.P. on the top of Belgian Chateau (H.23.b.)<sup>9</sup> and batteries were continually firing either on information from Segard O.P. or in answer to wireless aeroplane calls. Patrols sent out to our right again brought in useful information, but the officer who had taken this work in hand was unfortunately wounded; his place was taken by an intelligent corporal—but we don't train our N.C.O's to deal with other units and they seem shy of enquiring from strangers.

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<sup>7</sup>The warning hardly ever failed to come.

<sup>8</sup>Only some "W's" arrived.

<sup>9</sup>We shared this O.P. with the Heavy Artillery, but the "bury" did not help him as it did us; the unusual situation had arisen that (buried) communications in the forward areas were working well, while (air) lines to the rear were gone.

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It became apparent about 10.30 that Voormezeele was lost and that there was some kind of a gap in our line about I.25. central; whereas the main battle to our right seemed to die down about 11.00, trouble kept flaring up all day from the smouldering embers to the south of us. The barraging of all roads from 17.00 onwards was very heavy. To the east things remained quiet all day. The first news of the main fighting, received about 12 noon, was far from satisfactory, but later it became known that except at Voormezeele the enemy had been completely repulsed; it was some time before it was realized that the great German effort to reach the Channel Ports had been defeated.

The wagon-lines had spent a hard day dodging German M.P.I's; ever since the possession of Mount Kemmel had given the enemy such good observation, they had been suffering considerably, which accounts for the large number of horse-casualties especially on 29th. Casualties between April 20th and 29th totalled approximately 5 officers,<sup>10</sup> 62 other ranks, and 73 horses.

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### COMMENTS.

The chief interest of this chapter lies in the practical illustration it affords of the difficulties of emplacing artillery in a salient; to perform its double task, the 2nd Brigade in the S.E. corner of the salient, was strictly confined as regards choice of positions. As salients will keep occurring in war, the solution appears to be to keep the guns as far back as possible, which necessitates the use of a very long range.

From a broader point of view, the holding of a salient necessitates the enemy also holding one and imposes upon him the task of widening; it was this further task which brought our Cambrai effort in November, 1917, to an end. If the attacker wishes to continue the offensive, he has to launch it from a harrassed salient—a most inconvenient proceeding, as the Germans

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<sup>10</sup>23 battle casualties since 21st March among the officers of a Brigade R.F.A.

## TACTICAL STUDY OF F. A. GROUP

found to their cost during the months of May and June, 1918. The whole question affords one more example of the truth of the old saying "Everything has the defects of its qualities and the qualities of its defects."

It was freely suggested at the time that Mount Kemmel had been lost, owing to the want of liaison between the French division holding the mountain and the British troops holding Kemmel and Dranoutre Villages in the low ground flanking the approaches to the mountain. A single mountain of no great width<sup>11</sup> can be regarded as a narrow salient; its defence is best conducted not by a mass of troops on the top of the mountain or within the salient, but rather by the action of troops flanking the approaches; and those troops should be *under the same command* as the detachment directly defending the mountain or salient.

The decision, on the strength of a promise from the French to recapture Mount Kemmel, still to include Hill 60 in our front system—therefore to advance both infantry and guns further beyond the bottle-neck—caused surprise and was costly; but Hill 60 was an important pivot, not to be lightly given up.

### CHAPTER VI.

#### Arrangements to Meet a Further Enemy Offensive.

Though not coming within the period covered by Part II, a study of "The F. A. Group in Retreat" would scarcely be complete without such a chapter, as showing how far we had progressed in the practice of Defence since our first experience in March.

The arrangements fall under the heading (a) Actual operations in the forward area, (b) preparations to defend the battle zone, (c) preparations for withdrawal, (d) counter-offensive.

(a) Actual operations. Mount Kemmel was never retaken; in September, as a result of failure elsewhere, it was evacuated by the enemy. Throughout the summer its baneful influence

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<sup>11</sup>Mount Kemmel is about 2 miles from N.E. to S.W.



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affected all artillery operations, but a liberal bombardment rendered its possession of the least possible value to him. Fortunately for us, summer foliage began to appear almost directly we had lost it, else it is difficult to see how we could have emplaced sufficient artillery; one position the writer has in mind whose value depended solely on whether certain trees would or would not "bear." The result of enemy possession of this remarkable hill was to force an undue amount of guns into the cramped area between Diskebusch and Vlamertinghe; this was well enough when the extra batteries were of a horizon-blue tint and courtesy forbade protest; it was quite another matter when British batteries came trespassing over the mystic boundary drawn in an office tens of miles away! The fact is, defending artillery cannot be tied down by chalk lines, but one must recognize that over many guns crowded into one area cause much inconvenience to its rightful occupants.

With French reinforcements, their area kept extending to its left until they and the 6th Division became next-door neighbors. Our allies disappeared early in July for the Marne.

Ridge Wood<sup>1</sup> had been marked in April as a crucial spot; violent fighting went on for its possession throughout May and June, for it would have given the enemy most valuable observation. There were at least half a dozen local attacks, in every one of which the enemy gained temporary possession of the heights, only to be driven out again next day; these attacks usually coincided with some great effort on his part elsewhere. It was not until the 18th I.B. attacked in strength on 14th July, that the situation became less palpitating; no counter-attack followed his success, for the enemy was otherwise engaged.

The 2nd Brigade remained the nucleus of a reinforced Right

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<sup>1</sup>Early in July a section of the Right group was emplaced well to the East whose task was to enfilade the enemy line immediately opposite Ridge Wood. One hopes it was effective; great trouble was taken in the selection of the position and meticulous calculation was necessary to ensure not only correct line, but also whether the shell would clear Scottish Wood over which they had to pass. Such enfilade positions sound better than they are in practice; communication in battle would have been impossible; the Group Commander must lose control of such guns, and the officer on the spot has a very difficult task on acting according to the information which it is always so hard to procure.

## TACTICAL STUDY OF F. A. GROUP

Group (7 batteries); after a short period of rest in June, 6th Division reentered the line further to the west and the 2nd Brigade then became the Left Group. Enemy counter-battery work was severe, as was to be expected in such circumstances; the actual days of battle are sometimes restful for the artillery; the two opponents were like wrestlers seeking for hold, the German ambition being to start their offensive with Ridge Wood in their hands; in between their efforts, each side devoted its energies to the weakening of its opponent artillery. Camouflage was therefore of the first importance; it was not difficult to effect here, if the principle of "silent positions" was rigorously adhered to; never a shot was fired from them, day or night, unless every gun in the area was busy. Nasty place though it was, we kept observation going from Segard until on return to the line after "rest-and-training" we moved our O.P's further west along the Segard Ridge.

There was a lot of enemy bombing by night, but at this period he confined his attentions to rearward areas, and it was the wagon-lines which were affected.

(b) Preparations for Defence of the Battle Zone: It was thought that over such terrain tanks would make poor progress, so the authorities dismissed the idea of an enemy tank attack. Trench Mortars were always placed for counter-attack in case of penetration; they were not employed for daily trench warfare—of which indeed there was remarkably little. An important development took place in the S.O.S. policy; in April the rule had been "3 minutes intense and 12 minutes normal, to be repeated if the S.O.S. signal was repeated within the last five of these fifteen minutes"; by July it had been laid down that batteries were to continue on their S.O.S. lines until ordered off by *superior authority*, the idea being to cut off the enemy's advanced troops from his supports<sup>2</sup>; fire on the front penetrated was to be increased by the employment of certain batteries detailed as "swingers," whose fire was left at the disposal of officers on the spot. This policy killed the "pious

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<sup>2</sup>See Part I, Chapter III, para. (xxxv).

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hope" that F.O.O. could bring back the barrage to meet circumstances; but it was far more practicable from the point of view of the group-commander (the first fire-controller), enabled battery commanders to go on in the event of no-receipt of orders, and seemed to us an advance in thought. Several barrages were arranged behind our front line. Observation was planned out in depth right back to the gun-positions, F.O.O's being instructed to withdraw when it became impossible any longer to communicate. The difficulty of sorting ammunition was now at its height; little progress appeared to have been made with the idea of sorting ammunition in rearward areas; one never had any idea what nature of ammunition would reach one, other than whether it was shrapnel, H.E. or gas; we favored the principle of providing one gun with ammunition of the same group, if possible (which it seldom was), rather than dividing up each of the various groups amongst all the guns on any one position—decentralizing thus the duty of making corrections.

(c) Preparations for Withdrawal: This was, of course, by far the hardest work. Higher authority attempted to supervise, but positions were few and batteries many; Divisions were supervising Field Artillery positions, while the Corps looked after the Heavy Artillery; the attack might come from northeast, east, or south; the art of "looking after No. 1," somewhat thoughtlessly cultivated by those in power, which reached alarming proportions before the end of the war, and which has perhaps accounted for some of the present indiscipline at home, resulted in such things as batteries substituting their own boards for those of their neighbors. It seemed as if the only desideratum behind the line was to be able to mark a green, blue, or yellow circle on a wall-map; that, this done, all would be well and responsibility ceased—which is not the case. It is to be feared that there would have been much confusion in the event—but, after all, this is one of the known disadvantages of a salient in the defence.

The Group Commander, adhering closely to the limitations imposed as regards area, tried to organize positions to meet

## TACTICAL STUDY OF F. A. GROUP

every contingency; it was not expected that things would turn out as per arrangement, but what was hoped was that reconnaissance had been done by so many people in this effort (which lasted over months), that the whole area would be intimately known to batteries when a crisis arrived—which is, after all, the one essential; it was a simple aim for such complex and voluminous instructions as littered our office tables.

Cross-country routes were reconnoitred, marked out, and *prepared*, avoiding roads and known danger-spots. No attempt was made to stock the positions with ammunition. The Survey Companies were indeed asked to prepare fighting maps for every rearward position, but it was rather a hopeless task in such circumstances, and such as were seen did not inspire confidence. The entire area was searched, and successfully searched, for observation.

One can say that, wherever and whenever the attack came there were a whole series of positions *in depth*, going back several miles, which had been reconnoitred. For all the actual lines of defence barrages had been arranged and allotted to batteries on a basis of *zones of responsibility*, keeping in each case a battery or two in hand. Of course, there were no buried communications, but there were ditches along which to lay wire, O.P's were close to hand, and Infantry-cum.-group headquarters were ready. As the result of our fears rather than our virtues, we had progressed.

Forward wagon-lines were maintained to the end, in spite of their obvious disadvantages as regards condition of horses; the rear wagon-lines were altogether too far back.

(d) Counter-Offensive. During May and June the counter-offensive consisted in violent harassing by night and counter-preparation at dawn; intelligence summaries led one to believe that it was this harassing which staved off Prince Rupprecht's offensive until events elsewhere rendered it impossible. From time to time there were raids, developing into daylight raids, and eventually (on 14th July) into a quite considerable local attack. The purely defensive artillery work strengthened up

## THE FIELD ARTILLERY JOURNAL

into bold sniping, and the use of gas shell on a fairly large scale became more frequent with increased supply. Up to 22nd July or so, Prince Rupprecht's attack was "cried" almost daily, but most people realized his chance was gone when the extent of the German failure at Rheims on 15th and the French success on 18th had become known. No one will forget the revulsion of feeling which all ranks, almost it seemed the horses, felt when the crisis had passed and a new era was proclaimed by the 4th Army attack on the 8th August.

"Awake! for Morning in the Bowl of Night has cast the Stone which puts the Stars to Flight."

\* \* \* \* \*

With reference to remarks in Part I, Chapter III, para. (xvi), there is appended a copy of Right Group Standing Orders forming part of the early July Defence Scheme. Stress was laid in para. 24 (records of fire) in the hope of being able to locate the source of short shells.<sup>3</sup>

There were now 4 Lewis guns per battery, generally distributed 1 at each gun position (2 in the gun area), 1 at forward wagon-lines, 1 at rear wagon-lines; this arrangement suited the batteries and provided higher authority with anti-aircraft defence in depth.

From the commencement of June, it was once more possible to hope for good wagon-lines; but personnel was terribly short in spite of leave not being open, and the maintenance of forward wagon-lines interfered with administration; comfortable wagon-lines form the basis of a good battery, but with increased bombing they were no longer the resting-place they had been in the early part of the war. Supply of ammunition was mostly by light railway, but try as one will, the system does not work well in shelled areas at night, and the drivers had, as ever, terribly long hard nights on the roads, with little opportunity for distinction and often very little supervision. In stationary warfare the subaltern is apt to become an "O.P. boy"; the captain

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<sup>3</sup>Compare Part I, Chapter IV, A comment (ix).

## TACTICAL STUDY OF F. A. GROUP

and battery sergeant-major have a hard task and earn their pay if it is well done.

\* \* \* \* \*

### **APPENDIX "B" TO JULY DEFENCE SCHEME.**

#### GROUP STANDING ORDERS.

##### I. Alarm Arrangements.

1. One officer will sleep in the telephone pit, or alongside a telephone in the immediate vicinity of the position.
2. Two men will sleep in, or in the immediate vicinity of, each gun-pit.
3. Every position will be equipped with rocket indicator showing (a) flanks of battery zone; (b) Group O.P. (c) magnetic north. A lookout man will be on duty at this board watching for enemy aircraft by day and S.O.S. signals at night.
4. 18-pounders will be kept loaded at night.

##### II. Detached Section Orders.

5. An officer will sleep at a detached section position and will ring up the main position at dawn.
- 5a. Visual will be arranged to Battery or Group Headquarters and will be checked daily.

##### III. Silent Positions.

6. Silent positions will not be used for calibration, harassing fire, or ordinary S.O.S. tests. Registration will be covered by fire from the active position.
7. Ammunition will be "turned over" from time to time.

##### IV. Gun Pits.

8. Gun pits will be strengthened to the greatest extent that local circumstances allow.
9. Gun pits will be prepared so far as possible to allow of engagements of tanks.
10. 3 rifles and 50 rounds per rifle will be kept in each pit.

## THE FIELD ARTILLERY JOURNAL

11. Every pit will have a scheme-board in it signed by an officer showing S.O.S. angles and angles for such concentrations, etc., as are thought desirable. One of these will be the northern point of Scottish Wood (within our own lines).

A separate board should show gun and daily atmosphere corrections.

12. Every pit must have good facilities for egress and a platform marked for use in the open.

### V. Guns.

13. Every gun to have painted on the piece its most reliable calibration for each nature of charge, giving date of calibration. Subsidiary information will be painted on the shield.

14. Every gun will be painted for anti-tank engagement.

15. Sights will be checked daily.

### VI. Ammunition.

16. As far as possible only one group of ammunition will be provided for each gun.

17. Not more than 200 rounds will be kept in any pit, and not more than 100 rounds 4:5" cartridges.

18. 18-pounder ammunition is not to be stored more than 3 deep and must be stacked on a wooden or tin flooring.

19. Ammunition from the echelon and from silent positions is to be turned over from time to time.

20. The echelon will be kept full. The gun limbers will be filled with shrapnel. The shrapnel and H.E. will be kept in separate wagons divided between (a) the various subsections (b) the firing battery and first-line wagons. Clips and nose-caps will be kept on all rounds.

### VII. All Positions.

21. Alternative methods of egress will be generally known and thoroughly prepared. High roads to be avoided.

22. Limbers will be kept at or near the gun-position. Forward Wagon-Lines will be maintained.

## TACTICAL STUDY OF F. A. GROUP

23. Movement is to be restricted as far as possible during periods of high visibility. Men are not to leave the position in daylight, except on duty. Exposed work must be carried out at night.

24. A book is to be kept showing daily rounds fired, target, time of commencement and time of ceasing fire.

25. A "Defence File" is to be kept, including the defence scheme, and all definite instructions reference the operation in force at the time.

Abstract instructions will be kept together in a "Tactical Instructions File."

### VIII. Observation Posts.

26. Each O.P. will maintain a fighting map, marked to show grid bearings, and dead ground, and provided with a pointer. Also a list of code calls, a log-book, and available information reference Heavy Artillery.

27. O.P's are arranged in depth. When one becomes unusable the F.O.O. withdraws to the next and reopens communication as soon as possible.

28. Each battery will establish a local O.P.—if possible within sound of voice of the battery.

29. O.P. party will always be armed and carry ammunition; officer with revolver, men with rifles.

### IX. Liaison.

30. A liaison officer must be fully acquainted with all Artillery information concerning the whole of the units he represents, their S.O.S. lines, geographical, capabilities, etc.

31. Normally the party consists of an officer and two signallers and a lamp; they will be armed.

32. When a liaison officer can no longer help in coöperation, his duty is to go to the nearest telephone and ask for orders from the Group.

### X. Training, Inspection, and General.

33. Training of layers and in anti-tank drill at the gun-line,



## THE FIELD ARTILLERY JOURNAL

and drivers and signallers at the wagon-lines is to go on daily as can be effected.

34. Continual inspection of equipment, especially gas respirators is to be carried out. This is particularly necessary at wagon-lines and detached section positions.

35. Officers will impart information as advisable to responsible N.C.O's.

36. All officers will initial tactical instructions, routine orders, etc.

(To be continued.)

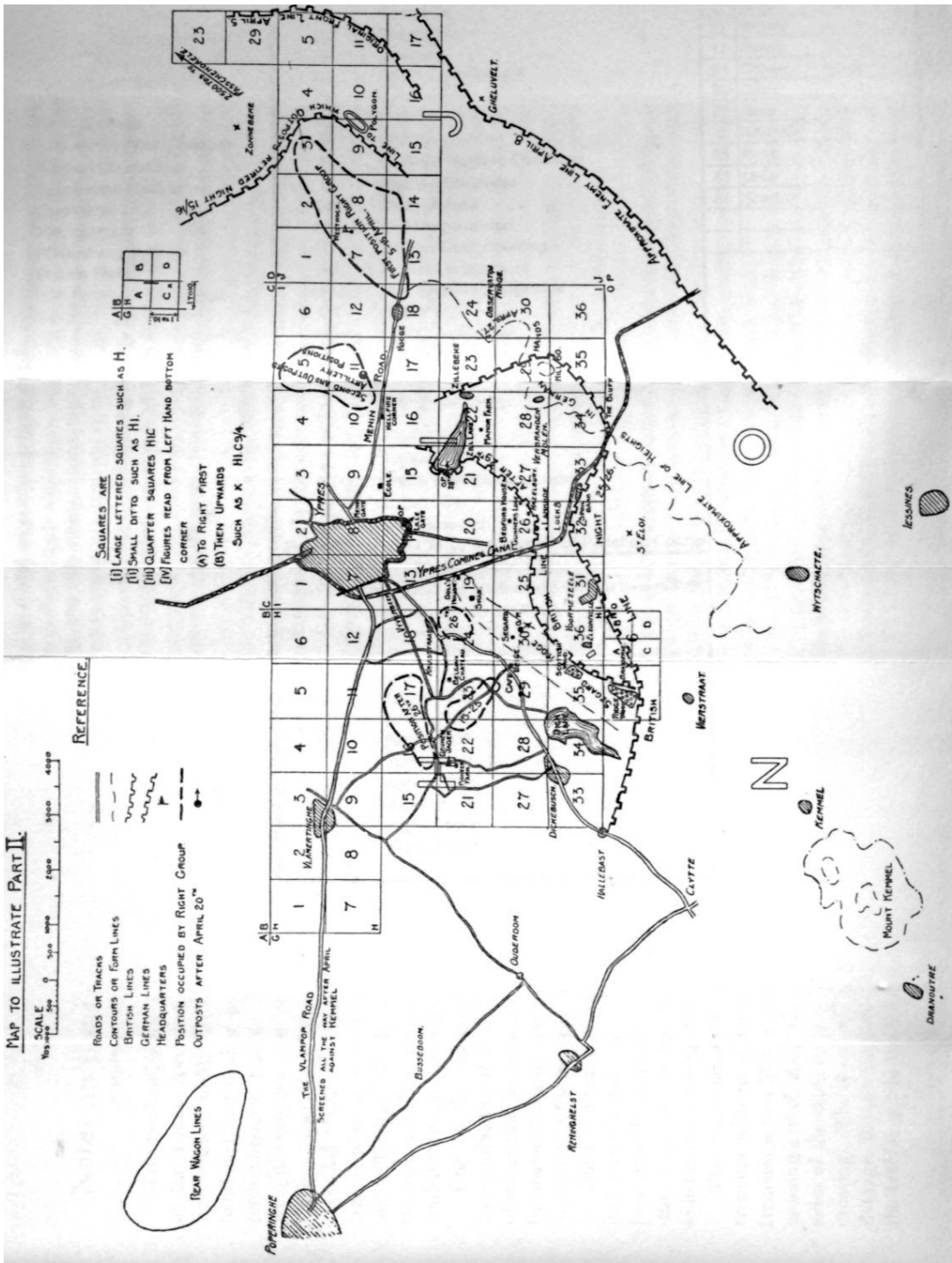
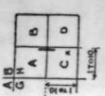
# MAP TO ILLUSTRATE PART II.



## REFERENCE

- Roads or Tracks
- Contours or Form Lines
- British Lines
- German Lines
- Headquarters
- Position occupied by Right Group
- Outposts after April 20th

- SQUARES ARE
- (I) LARGE LETTERED SQUARES SUCH AS H.
  - (II) SMALL DOTS SUCH AS H1.
  - (III) QUARTER SQUARES HIC.
  - (IV) FIGURES READ FROM LEFT HAND BOTTOM CORNER
  - (A) TO RIGHT FIRST
  - (B) THEN UPWARDS
  - SUCH AS X HIC34.



## **Notes on the Reconnaissance Tractor**

BY MAJOR G. R. ALLIN, FIELD ARTILLERY, U.S. ARMY.

THE reconnaissance tractor was described in the last issue of the FIELD ARTILLERY JOURNAL. Since that description was written, additional tests have been made of it, the tractor hand-cart and tractor power-cart. In one demonstration the reconnaissance tractor carried six persons whose combined weight exceeded one thousand pounds and drew the hand tractor, containing two persons whose combined weight exceeded two hundred pounds. With this weight the tractor went up a short incline, exceeding fifteen degrees, without difficulty. With only the driver in the tractor, it ran through a shallow pond that it is doubtful if a man could have waded through only with great difficulty, if at all.

One of the design requirements for the reconnaissance tractor was that it should be able to negotiate streams or bodies of water that horses can cross. This requirement has been met by placing the engine inside the body, which has sufficient buoyancy to float the tractor. It has given several demonstrations of its ability to float, and when on the water the body has several inches free board. No means of self-propulsion on water have been provided in this tractor; but a small protected screw, which can be operated by the tractor engine when desired, will be provided in the redesign of this vehicle.

The reconnaissance tractor can cross small ditches and trenches without difficulty, and can cross larger ditches and trenches with a little assistance. The picture shows the tractor crossing a ditch about the equivalent of a standing trench. The sides of the ditch have been cut down slightly to facilitate the crossing. The block and pulley were attached to avoid possible damage, though they were not found to be necessary. When the tractor got to the bottom of the ditch, it had to have some

## THE FIELD ARTILLERY JOURNAL

assistance, as it was longer than the width of the ditch, and could not get sufficient bearing to start up the far side of the ditch. When once started, it got out all right. In the redesign of the tractor a small winch or capstan, with sufficient power to lift the weight of the entire vehicle, if necessary, will be provided.

In another demonstration a direct comparison was obtained between the tractor and a mule in difficult going. A shallow pond with a quicksand bottom was selected for the test. The tractor was sent in first at the narrower part of the pond, crossed over and part way back, then turned and went through near the centre of the pond, thus crossing some of the worst of it. No difficulty was encountered until the tracks of the tractor sank in so far that the body rested on the water and sand, and the tracks were no longer sufficiently in bearing to propel the tractor. The mule then tried to follow the track of the tractor. He crossed the pond with a good deal of difficulty, and started back, when he sank in so deep that he had to be helped out.

The most novel feature of this vehicle is its track, which consists of two fabric belts held the proper distance apart by spring steel strips so shaped as to form a track for the wheels to run in. These strips are placed on the outside of the belts, and are the only part of the track that comes in contact with hard surfaces. On soft surfaces the parts of the belts between the metal strips come into bearing, and so greatly reduce the unit pressure. The ends of the metal strips are bent slightly up to make the track ride up in turning instead of gouging into the ground, as would be the case were the ends straight. Experiments showed that this is necessary, as otherwise the tracks could be twisted off the wheels in turning. The belts are made of material similar to that in automobile tires. In order to obtain an immediate test of the durability of this type of track, it is to be placed on a commercial automobile and thoroughly tested.

In addition to the screw and winch already mentioned, the redesign of the reconnaissance tractor will considerably reduce

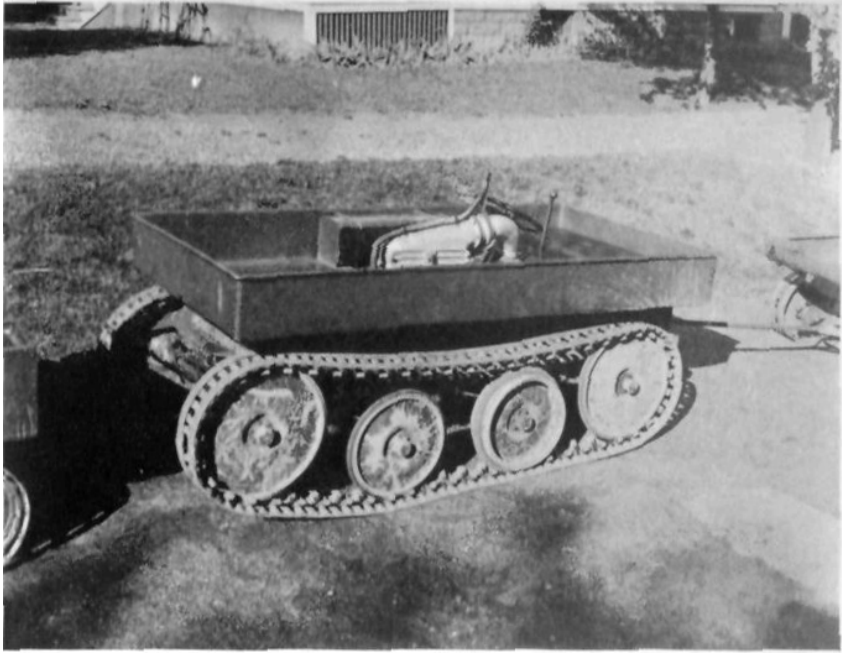


FIG. 1.—RECONNAISSANCE TRACTOR

Preliminary model of vehicle designed to replace the horse of the individually mounted man. September 28th, 1920



FIG. 2.—RECONNAISSANCE TRACTOR CROSSING SMALL RIDGE



FIG. 3.—RECONNAISSANCE TRACTOR DEMONSTRATING ITS ABILITY TO FLOAT WHEN LOADED



FIG. 4.—RECONNAISSANCE TRACTOR CROSSING A DITCH  
Block and tackle were used merely to avoid possible accident



FIG. 5.—RECONNAISSANCE TRACTOR GOING THROUGH QUICKSAND



FIG. 6.—MULE STUCK IN QUICKSAND  
Reconnaissance tractor can be seen just over mule's croup

## THE RECONNAISSANCE TRACTOR

its size. It will be made only large enough to meet the original requirement as to capacity, *i.e.*, 500 lbs. This will provide sufficient capacity for two men and two or more instruments, and should permit of a material reduction from its present weight of about 1600 lbs. The shape of the body will be changed to facilitate passing through brush or along narrow trails and crossing water.



# Questions Affecting Artillery

LECTURE BY GENERAL LE GALLAIS TO THE OFFICERS OF THE SIXTEENTH  
INFANTRY DIVISION, FRENCH ARMY\*

(Concluded.)

## IV. *Zones of Action.*

Our pre-war artillery regulations, quite remarkable in their ensemble, indicated very clearly the rôles of the different commanders in the use of artillery.

To the commander, the divisional general, appertains decision on the following points:

The functions to be assigned to the artillery or to the different groups of artillery under his orders.

Distribution of this artillery, as a whole.

Zones of action.

Emplacements of the artillery.

Certain detail functions, or detachments recognized as necessary.

Supply conditions, as a whole.

Reserve units, if there is occasion for them.

The following tasks appertain to the artillery commanders of the different units:

Distribution of the batteries or groups so as to carry out the functions assigned to them.

Distribution of the zones of action.

Choice of successive positions.

Prevision and preparation of the movements of advance or retreat.

Liaison with the infantry units which the artillery supports.

The constant responsibility of effecting within the desired time the concentrations prescribed by the commander.

Designation of the objectives, either at the request of the infantry or on their own initiative.

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\*Translation from *The Revue Militaire Générale*, December, 1919.

## QUESTIONS AFFECTING ARTILLERY

Supervision of the field of battle and the firing operations.

All of them, commanders and artillery unit commanders, have a sufficiently heavy task, the execution of which will require their best energies.

These principles, true for open warfare, are applicable in an equal degree to position warfare.

They have been lost sight of too often, even up to the end of the war, either through insufficient knowledge of the properties and use of artillery, through a desire to escape responsibility by passing it on to subordinates, or through other causes.

The importance of artillery has become such that the general of an infantry division or the general commanding an army corps must have a thorough knowledge of artillery, its properties, its capacities, its use, what may and what may not be required of it, just as the same general must know thoroughly how the infantry marches and fights, how the feet, the back, and the morale of the foot-soldier must be cared for; just as he must not be ignorant of the fact that bad management of the cavalry ruins it in a week, and that the horse should be considered before the man, and that he must not use his engineer units in small detachments without assigning clear and definite functions to the engineer commanders.

No one is perfect, and all of us have made mistakes in this war. The only unpardonable mistake for cavalry, according to our good old rules, is inaction.

The only unpardonable mistake for a commander is, in my opinion, indecision, which, regarded from the viewpoint that interests us, that of artillery, is represented by the lack of a definite function given to the artillery, the lack of orders regarding the distribution and use of the artillery troops.

It is the commander who should determine these things, but he must know what he wants, and must not fear to accept his responsibility.

Position warfare has in no degree modified these ideas, which are founded on good sense. There was no need to know any

## THE FIELD ARTILLERY JOURNAL

more about them, and the adaptation to circumstances should have come about naturally through a simple effort of reason.

Among these adaptations, these complements if you will, one point appears to me to merit our particular attention—it is that of the zones of action, and the consequent distribution of the artillery into groups.

The doctrine which seems established, and which has resulted from the experience of the war, is the following:

The battlefield is fictitiously cut up into sections corresponding to the zone of action of the divisional unit; and within this section the terrain is again divided in depth, with respect to the artillery, into three successive zones, to wit:

First, normal zone of the divisional artillery.

Second, normal zone of the army-corps artillery.

Third, normal zone of the army artillery.

We see at once that what characterizes these zones of action is the range of the guns at the disposition of each large unit.

In principle, all objectives situated within the first zone are reserved for the divisional artillery.

Those of the second zone, for the army-corps artillery, etc.

This rule cannot be rigid; to make it so would be to disregard one of the most essential modes of action of artillery—fire in concentration and in mass.

Therefore the normal zone of the division will be at the same time the contingent zone of the army corps, which will reserve to itself certain objectives, especially enemy batteries, and will lend its aid, in case of need, to the divisional artillery.

In the same way, the normal zone of the army-corps artillery is at the same time a contingent zone for the divisional artillery, within the limits of its available resources and its range, and a contingent zone for the army artillery, for special destructions, interdiction, etc.

What is true with regard to depth, is equally applicable in breadth from sector to sector, within the limits of the available resources and the range.

This distribution into zones carries as a consequence, especially

## QUESTIONS AFFECTING ARTILLERY

where the fronts are very wide or where artillery has been concentrated in preparation for an offensive, the formation of special organizations called groups of artillery.

The necessity is evident.

For very wide sectors of infantry divisions, for instance, it is not possible for the batteries of the extreme right to act, without displacement, upon the extreme left, and *vice versa*.

Therefore we form, for instance, two groups—more are very rarely necessary—each having a normal sector in breadth within the zone of the division, and contingent sectors towards the centre of the infantry division sector and towards the exterior wing.

In the case of masses of artillery accumulated for an offensive, it is no longer the width of the sector, now generally reduced, but is instead the number of groups placed under the orders of the divisional artillery commander which makes it necessary to form groupings in order that command may be possible.

Two systems, therefore, present themselves—either to form these groups with special reference to the range, or with special reference to the functions assigned, always taking into account the grouping on the terrain and the convenience of liaison.

My opinion is that there is no immutable rule, and that everything depends on circumstances and on the capacity of the group commanders.

I will give two examples:

Let us take a very extensive divisional sector, not threatened with an attack.

There is no doubt as to the course to be pursued; two groups should be formed, each under the orders of a commanding officer, and comprising the batteries of 75's, the trench batteries of the sub-sector, and those batteries of 155 (short) that cannot act upon the entire sector.

The direct use of the group, or groups, of 155 (short) that are able to act upon the entire sector held by the infantry division should be reserved to the commander of the divisional artillery.

## THE FIELD ARTILLERY JOURNAL

Let us take a divisional sector reinforced by artillery in preparation for an attack.

Here I should prefer to be guided by the community of functions and the grouping on the terrain (facilitating liaison) rather than by the range.

I should form, for instance, one group on the right, comprising, under the orders of a colonel, all the trench artillery and all the 75's of the sub-sector which are to be used to clean up the terrain after the action of the trench artillery and to furnish the artillery accompanying the attack; and another similar group on the left. (If there are to be three regiments in the attack, there should be three subgroups, each corresponding to a regiment of infantry.)

All the heavy artillery, short artillery and mortars, should form a group apart.

Finally, batteries or groups of 75's, available for use in emergencies, either on the flanks, or to reduce centres of resistance, etc.; the batteries specially charged with safeguarding the flanks being under the orders of the wing group commander, and the others (one, two, or three batteries) being reserved under the immediate command of the divisional artillery commander for use in case of emergencies reported by aeroplane or by other agency.

### *V. Projectiles.*

It is not possible to discuss the use of artillery without saying a word on the use of projectiles. The cannon is the vehicle, the projectile is the instrument that does the work. It would be all the more illogical to overlook this subject since a new projectile invented by German barbarity has become one of the most dangerous dispensers of death.

Before the war we had two general classes of projectiles:

Shrapnel for use against personnel.

High-explosive shells for use against obstacles and sheltered personnel.

Time shrapnel, very highly esteemed before the war and with

## QUESTIONS AFFECTING ARTILLERY

good reason, has again been decisively proved by the experience of the war to be the projectile most efficacious against untrenched and unsheltered personnel—the projectile par excellence for such use.

But the cost of this projectile is high, its manufacture requires special care, and the projectile loses all effectiveness in time fire when it is not handled by a capable officer who knows how to range his height of burst.

For all these reasons, and also because the war became a war of moles, the high explosive projectile has been the only one in current use since 1915. The Command attempted to induce the artillery officers to retrace their steps, but it may be readily understood that, under the handicap of rather poor manufacture and of inferior fuses causing considerable variations in the time of burst, our officers were reluctant to return to the use of shrapnel.

We must study to overcome these objections, improve the manufacture of powder and fuses, perfect the technical instruction in firing of our officers, and remind them that we obtained, during the first months of the war, decisive and astonishing results by the use of well-adjusted time fire.

Its effectiveness makes itself felt over a mean horizontal surface of at least 1500 square metres per projectile, while that of a 75-mm. high-explosive shell scarcely exceeds 30 square metres. Compare the two.

The new projectiles, which made their appearance about 1915, comprise the whole series of tear-gas shells, poison-gas shells and yperite shells.

Our powerful poison gases have the serious defect of a very narrow zone of action and of ceasing to be toxic in a few seconds.

We have all seen, in the experimental trenches, an uninjured dog yelping between two dead comrades, or *vice versâ*. The use of these projectiles is, therefore, a delicate affair. Surprise is necessary, also mass concentration and a light favorable wind.

The yperite shells are, in my opinion, much more terrible;

## THE FIELD ARTILLERY JOURNAL

they have a lasting effect. They make trenches, shelters, and woods untenable; they are often fatal a long time after the poisoning takes place.

Their mere presence is a military indication the great value of which should not be underestimated.

It is certain that where the enemy employs these projectiles he will not attack.

He has, then, decided upon a defensive or a retreat.

I have done no more than merely skim the surface of all these artillery questions.

A volume would be necessary for a thorough study of them. However, the experience of the war will certainly enable us to draw some profit from these little talks.

Even though your opinions may differ from mine on certain points, yet the discussions which will not fail to arise among you, if they do not shed full light on the questions at issue, will at least lead you to exchange ideas—reflect, and prepare for the future while considering the past.

GENERAL LE GALLAIS.

April 20, 1919.

## Divisional Artillery Strength

BY LIEUTENANT-GENERAL BALCK

(From the *Artilleristische Monatshefte*, June, 1920.)\*

[TRANSLATOR'S NOTE.—*The writer remarks in a footnote that under the present circumstances in Germany his suggestions cannot be carried out, but that he feels it desirable to discuss and draw lessons from the experience of the war. This suggests a special value that contemporary German magazine articles may have for us. The very fact that a writer is discussing a theoretical desideratum, without hope or expectation of translating it immediately into action, gives him a certain detached point of view difficult to acquire when one is working on an immediate organization problem. This is quite aside from the self-evident fact, that General Balck's opinion on a military question must command the respect of every soldier, of whatever country.*]

### PART I

BEFORE the recent war, each German infantry division had an artillery brigade of two six-battery regiments, one battalion being armed with light field howitzers. The foot artillery was not in time of peace under the order of the corps with which it was to serve in war, so that the other arms knew little or nothing about its use. There were no cadres for new formations. Since it was generally, though not openly, admitted that the four-gun battery was justifiable, if not superior to the six-gun, the third platoons of the peace batteries might readily have been used as cadres for reserve batteries. Thanks to the training of our reserve officers at the School of Fire, there were few complaints at the beginning of the war about the work of the reserve batteries; but there were many complaints of lack of tactical

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\*Translated by Colonel O. L. Spaulding, General Staff, U. S. Army.



## THE FIELD ARTILLERY JOURNAL

training in the commanders of Ersatz<sup>1</sup> batteries and new formations not contemplated beforehand.

The artillery of the French army corps was organized before the war into two divisional regiments of nine batteries each, and one corps regiment of twelve batteries. Six reinforcement batteries were also contemplated. Cadres were provided for new formations, so that each corps was normally to furnish ten reserve batteries. In Russia new formations were provided for by six reserve artillery brigades, aggregating 33 batteries, and five reserve artillery battalions aggregating 14 batteries, all organized in time of peace, as well as cadres for 17 horse batteries and for Ersatz units.

At that time, the war of movement only being considered, it was usual to limit the number of guns assigned to a corps to those that could be deployed on the front of a corps acting in an army; that is, 24 batteries on a front of 5000 metres. The deployment was assumed to be in a single line. On maps of the battles of Sedan and Gravelotte, it will be noted how difficult it was found to deploy the artillery within the space allotted, although each corps then had only fourteen batteries. Experience seemed to indicate also that the space in the march column allotted to artillery should not be too great. In the divisional column, the artillery with its light ammunition column occupied 5600 metres, as against 4800 for the infantry at full strength. The artillery had increased since 1870 from 36 to 72 guns for each twelve battalions; that is, six guns per thousand infantry at full strength. The proportions always change during a campaign; thus, in the 5th Army Corps after Woerth the proportion was 4.1 per thousand; in the 10th Corps at Vionville it was 4.16, at the surrender of Metz 5.8, at Beaune-la-Rolande 6.4, on December 3rd 8.8, and on December 9th 11.4.

As corps artillery, there was a battalion of heavy field howitzers, consisting of four four-gun batteries. The war of positions was not considered, but for siege operations it was intended to assign foot artillery brigades to the divisions as

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<sup>1</sup>Reserve batteries.

## DIVISIONAL ARTILLERY STRENGTH

required. Similarly, for attack of a fortified field position the divisional artillery was to be reinforced by a mortar battery or two, to fire upon hostile artillery in concealed positions, while the infantry advanced and forced the enemy to offer shrapnel targets.

Thus, at the beginning of the war, the Second Army consisted of three active and three reserve corps, a cavalry corps of two divisions, two Landwehr brigades for the lines of communications, four mortar battalions, one 10-cm. gun battalion, and two seacoast mortar battalions. The divisional and corps assignments in the active corps were normal, as above. The allowance of heavy howitzers to the corps was much too small, in view of the superiority of the French field gun; every division constantly felt the need of heavier artillery, especially to cover by fire the deployment of the light batteries. The need of heavy guns as well as howitzers was also felt, even in the attack; the regulations had previously limited their use to the defense.

The organization did not take into account that inferior infantry needs to be stiffened by additional artillery. It is always possible that circumstances may be such as to require the use of the poorest troops for the most important tasks. At the opening of the war the reserve corps had only twelve batteries, with no howitzers either light or heavy. The Landwehr brigades, intended to guard lines of communication, were strong enough for this purpose—six or eight battalions and one or two batteries, mostly old type. This organization may have prevented their use in front line on the right flank at the Marne—although the Third Army did use its Landwehr brigade successfully at Betheniville on September 13th.

A Landwehr corps of two divisions, under General von Woersch (34 battalions, 12 squadrons and only 12 Ersatz batteries) was organized in Silesia in August, 1914. From September 7th to 9th it was engaged at Tarnovka with the best of Russian troops, the Guard and Grenadier Corps, losing 8000 men.

The 2nd Landwehr Command of the Fifth Army consisted

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of five mixed Landwehr brigades, with thirty battalions but only six batteries, four of Landsturm and two improvised Landwehr. As early as August 23, 1914, these troops were assigned to the 16th Army Corps for an enveloping attack, and became heavily engaged on the 24th. On the 25th they were attacked in the left flank from the direction of Verdun, by superior forces with very strong artillery, and driven back. This use of troops was an expedient to which we should not have been driven if we had deliberately planned for and sought the war. But it is evident that a reserve or improvised unit ought to have stronger, not weaker, artillery.

Other improvised units had similar troubles. The reserve corps put in the field in October had nine batteries to the division, three of them howitzers. The 83rd Division, organized in the spring of 1915 out of seven Landsturm and five Ersatz battalions in Posen, had at first only three gun batteries and one howitzer battery; but the division took part in the Przasnycz break-through.

In the rapid increase of the army, it soon became necessary to accept the four-gun battery, which was done without causing any of the difficulties feared before the war. Next, the infantry of the division having been reorganized on the three-regiment basis, each division was given six light gun and three light howitzer batteries; later, during the period of stabilization, heavy batteries from the corps artillery were distributed among the divisions so as to give each a battalion consisting of two heavy howitzer batteries and one 10-cm. battery. With the new infantry organization, the old two-regiment artillery brigade was found unsuitable; the third regiment of the division was generally left without artillery, hampering its use even as a reserve.

This general plan continued throughout. It was, however, found convenient to leave the heavy batteries in position as sector artillery, relieving them when necessary from the army artillery, but to keep them under command of the divisions.

Thus, in the battle of Arras, in the spring of 1915, a sector of three kilometres had two heavy howitzer batteries, one mortar

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battery and one 10-cm. battery. On quiet fronts the strength was greatly reduced. The 13th Landwehr Division in Lorraine, at the end of September, 1915, when the fortress of Metz had given up most of its guns, held thirty kilometres front with 12,000 infantry rifles, 63 machine guns and 66 guns, not counting four long 15-cm., four 12-cm. and six 9-cm. guns which were classed as obsolete. In the left brigade sector, twelve kilometres, the strength was one rifle to each 2.5 metres, one machine gun to 476 metres, one battery to 1892 metres, and one gun to 473 metres. On the eastern front things were even worse. On one occasion an army of ten divisions had only 4.9 guns of all types to the kilometre front.

In position warfare it proved impracticable to keep battalions together. It was found more satisfactory to mix guns and howitzers according to the nature of the targets and the plan of employment. A report made in the spring of 1917 will be of interest here:

"The light howitzer battalions have seldom been used as units, either in position or manœuvre. Certain tasks can be handled only by howitzers, on account of their curved trajectory and heavy projectile; these tasks demand the assignment of single howitzer batteries at widely separated places. This breaks up the organization, and deprives the battalion commander of influence over the use of his battalion and the discipline and care of his men.

"In position warfare, it has become the rule to organize mixed groups, each having both types of gun, and being charged with all barrage and other duties within the boundaries of an infantry regiment. This gives better connection between the arms, and simplifies the transmission of orders by the artillery commander, since it is not necessary to make special assignments of howitzers for every special task.

"The problem of connection between the arms comes up even more conspicuously in manœuvre fighting. It is facilitated by assigning an artillery battalion to an infantry regiment;

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but this works well only if the battalion has both guns and howitzers, for the requirements cannot be foreseen.

"All these considerations point to the definite organization of mixed battalions. There are serious objections, as in the matter of exchange of men and matériel to replace losses, and in ammunition supply; the ammunition columns and trains would require a corresponding reorganization. But these objections must give way before the decided advantages. No serious difficulties have been found in handling the mixed units, due to differences in mobility.

"Organization of such battalions would make it easier to hold normal units together. It would also counteract the tendency to treat howitzers as a specialty.

"One more point is to be made. Troops soon learn to construct cover against gun fire very rapidly. Hence it would be well to give the mixed battalions two howitzer batteries and only one gun battery, as soon as a howitzer with sufficient range can be developed."

The same line of reasoning indicates a mixture of heavy batteries also, and led to the formation of battalions with two or three heavy howitzer batteries and one 10-cm. gun battery. Toward the end of the war similar battalions were formed with two mortar batteries and one 13-cm. or 15-cm. gun battery. No difficulty was found in ammunition supply.

The basis of artillery tactics in position warfare was at first found in retaliation and barrage fire; later we adopted the French idea of counter-preparation. The necessity of dividing the front into barrage sectors of reasonable breadth was one consideration in determining the assignment of artillery to divisions. Efforts were made to supplement artillery in barrage by machine guns and light mine-throwers. Since only light guns were regularly used for barrage, the divisional artillery had to be reinforced at threatened points. A barrage sector was not supposed to be over 200 metres, but shortage of guns often made it necessary to exceed this materially; and after a long artillery preparation enough guns were generally out of

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action to thin the barrage still more. The barrage often came too late, especially when the lines were close together. Besides all this, frequent calls from the infantry for automatic barrage fire led to great ammunition expenditures; and finally the artillery abandoned the barrage scheme.

The firing of gas became a function of the light field artillery; and the effort was made to replace barrage by fire for annihilation upon selected points, in which the heavy guns could take part. The front of a sector, or the artillery strength for a given sector, now came to be determined by the possibilities for annihilating fire by the whole mass of guns; the following frontages were accepted for a normal division:

Light gun battery, 150–1200 m.; 6 batteries .....	900–1500 m.
Light howitzer battery, 200–300 m.; 3 batteries .....	600–900 m.
10-cm. gun battery .....	300–400 m.
Heavy howitzer battery, 300–400 m.; 3 batteries .....	900–1200 m.
Total for division .....	2700–4000 m.

For active operations, this artillery, of course, required reinforcement, at least for the purpose of enabling the heavy artillery to break up the hostile artillery deployment. The functions of the light artillery were then harassing, interdiction, and the firing of gas. The necessary batteries could sometimes be taken from reserve divisions, otherwise from the newly organized army artillery. It was objected that divisions did not take proper care of army artillery units attached to them; but the institution of this organization made it possible to relieve divisions complete, including their artillery, which had not been the case in the operations on the Somme. The primary use of the army artillery was to reinforce the heavy artillery, for destruction of hostile artillery, harassing fire, and firing gas.

As division fronts lengthened, under pressure of necessity, the heavy artillery was assigned to the divisions. This was contrary to the French theories, but was found convenient. Generally a division had, besides its nine field batteries, three heavy

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howitzer batteries, and perhaps a mortar battery and a gun battery or two; this for a front of about three kilometres in a quiet sector.

In the Champagne, in the autumn of 1915, the 15th Reserve Division, with four infantry regiments, held twelve kilometres front. Its artillery consisted of six batteries of field guns (the 23rd Reserve Field Artillery being temporarily with the 5th Bavarian Division) four of old light howitzers, one of 10-cm. guns and four of mortars. Opposed to them the French had about 400 field and 200 heavy guns. The 50th Division, with six kilometres front, had twelve batteries of field guns, four of heavy howitzers, one of old Russian 15-cm. guns and two of old mortars, against about 240 field and 120 heavy guns. An estimate for the whole 32-km. front of attack gives 1285 French field guns against 192 German, and 650 French heavy howitzers against 64 heavy howitzers, 24 heavy guns and about 30 mortars; or, per kilometre, 40 light and 20 heavy guns against 6 light and 4 heavy.

On the Somme, in September, 1916, the 51st Reserve Division was at Combles, on a front of 4.75 km. Having taken over the sector during the action, there was little fortification, and almost no obstacles. Part of the infantry was badly used up; the 74th Reserve Infantry had a nominal strength of 79 officers and 1980 men, and effective strength present in the trenches of 31 officers and 864 men. (*Translator's Note.*—Neither this regiment, nor the artillery regiment mentioned above, belonged organically to the divisions under discussion.) On September 23rd there had been identified 37 hostile field batteries and nine heavy. The division was opposed by three hostile ones, two of them French; it had 11 batteries of field guns, 4 of light howitzers, 3 of heavy howitzers, 1 of 15-cm. guns and 4 of mortars. The 52nd Reserve Division, on the right, had 21 batteries of light guns, 9 of light howitzers, 7 of heavy howitzers, 4 of 15-cm. guns and 2 of mortars.

The artillery was everywhere too weak; it could hardly hold out against the enemy's guns. And still it is clear that the

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weaker and poorer the troops, and the weaker their fortifications, the greater their need for artillery. It was necessary for the long range guns to be able to reach the enemy's back areas, and for the rest not only to cover his trenches with annihilating fire, but also to be ready, in case of a break-through, to continue the action. This compelled the grouping of batteries according to the tasks assigned, and organization of each group in depth, to some six kilometres from the front line.

Our situation on the inner line between east and west, and the ability of the enemy to choose his point of attack, compelled us to use wide divisional sectors and comparatively weak artillery. In the Champagne in the spring of 1917, a serious attack was expected. On February 25th the 214th Division took over a well-prepared front of seven kilometres; on April 12th and 13th, the enemy's artillery preparation having already begun on April 10th, the 29th Division took over the right section of it, leaving the 214th a front of 4.5 kilometres, and artillery as follows:

6 batteries,	19 light guns
3 batteries,	9 light howitzers
1 battery,	6 9-cm. guns
2 batteries,	4 10-cm. guns
2 batteries,	7 old model heavy howitzers
3 batteries,	8 new model heavy howitzers
2 batteries,	4 mortars
1 battery,	4 15-cm. guns
—	—
20 batteries,	61 guns in all

Although all the batteries took part in the barrage, it was very thin, 225 metres to the battery on the average. The first break came on the front of the 58th Reserve Division, which was next on the left; but the resistance of the 214th was weak, in spite of its strength in artillery, the troops being badly used up. Another disadvantage was the late arrival of the 29th Division in line.

*(To be continued.)*



# A Study

## TYPES AND PROPORTIONS OF PROJECTILES AND FUSES REQUIRED AS A WAR RESERVE FOR FIELD ARTILLERY

(Reference should be made to the accompanying table.)

1. THE two controlling factors in selecting types of ammunition are: first, power or efficiency; and second, simplicity of manufacture, supply and use. A great number of types of projectiles designed to cover all possible missions of artillery could be recommended for adoption, but such a procedure seriously affects the second controlling factor. The types of projectiles should be chosen with a view to covering the probable missions of artillery and not the possible missions. The accidental or abnormal missions can be accomplished by the use of some one of the types of projectiles adopted, which, though not as efficient as one designed especially for that mission, will still accomplish it with enough effectiveness to justify its use rather than complicating production, supply, etc., by the addition of another type.

2. A logical decision as to the kinds and proportions of projectiles and fuses required for a war reserve can be reached only after consideration of the probable character of our future hostilities, and the uses of the various types in connection with artillery tactical missions. The War Department has stated that all war plans should be based on offensive operations, and it is with that policy in mind that the conclusions are drawn. The tactical missions generally assigned artillery may be briefly stated as follows:

- (1) Barrage.
  - (a) Offensive.
  - (b) Defensive.
  - (c) Counter-offensive preparation.
- (2) Harassing.
- (3) Interdiction.

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- (4) Counter-battery.
  - (a) Neutralization.
  - (b) Destruction.
- (5) Demolition.

For purposes of this discussion only, these terms have been given the following meanings:

By barrage is meant all fire delivered directly in support of our infantry. This will include what is known as the standing barrage, which is purely defensive; the rolling or offensive barrage, fire in open warfare delivered against enemy troops in the open, and all concentrations on enemy strong points during attack; and the counter-offensive preparation designed to break up the dispositions of the enemy prior to the launching of his attack.

By harassing is meant all fire delivered for the purpose of lowering the enemy's morale. This will include all fire delivered solely to deprive the enemy of rest, or inflict losses during periods of stabilization. This fire may be delivered at any time except during an actual attack.

By interdiction is meant all fire delivered for the purpose of preventing or impeding the movement of supplies, matériel or personnel.

By counter-battery is meant all fire delivered against hostile enemy batteries for neutralization or destruction.

By demolition is meant all fire other than that included in counter-battery fire delivered solely for the purpose of destroying material objects, irrespective of what the object of such destruction may be.

3. Projectiles may, in general, be classed under three heads, according to their use:

- (1) Those for use against personnel.
- (2) Those for use against matériel.
- (3) Those whose tactical use does not fall within either of the two heads above. An example of this class is smoke shell.

Projectiles which will be used against personnel, or "mankilling projectiles," are high-explosive shell, shrapnel and gas

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shell. Those for use against matériel are high-explosive shell, and in some cases shrapnel or smoke shell for incendiary effect.

To be effective, shrapnel must be burst in the air and the fire must be observed. It cannot, therefore, be satisfactorily used at night, or generally in fog, rain, or snow, or at ranges beyond the limit of observation.

Gas shell can be used only under certain conditions. In general, winds must be favorable; the area gassed cannot be immediately occupied, etc.

High-explosive shell can be used under all conditions.

Smoke shell can be used under all conditions.

These considerations lead to the conclusion that high-explosive shell can be used whenever shrapnel or gas shell can be used; that gas shell can be used in some cases where shrapnel cannot be used; that shrapnel can be used in some cases where gas shell cannot be used; that high-explosive shell may be substituted for shrapnel or gas shell in all cases where the mission would normally indicate the use of the latter; that shrapnel may be substituted for gas shell in certain cases where the mission would normally call for the latter. Smoke shell has a special use for which there are no satisfactory substitutes. While substitution of one projectile for another is not recommended, it has frequently been resorted to, and the possibility of the necessity arising of so doing again should not be lost sight of. Shrapnel fire is more difficult to execute properly than shell fire, and so requires a more highly trained personnel. In any war demanding a maximum effort on the part of the nation it will be difficult to obtain personnel sufficiently skilled in the conduct of fire with shrapnel.

4. With the preceding considerations in mind, the missions of the different calibres of guns will be discussed.

*75-mm. Gun.*—The mission of the 75-mm. gun is the support of the infantry. It is exceptionally used to perform other missions.

Of the artillery missions, that which gives the closest support to the infantry is the barrage, which is used in some form whenever there is an advance of our own troops, or an advance

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or a suspected advance by the enemy. Of the barrage missions, the offensive barrage requires a high rate of expenditure, covering a period frequently of several hours, and is participated in by a large number of guns. The defensive barrage and counter-offensive preparation require a high, but usually decreasing, rate of expenditure covering a short period of time, and are generally participated in by a relatively small number of guns.

Harassing becomes more important as conditions stabilize.

Interdiction is a relatively unimportant mission of the 75-mm. gun.

Counter-battery is usually assigned to cannon of larger calibre, and the use of the 75-mm. gun for counter-battery work is exceptional.

The 75-mm. gun is a relatively poor demolition weapon.

The estimated expenditure of ammunition in per cent. for the various artillery missions is shown in the table.

Projectiles to perform those missions are assigned in accordance with the uses indicated in the discussion of projectiles.

The offensive barrage will more frequently be started at dawn, or just before dawn, when it would be impracticable to observe shrapnel fire. It might be argued that the height of burst could be adjusted the day before, but were this done the adjustment would very probably not be correct on account of changed atmospheric conditions. Shrapnel was frequently used in the offensive barrage during certain phases of the World War, one battery of a battalion firing shrapnel, and the other two shell. Smoke will be used in the offensive barrage under certain circumstances for screening purposes, and was sometimes so used during the World War in the proportion of one smoke shell to three high-explosive shells. Gas shell will probably not be used on account of the difficulties it would cause to our troops. Shrapnel and smoke shell will therefore be used relatively infrequently, the main reliance being placed on high-explosive shell.

The defensive barrage will frequently be fired at night, or under conditions that will not permit observation, and when fired at such times shrapnel fire will not be efficient. Reliance

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must therefore be placed on high-explosive shell. Gas shell will probably not be used, because it would interfere with any counter-attack.

Counter-offensive preparation will very frequently be fired at night, or under conditions that will not permit observation, and when fired at such times shrapnel fire will not be efficient. Gas shell may be used in cases where it will not interfere with the plans for counter-attack, and where weather and terrain conditions permit. High-explosive shell will be the main reliance.

Harassing will generally be done at night or when observation is not practicable, so that the amount of shrapnel will be relatively small. Gas shell are very effective for harassing when conditions permit their use. High-explosive shell can be used under all conditions where either shrapnel or gas shell can be used.

Interdiction is carried on under conditions which are very similar to those under which harassing is conducted, and the same types of projectiles can be used, though gas shells for the 75-mm. are not as effective for interdiction as for harassing.

Counter-battery missions for the 75-mm. gun will be almost entirely neutralization, for the projectile is too light to do much destruction. Neutralization is similar to interdiction, and so the same types of projectiles and the same percentages of those types will be required.

High-explosive shell is the most effective projectile for demolition, and should constitute the entire requirement for this purpose.

All the missions considered, except demolition and counter-battery destruction, require effect on personnel. This effect is best produced by a low-bursting shrapnel, or a shell that is burst just before it penetrates the ground. The fuses to accomplish this are the combination time and percussion fuse for shrapnel, and the super-quick fuse for high explosive, gas and smoke shell. For demolition, for which high explosive shell only is effective, either the super-quick or the non-delay fuse may be required. If the target to be demolished is above the ground,

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such as wire, the super-quick fuse is most effective. If the target is light cover, buildings, or similar material, the non-delay fuse is effective. A non-delay fuze should burst the projectile immediately after penetrating light cover.

Since no super-quick fuse has yet been produced that functions satisfactorily at all angles of impact, there being many failures at small angles of impact, it will be necessary to include a small percentage of non-delay fuses in the requirements where super-quick action would be preferred. Based on the above considerations, the estimated requirements in per cent. of the various projectiles and fuses to perform the probable missions are shown in the table.

*155-mm. Howitzer.*—The 155-mm. howitzer is an excellent counter-battery weapon. It is also the most efficient weapon against machine guns. While it can be efficiently used for demolition, harassing and interdiction, it is believed that other cannon can successfully perform some of these missions, and that the main work of the 155-mm. howitzer will be counter-battery and barrage.

On account of the difficulty of adjusting its height of burst, of getting a satisfactory time fuse, and of the large angle of fall, shrapnel is not regarded as an efficient projectile for this calibre.

In the barrage, the offensive barrage will be much more important than the defensive barrage or counter-offensive preparation. This howitzer will take a prominent part in the attack on strong points during an offensive operation, and was frequently used during the World War to extend the depth of the barrage. It is doubtful if it will participate in the defensive barrage, but will sometimes take part in the counter-offensive preparation.

It will be used for both neutralization and destruction in counter-battery fire, but it is believed that neutralization will be the most usual mission, with destruction an incident of it.

Gas shell will probably not be used in the offensive barrage, because of the difficulties it might cause our own troops. Smoke shell may be used in small quantities to prevent observation from

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enemy observation posts, but the screen for our infantry will be provided by the 75-mm. guns. Screening in depth is unusual. Only a small amount of smoke shell is required, and the rest will be high-explosive shell.

Whatever part this cannon is called upon to take in the defensive barrage will be similar to its work in counter-offensive preparation, so the two are considered together. Gas shell can be used efficiently under certain favorable conditions, but high explosive shell will be the most important projectile for this work. Smoke shell will not be needed.

Harassing can be effectively carried on with either gas or high explosive shell, but conditions must be favorable to permit the use of gas shell, so high-explosive shell will be the main reliance.

Unless conditions are very favorable, high-explosive shell will be much more efficient than gas shell for interdiction.

In counter-battery neutralization, gas shell can play an important part. A battery position can be quickly rendered untenable for days by well-placed persistent gas shell. High-explosive shell will not only neutralize, but it may destroy, so that there is an advantage in using it for neutralization. High-explosive shell only will be used for counter-battery destruction.

Demolition will be carried out with high-explosive shell.

Those missions calling for action against personnel are best effected by bursting the projectile before it penetrates the ground. Those missions calling for action against matériel are best effected by bursting the projectile before penetration, if the material is above the ground, and by bursting the projectile after penetration if the material is in the ground. To burst the projectile before penetration requires a super-quick fuse, and to burst it after penetration requires a non-delay or delay fuse. The same remark regarding the limitations of the super-quick fuse of the 75-mm. gun applies to the 155-mm. howitzer. With the above considerations in mind, the estimated requirements in per cent. of the various projectiles and fuses are shown in the table.

*4.7-inch Gun.*—This is the gun of the Corps Artillery, and

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its use primarily is against targets lying beyond the zone of action of the Divisional Artillery. It will be used in the barrage to extend the depth of barrage laid down by the 75, to effect concentrations on points beyond the range of the 75, and perhaps to carry on a barrage after the effective range of the 75 has been passed, though this last use will probably be rare. In addition to its use in the barrage, the main missions of this gun are harassing and interdiction. It will be used in counter-battery, to some extent, to supplement the work of the 155-mm. howitzer. Its use in counter-battery will be almost entirely neutralization, as it is inferior to a howitzer for destruction. It will be used for some demolition in addition to its counter-battery work where the targets cannot be reached with the 155 howitzer, or where the fire of this cannon is not available. It is a relatively poor gun for demolition, by reason of its dispersion, which is greater than that of the howitzer.

The remarks with reference to the character of projectiles and fuses made in the discussions of the 75-mm. gun and 155-mm. howitzer are largely applicable to this gun. A small amount of smoke shell is provided in the offensive barrage in case this gun is required to screen the movements of infantry beyond the range of the 75. Gas shell is not provided in the offensive barrage, as its use might limit the movements of our own infantry. A smaller proportion of shrapnel will be used with this gun than with the 75, because of the inferiority of the time fuse, and the greater difficulty of observation. Otherwise, the discussion of projectiles used for the 75 is applicable to this cannon.

With respect to fuses, the combination time and percussion fuse should be provided for all shrapnel. The remarks made heretofore with respect to super-quick fuses are equally applicable to this gun. No non-delay fuses are included for the barrage, because it is not thought that this gun will be used for that mission at such short ranges as will give so small an angle of impact that the super-quick fuse will fail to function. For the missions of harassing, interdiction and counter-battery, the super-quick fuse is most desirable, as these missions with this



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gun are practically entirely against personnel. For demolition, a non-delay fuse should be provided. The estimated requirements in per cent. of the various projectiles and fuses are shown in the table.

*155-mm. G.P.F.*—This gun outranges all other mobile guns and howitzers, of corps and heavier type, from three to six thousand yards, and is much more mobile than the heavier howitzers, permitting it to be located further forward than they can be. It will, therefore, frequently be called upon to perform missions that would preferably be performed by howitzers if they had the necessary range. The discussion of the action of the various types of projectiles are the same for this gun as for the preceding calibres. No shrapnel is provided for this gun, as its great range would prevent the effective use of a combination fuse and render the observation of fire extremely difficult. Gas shells are included for the mission of harassing and counter-battery, since this is an excellent neutralizing agent with this calibre. The missions of this gun, with the exception of demolition, are principally against personnel, so the super-quick fuse has been provided for them. The short-delay fuse has been provided for demolition. The estimate requirements in per cent. of the various types of projectiles and fuses are shown in the table.

*8-inch Howitzer and 240-mm. Howitzer.*—These are very powerful howitzers, which will be used to reinforce and extend the zone of action of the Corps Artillery. No shrapnel are recommended for these cannon, as by reason of their range and great angles of fall it will not be an effective projectile. Gas shell are not recommended for these cannon at the present time. When further development has been made in chemical ammunition for these calibres, this question will be reopened, and it is possible that at that time some gas shell will be recommended. The Chemical Warfare Service now has in its program the development of gas shell for these calibres along lines that have not yet been undertaken. In so far as the projectile is concerned, therefore, the relative frequency of the missions of these calibres are comparatively unimportant, since only high explosive

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shell is recommended. With respect to fuses the barrage harassing, and interdiction missions of these cannon, being purely against personnel, will be best accomplished by means of the super-quick fuse. That part of the counter-battery mission, which is intended to accomplish the neutralization of enemy batteries, is also best accomplished by the super-quick fuse. At battery positions the destruction desired is largely the destruction of artillery matériel and comparatively light cover. These missions are perhaps best accomplished with the super-quick fuse. For the demolition mission of these calibres, short delay fuses are provided. The estimated requirements in per cent. of the various projectiles and fuses are shown in the table.

5. In the preparation of the table the following authorities were consulted:

(a) Replies to questionnaires sent by the Chief of Field Artillery to certain artillery officers who had had considerable experience overseas in the World War.

(b) Appendix 2 to the History of the Ordnance Department, A.E.F., Artillery Ammunition Section.

(c) Report from minutes of British Ordnance Committee, composed of Army and Navy Officers, meeting August 31, 1920.

(d) Study of Field Artillery ammunition prepared at the General Staff College, May 18, 1920.

(e) A study of the problem of ammunition reserve for Field Artillery prepared in the War Plans Division, General Staff, dated July 9, 1919.

(f) The report of a Board of French Artillery Officers, of which General Herr was the president, and which corresponds to our own Calibre Board.

6. It must be distinctly understood that the percentages of ammunition recommended in the accompanying table are for a war reserve only, and have no relation whatsoever to the proportions to be provided for the peace-time training of the Army. In that training a large proportion of that type of projectile most difficult to handle should be used regardless of the relative frequency with which this projectile would be used in service.

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It is probable, therefore, that for peace-time training a relatively large amount of shrapnel will be recommended. Furthermore, for purposes of safety, it is probable that a relatively small proportion of chemical ammunition will be recommended.

7. The proportions of the different kinds of projectiles and fuses shown in the table are based on the best information available at the present time, and are stated without consideration of the kinds and quantities now on hand.

Calibre and type	Mission	Estimated expenditure each mission (per cent.)	Appropriate type and estimated expenditure (per cent.)				Total each type (per cent.)				Fuses Total each type (per cent.)				
			Shell	Shrap.	Gas	Smoke	Shell	Shrap.	Gas	Smoke	SQ	ND	SD	LD	Comb.
75-mm. Gun	Barrage .....	70				33	9	4.5	3.5						
	(a) Offensive .....	50	70	20	0										
	(b) Defensive .....	25	95	5	0					61	*			9	
	(c) C.P.O. ....	25	70	5	25	0									
	Harassing .....	15	45	10	45	0				6.75	0			13.5	1
	Interdiction .....	5	50	10	40	0	2.5	0.5	2.0	0				4.5	.5
	Counter Battery .....	8	65	10	25	0	5.2	0.8	2.0	0	7.2				.8
	(a) Neutralization .....														
	(b) Destruction .....														
	Demolition .....	2	100				2.0	0	0	0				2	
Totals .....	100					69.45	11.8	15.35	3.5	86.2	2			11.8	
Recommended totals .....						69.0	12	15	4.0	80	8*			12	
155-mm. How.	Barrage .....	30				26.25	0	2.7	1.85	30					
	(a) Offensive .....	70	95	0	0	5									
	(b) Defensive .....	30	70	0	30	0									
	(c) C.P.O. ....														
	Harassing .....	15	70	0	30	0	10.5	0	4.5	0	15				
	Interdiction .....	5	80	0	20	0	4.0	0	1.0	0	5				
	Counter Battery .....	40					28.0	0	12.0	0					
	(a) Neutralization .....	75	60	0	40	0					35			5	
	(b) Destruction .....	25	100	0	0										
	Demolition .....	10	10			0	10.0							10	
Totals .....	100					78.75	0	20.2	1.05	85			15		
Recommended totals .....						79	0	20	1	83			15		
4.7" Gas	Barrage .....	30				27.0	1.68	.9	.49	28.32				1.68	
	(a) Offensive .....	70	90	8	0	2									
	(b) C.P.O. ....	30	90	0	10	0									
	Harassing .....	25	65	5	30	0	16.25	1.25	7.5	0	23.75			1.25	
	Interdiction .....	25	75	10	15	0	18.75	2.5	3.75	0	22.5			2.5	
	Counter Battery .....	15	75	5	20	0	11.25	0.75	3.0	0	14.25			.75	
	Demolition .....	5	100	0	0	0	5	0	0	0					
	Totals .....						78.25	6.18	15.15	.42	88.78	5			6.18
	Recommended totals .....						78	6	15	1	80	5			6
	155-mm. G.P.F.	Barrage .....	15	100											
Harassing .....		20	70		20				6		20				
Interdiction .....		30	100								30				
Counter Battery .....		15	75		25		11.25		3.75		15				
Demolition .....		20	100				20						20		
Totals .....							90.25		9.75						
Recommended totals .....						90		10		80		20			
8" How. and 240-mm. How.	Harassing .....	15	15								15				
	Interdiction .....	20	20								20				
	Counter Battery .....	40	40								40				
	Demolition .....	25	25										25		
	Totals .....						100				75			25	
Recommended totals .....						100				75			25		

\*6 per cent. added to provide for cases in which SQ fuses do not function satisfactorily.

## DISCUSSIONS

### Remarks on "Maps and Map Firing"

By Brig.-Gen. Dwight E. Aultman, U. S. A., U. S. F. A. JOURNAL, July-August, 1920.  
BY EDWARD B. RICHARDSON. FORMERLY MAJOR, 101ST. F. A., AND LIEUT.-COL.,  
25TH F. A., DISCHARGED.

It is a joy to receive THE FIELD ARTILLERY JOURNAL and find some common-sense remarks on the use of maps and map firing, and the writer feels sure that he voices the wish of the many Field Artillery officers who saw service abroad that those who have the directing of Field Artillery instruction in this country in the future be largely made up of overseas officers, who held the ranks of captains and majors with their units in the line of stable and unstable sectors, so that the value of maps and map firing will be taught, based on practical experience in war. No brigade commander had time available to watch the work of orientation often enough to get the intimate and practical knowledge had by a line officer of how it was done in France.

To the writer's personal knowledge, and to his horror when he returned in September, 1918, to take over new troops, the importance of map work was not believed in by many of the higher officers, the majority of whom had not seen front-line service, and was not stressed sufficiently, the old "before the war" open warfare being preëminent in instruction courses and in field work. The writer's own colonel criticised his overseas battery commanders for seeking overhead concealment, and, when the writer mentioned aeroplanes, directed "Enemy has no aeroplanes," and the problems of the following days invariably had the clause "Enemy assumed to have no aeroplanes." This is mentioned as an example of how "overseas" ideas were received. Balloons were beyond his ken, for they and the penalties of appearing on the crest for direct fire never worried him.

The following remarks are made as to certain statements in the article, from the standpoint of an officer of 75's.

## THE FIELD ARTILLERY JOURNAL

Stress is laid on the "Canevas de Tir," whereas it is believed that this was seldom available except in stabilized sectors, and that even then other matters of more pressing importance caused the actual battery locations to be found by triangulation from the "Canevas" only after several days, and that registration and service firing generally preceded this work. In unstabilized sectors or in war of movement, such as the Château-Thierry drive, there were no "Canevas" at hand, nor time to use them had they been available. The statement is made that "the best maps available were useless" without the "Canevas," but such is wide of the mark, for most of the firing was done without thought of triangulation points. The Plan Directeurs were used, the guns being located from a house, a cross-roads, a wall corner, and especially from old-time cemeteries, where available, or even from the third dot in a row of five apple trees.

The stretching and warping of paper maps mentioned was there without question, but many a battery was located at night with only a rain-spotted map available; its barrage was fired and the trick was turned.

Again, "the selection of actual positions is simple," is a statement to which exception is taken when the B.C. has the life of his men, the preservation of his matériel, the feasibility of getting up ammunition by day, a 2000 metre near limit with a 180° field of fire, the keeping clear of other batteries, and from the proximity of smoking infantry kitchens in mind.

The statement that "probably 90 per cent. of artillery targets are invisible from any ground observing station" is correct, and should be stressed in consideration of this subject. The article does not bring out the importance and extent of night firing that is necessary, simply mentioning that "night firing must always be unobserved." In stabilized sectors 75 per cent. of the firing is at night; in action of movement at least 50 per cent. of firing is by night. Night is the usual time for retirement and advance on roads, the enemy being then hidden by darkness, while during the day he remains concealed to the

## DISCUSSIONS

best of his ability. Invisible targets were the rule, and will be to a greater extent, if possible, in future wars.

Map barrages are well and emphatically mentioned. In certain "*coup de main*" the reinforcing batteries moving into the sector were not allowed to register for fear of arousing suspicion, in the Château-Thierry drive registration was generally impossible, and many a time word has come to a battery after "H hour" to fire a rolling barrage, and from the map and the watch the battery has joined in. Colonel Screws of the 167th Infantry can tell of such cases at L'Esperance Ferme, when he was supported by the 101st F.A. His men made their objective behind that barrage. No "Canevas" was available, no registration possible; the Plan Directeur alone was at hand.

"For *effective* fire, the guns must invariably be adjusted," would be a truer and an ampler statement if it read: "For economical effective fire." Effect was often produced by volume of fire under the conditions just mentioned. Such fire was not economical, but the result was obtained in an uneconomical but the only practical way.

Where listing the advantages and disadvantages of the two systems, under "Pre-War Methods," as an all-important disadvantage, should be mentioned, necessary exposure with consequent severe casualties and destruction of material.

Exception is also taken to the stated advantage of "independence of communications," for it is difficult to conceive after the experience of the war that a B.C. will locate his battery so in the open that he can, in many cases by voice or wig-wag, direct its fire from his observing station. In France, a country of fields with groups of "foret" and "bois," such a proceeding would be exceptional. In the eastern half of the United States the writer knows that worse conditions for visibility obtain, and he believes that in the major part of the western half of the United States conditions are no better than in the East. Communication in open warfare by wire from battery to observer to infantry line is a "*sine qua non*."

The three concluding paragraphs are excellent, and it is to

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be hoped that the "Fort Sill School of Fire" and other firing centres will instruct more in accordance with the ideas of overseas officers than with the ideas of the unfortunates who were literally held home doing their inexperienced best for the many they sent where they so longed to go, and where new and broader ideas were always in the making.

It is not the writer's intention that these remarks be taken as a criticism of Brigadier-General Aultman's article, even though all his statements are not agreed to *verbatim*, but rather that the general be credited with whatever there may be of value in them, since his article caused their appearance in print.

The writer is "out of the game" now, but still follows the red guidon in THE FIELD ARTILLERY JOURNAL with interest, and hopes that those who were "over there" and are still in the service will impregnate in the new teaching the practical ideas learned from a glorious experience.

# CURRENT FIELD ARTILLERY NOTES

## Ordnance Notes

### I.<sup>1</sup>

*Organization.*—The Artillery Division is a part of the Office of the Chief of Manufacture<sup>2</sup> and is responsible for the development, design, procurement, production and inspection of artillery matériel. Artillery matériel includes all guns and trench mortars with their mounts, and fire control instruments for all calibres from the infantry accompanying howitzer to the largest. The types of matériel include accompanying, mountain, field, siege, self-propelled, anti-aircraft, railway and seacoast.

The Rock Island, Watertown and Watervliet Arsenals are under the control of the division. The Erie Howitzer Plant and the Rochester Gun Plant, maintained under the administration of Watervliet Arsenal, are also included in the division facilities. Fire control is produced at Frankford Arsenal.

*Production Facilities.*—As a result of studies made after the armistice, it was decided that the Department should retain at the Arsenals, production capacities only for such matériel as could not be procured from commercial plants in time of war without serious delay. Manufacturing capacity was held for guns and recuperators. These articles require special shop buildings, equipment and machine tools. Gun carriages, except for the recuperator, can be produced in automobile or car plants and no war capacity for such articles has been held. The Department's facilities for gun forgings have not been greatly increased as commercial plants are now available or could be modified for gun forging production within a reasonable time. Jigs, fixtures, gauges and special facilities, constructed during the war for manufacture of special articles, have been shipped

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<sup>1</sup>Reprint from *Army Ordnance*, November-December, 1920.

<sup>2</sup>The office of the Chief of Manufacture is a sub-division of the office of the Chief of Ordnance.—ED.



## THE FIELD ARTILLERY JOURNAL

to the arsenals and classified for future use. Studies have been made and are still progressing of the methods of manufacture used by contractors during the war. These data will be collected and made available for the future contractor.

For war production and peace-time manufacture, the machine tool equipment has been carefully renewed at each arsenal. The Department now has available some of the best equipped plants in the country. Watertown Arsenal is equipped with an open hearth and electric steel foundry, a gun forge plant, a projectile plant, and shops for the manufacture of seacoast and railway mounts. It has production capacity for cradles and recuperators for guns of 8-inch calibre and above. Watervliet Arsenal and its outlying plants have production capacity for all calibres of guns from 75-mm. up. Rock Island, in addition to its machine guns and small arms plants, has production plants for recuperators for field and siege guns and well-equipped shops for peace-time manufacture of gun carriages and tractor matériel.

*Artillery Wheels.*—It is not intended in the brief space of this article to attempt any thorough discussion of the title, as casual knowledge will tell one that the answer depends on consideration of numerous conditions of manufacture and use. The question is, however, at this time one of concern to the Artillery Division.

Prior to the war, practically all mobile gun carriages in this country and abroad were transported on steel-tired wooden wheels, and no springs were interposed between the axle and the gun mount. The same practice was followed as regards caissons for carrying ammunition, although shortly before the war, experiments had been made with a spring-supported caisson. During the war both the French and Germans brought out new matériel in which the gun and its mount were sprung above the axle. In some cases, solid rubber tires were introduced along with incorporation of the springs.

In view of the continuous tendency in automobile and truck construction to a decrease in the unsprung load, the question

## CURRENT F. A. NOTES

may arise as to why there should be any hesitation in making gun carriages as elastic as possible, and it is at this point that we are confronted with certain special considerations. In the first place, it is improbable that it will ever be possible to move artillery, particularly of the heavier types, at speeds greater than 15 miles per hour; and in fact it will only be under the most exceptional circumstances that it will be possible to move at this speed. This is due to the congestion of roads, which is unavoidable in the concentration of large masses of troops or equipment. Again, while it is desirable that the carriage should be lightly sprung in traveling, it must be rigid in firing; therefore, if we support the carriage upon springs, or use a spring wheel in case a satisfactory type is developed, it is necessary to provide a check on any spring movement during firing. This is, of course, entirely possible mechanically, but nevertheless introduces one more objectionable complication.

The question also arises as to the actual necessity for using a rubber-tired wheel and at the same time spring-supporting the carriage. For a great number of years artillery carriages have, as stated, traveled on steel-tired wheels without springs, and some of these carriages have traveled a few thousand miles over practically all conditions of road, including cobblestone, and at speeds up to 8 miles per hour. It would appear then, since we are only proposing to increase the speed to 15 miles per hour, due to use of tractors, that the use of either a rubber-tired wheel or of springs alone would be adequate to meet the increased vibration and shock.

Solid rubber tires are objectionable on the grounds: first, of initial expense; second, cost of upkeep, including consumption of valuable time and labor; and third, the increased weight of the wheels, which is quite serious, particularly in the case of the smaller calibres of matériel, where, on account of being handled by hand, the weight element is very important.

If we use a steel-tired wheel, it is reasonable to assume that we must spring-support the mount, and it is probable that a spring-supported mount would render unnecessary the use of

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rubber tires in those cases where the weight, costs of maintenance, etc., are very objectionable. However, in this case matériel would undoubtedly be very noisy while on the road.

One solution of the problem would be answered by the use of a spring wheel, and it is believed that such a wheel can be developed. It is to truck manufacturers that the Department must look for the final development of a satisfactory spring wheel, as appropriations are not adequate to permit construction and experiment except to an insignificant degree.

The length of this article does not permit mention of scores of points which are involved in the subject, but the few which have been touched upon are sufficient to show that the question is a broad one, which must be very thoroughly developed in order to provide the best possible type of artillery gun carriage.

*Caterpillar Mounts.*—The accompanying illustration<sup>3</sup> shows one of the latest designs of the Ordnance Department in the development of the self-propelled mounts for heavy field guns. This wheeled caterpillar for the 155-mm. G. P. F. gun, Model 1918, is a combination type of self-propelled gun mount which can be run on four rubber-tired wheels or on an endless track with grouser action, which passes over the wheels. When traveling on the road or over good ground, this mount operates exactly as a motor truck, with the tracks (not shown in the illustration) carried on shelves along either side of the vehicle, and the centre pair of wheels raised from contact with the ground. For manœuvring over varied terrain, steep grades, swamps, etc., the centre pair of wheels are lowered to the ground and the tracks removed from the shelves and placed over the wheels. It requires only about thirty minutes for the gun crew to adjust the tracks over the wheels and the mount then becomes a caterpillar, with very low unit ground pressure, capable of negotiating terrain impassable for wheeled vehicles.

As a wheeled vehicle, the mount normally travels with the breech end of the gun first, although there are four speeds forward and four reverse, and the vehicle operates with equal facility

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<sup>3</sup>For illustration see Sept-Oct., 1920, issue of F. A. JOURNAL, page 476.

## CURRENT F. A. NOTES

in either direction. The speed of this mount, under favorable conditions, is in excess of twelve miles per hour, which was specified as the maximum needed for this type of gun, by the Field Artillery Board Report. When operating as a caterpillar with the tracks over the wheels, it is preferable, although not necessary, to manœuvre the mount with the breech end of the gun first, as this places the tracks in tension on the ground side.

The mount is of the built-up structural steel type, consisting of two outside web plates tied together at the front end by cross members to form a box for housing the engine and transmission unit. Back of this engine compartment is located the gun carriage bolted to horizontal plates supported by the side frames of the mount. At the rear the web plates are tied together by a hollow axle supporting the two cast-steel arms which carry the steering wheels.

Each side of the vehicle is equipped with four solid rubber-tired double wheels, viz: the driving wheel, the steering wheel and the two centre wheels mounted on a movable support. The two centre wheels are lowered to take part of the weight of the vehicle when operating as a caterpillar, and raised to clear the ground when operating as a wheeled vehicle.

The driving power of the mount is a six-cylinder ball-bearing gasoline engine located transversely in the front end of the mount. Power is transmitted through two disc clutches, one at either end of the engine crankshaft, to the transmission gear and gear sets and thence to the driving wheels through an internal gear drive. The final drive pinion shafts are each equipped with a hand brake.

Each link of the caterpillar track is equipped with a tooth of special shape which engages in sockets in the driving and steering wheels between the rubber tires of the wheels. These slots are open at the bottom to allow rocks and sand and other material to pass to the outside of the wheel, so as to not wedge the track tooth and thus throw the track off the wheels.

Rather extensive tests of a pilot vehicle of this type have

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indicated promising possibilities of this design, and a battery of four of these mounts will shortly be issued by the Ordnance Department for a prolonged service test in the field.

*Decoppering of the 16-inch Gun.*—The possibility of the removal of copper from the lands and grooves of cannon, by the use of a tin-lead alloy introduced into the powder charge—which was developed and used to a limited extent by the Allied Armies during the World War—has been recently tried out in a 16-inch, 35-calibre gun, with most satisfactory results. The gun in question had been fired about 150 rounds and a heavy coating of copper of a granular form had accumulated, both on the lands and in the grooves; 20 rounds were fired as rapidly as possible, in which 450 grams of the alloy were introduced between the front end of the powder bag and the base of the projectile. The results shown by a visual inspection are that practically all of this accumulation of copper has been removed and that remaining is in the form of a smooth plating. The alloy apparently caused no change in the muzzle velocity or range of this gun, and the final 10 rounds showed a marked improvement in deviation. The alloy used consisted of 60 per cent. tin and 40 per cent. lead, and was rolled into strips 1½ inches broad, 50 inches long, and weighing 20 grams each.

*Research on Elasticity.*—An extensive program of experimental work has been carefully prepared by the Artillery Division for the purpose of determining the physical constants of the elasticity and resistance of the materials used in Ordnance construction.

Evidence has accumulated for quite a long time tending to cast most serious doubts upon the effective value of the hypotheses upon which the science of elasticity is established, particularly in their application to practice. Investigation of numerous cases of failure of material has shown the desirability of dealing with the material as it actually is and not as it is assumed to be for the purpose of mathematical treatment. Preliminary tests on tension and compression have already yielded enlightening and very encouraging results of far-reaching import.

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Briefly, they show that there is but one elasticity, that of the mass proper subjected to stress; that the Poisson ratio instead of being practically constant varies from zero to one-half; that the stresses and their resultant strains combine in simple additive manner.

The program which is now under way at the Watertown Arsenal comprises broadly: tensile and compressive tests of gun steels, and micro-photographic studies of the structure of the material before and after application of stress; tests with combined stresses applied hydraulically to the specimen, in such a way as to avoid the confusing effect of friction on the surfaces of application of the loads; tests of hollow cylinders of various proportions stressed by internal hydraulic pressure; some of these cylinders will be treated as simple ring elements, unsupported at the ends in conformity with the usual theoretical hypothesis, and internally along their full length; others will be internally pressed upon part of their length in order to determine the supporting influences of the ends, such as actually obtains in a cannon and which, so far, has not been dealt with by theory; these cylinder tests will be divided into two main parts, one dealing with a stressing which will extend nearly to the natural elastic limit, and the other with stressing carried purposely beyond the elastic limit; this matter is essential for obtaining reliable data applicable to autofrettage work.

Tests with compound cylinders will also be made so as to obtain reliable data on shrinkage processes.

In addition, the Watertown Arsenal has prepared the first gun tube to be treated by auto-frettage process; it is of the monoblock type, 155-mm. howitzer, and will be ready for treatment within a fortnight.

*Fire Control Instruments.*—Frankford Arsenal has nearly completed for test a type of stabilized balloon observation instrument for use in range determination for long-range seacoast artillery. The ranges attained by the latest types of railway and seacoast artillery are such that the targets would, in a great many cases, be below the horizon, as viewed from the usual

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observation tower now in use in the Coast Defenses. The captive balloon equipped with suitable instruments for making the necessary observations provided a means of obtaining the desired data for all practicable ranges of the target, if atmospheric conditions are such as to permit visual observation. When visual observation is not possible, other methods of locating the target will be required. One of these methods is by means of observations taken from an airplane, itself being located by observation from the battery position. An instrument to permit the necessary observations from airplanes to be made is also being developed by Frankford Arsenal for test.

Frankford Arsenal has completed, and will shortly ship to Fort Monroe for test, a Wilson Range Correction Board. This board is designed to take the place of the Pratt Range Board. The curve on the Wilson Board is generated by means of a flexible spline, several points of which are fixed by means of the given data, leaving the spline free between these points to take up a natural curve showing the total correction as a function of range.

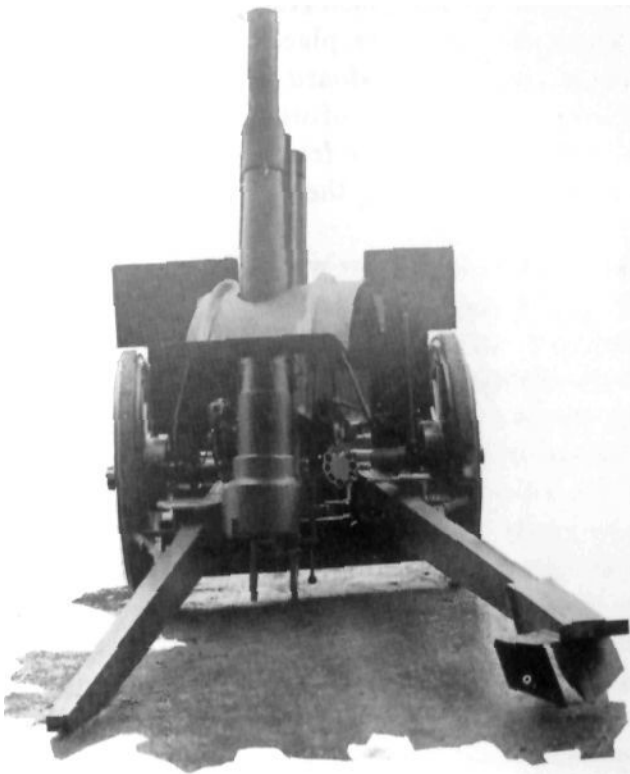
Frankford Arsenal is now working on a combination direct and indirect fire sight for Railway Artillery Mounts. The 3-inch telescopic sights are satisfactory for direct fire on fixed mounts, but are subject to error when used on Railway Mounts which may be out of level. The present panoramic sight is satisfactory for indirect fire, but not for long range direct fire under the conditions of low visibility existing on the seacoast, hence the necessity for a sight which will enable the mount to be used to maximum advantage in both cases.

Three experimental types of fire control instruments for anti-aircraft artillery have been designed and are being constructed at Frankford Arsenal. These are the result of research and experience regarding the successful operation of anti-aircraft matériel gained during the war. They will, when placed in quantity production, complete the composition of fire control apparatus for all of our anti-aircraft artillery batteries.

Two Barr and Stroud two-metre base range and height

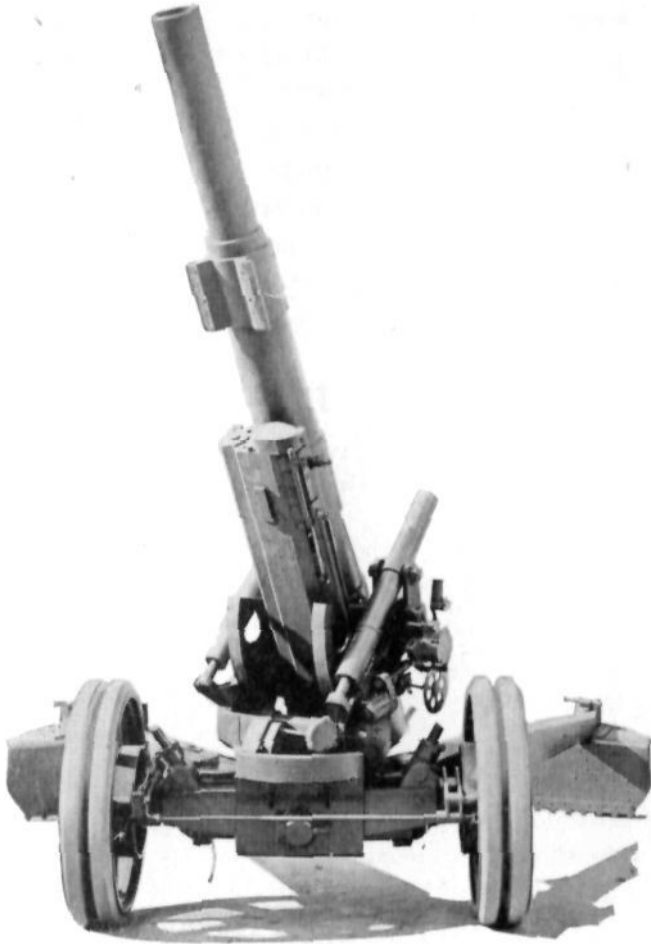


WOODEN MODEL OF 75 MM. GUN ON SPLIT TRAIL CARRIAGE  
The 105 mm. howitzer will be mounted on same carriage



WOODEN MODEL OF 105 MM. HOWITZER ON SPLIT TRAIL CARRIAGE  
The 75 mm. gun can be mounted on the same carriage





WOODEN MODEL OF 155 MM. HOWITZER ON SPLIT TRAIL CARRIAGE  
By making slight modifications the same carriage will take the 4.7 gun

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finders of the "coincidence" principle have arrived at Frankford Arsenal. The optical parts of these instruments are the same as the ordinary two-metre base self-contained range finder. An exterior mechanism, which comprises two pairs of variable ratio gear wheels or toothed cones, is provided between the prism operating pinion and the elevating gear, so that the prism is thereby moved in accordance with the changes in the angle of elevation in order to keep the coincidence unaltered when the height of the target remains unchanged. A differential bevel gear train adds the rotational movements and imparts the sum to the axis of the intermediate wheel, thus resolving the height component. These are of the latest design and will be used in anti-aircraft gunnery to determine the altitude of an airplane.

## II

BY MAJOR G. R. ALLIN, FIELD ARTILLERY, U.S. ARMY.

*Field Artillery Representative on the Ordnance Committee.*

The report of the Board of Officers, appointed December 11, 1918, "to make a study of the armament, calibres and types of matériel; guns and proportions of ammunition; and methods of transport of the artillery to be assigned to a field army," and officially known as the Calibre Board, was published in the July-August, 1919, number of THE FIELD ARTILLERY JOURNAL. The report calls for the redesign of almost all the artillery munitions used during the war. The Ordnance Department has been engaged on this work for the past year and a half, and has redesigned all the calibres mentioned in the report, except the 240-mm. howitzer and the 8" gun. Wooden models in accordance with these new designs have been constructed, and work is under way on the pilot matériel. In addition to the wheeled carriages, self-propelled mounts have been designed for the calibres described in the report as organic division, corps and army artillery. Pilot vehicles for the division and army artillery are under construction. New designs for projectiles for each calibre of the pilot material have been completed, and the

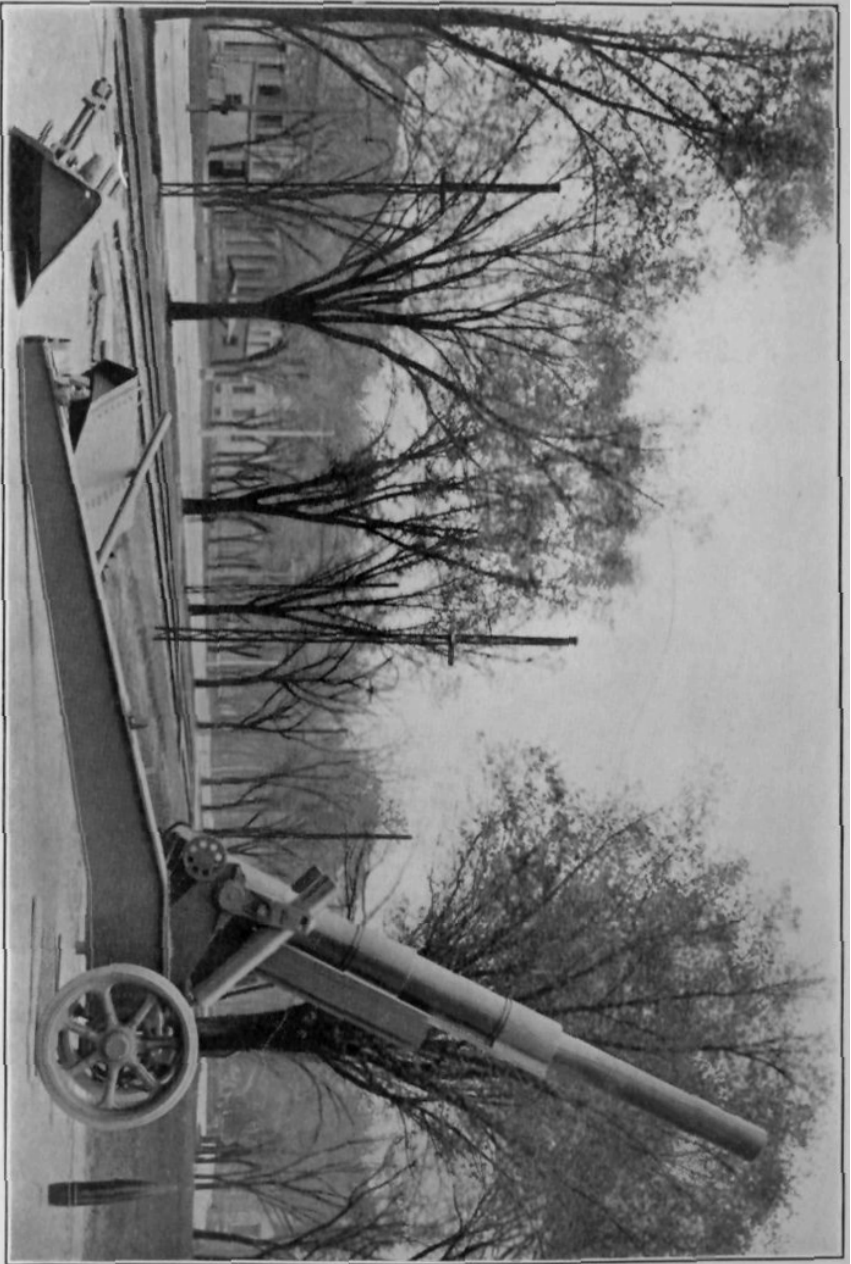
## THE FIELD ARTILLERY JOURNAL

manufacture of limited lots for experimental purposes has been completed or is under way. New designs of fuses to meet the requirements of the report have been completed, and several experimental lots have been manufactured and tested. New designs of caterpillar vehicles to replace those now in use and to provide the additional vehicles called for by the Calibre Board have been completed, and pilot vehicles are under manufacture or test.

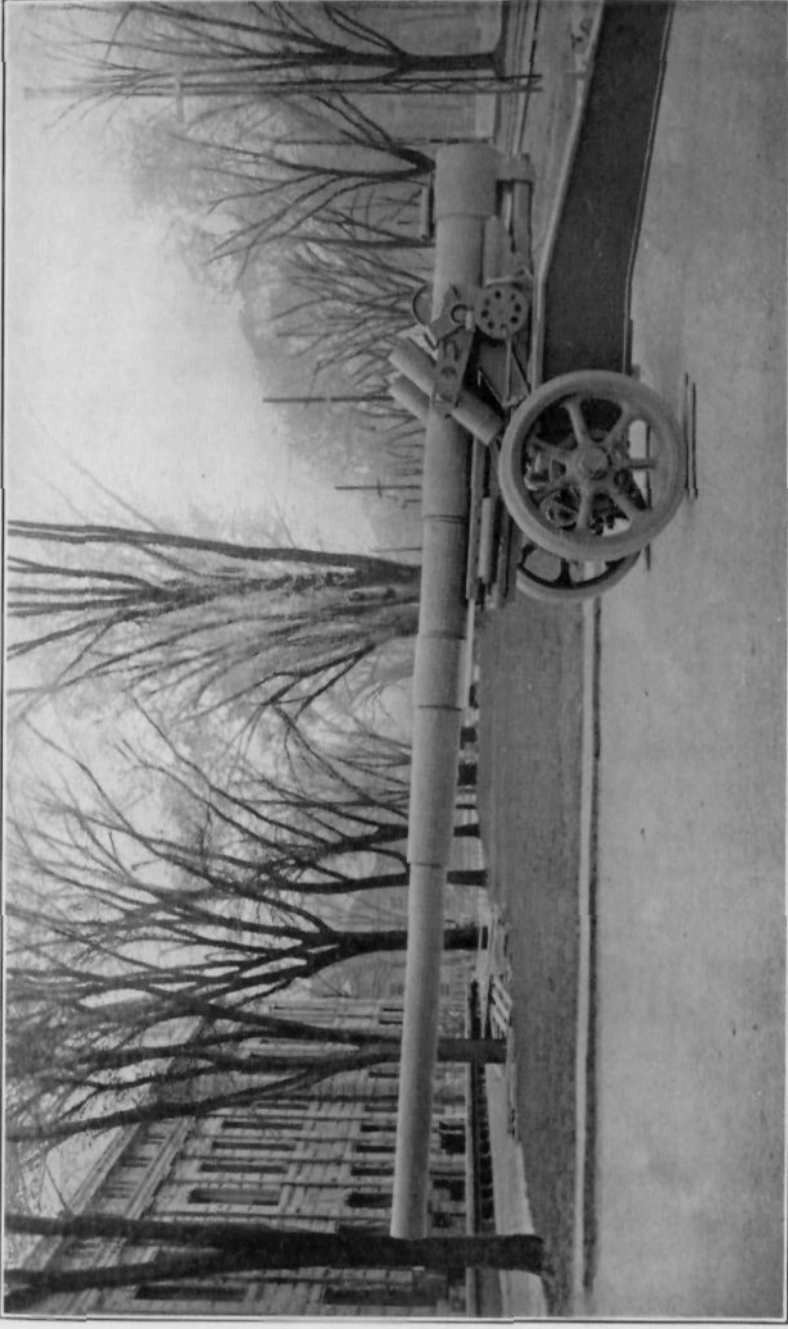
Range requirements of the Calibre Board program necessitate greater muzzle velocities, and hence greater weights in the various types of matériel to meet the range requirements. To keep the weight as low as possible, gun development has proceeded along three parallel lines: First, by the use of alloy steel of higher physical quality than previously prescribed; second, by the use of wire-wound construction; and third, by the auto-frettage construction.

\* \* \* \* \*

Two types of carriage are under construction to meet the requirements of the Calibre Board for a divisional gun giving a range of 15,000 yards—one a split trail carriage, and the other a box trail carriage. The design of the split trail carriage was completed first, and two pilot vehicles are nearing completion at Rock Island Arsenal. One gun has been completed and assembled on one of these carriages. It is expected that this gun will be given a preliminary proof firing at Rock Island Arsenal during the month of December. This carriage embodies the independent line of sight principle, and has a hand wheel on each side, permitting the rocker to be given the necessary site elevation. A hand wheel is provided on the right side to permit the gun being given the necessary range elevation. The carriage provides for 30 degrees traverse, and elevation from minus 7 degrees to plus 80 degrees. The weight of the gun and carriage in firing position will be about 3500 pounds. The box trail type of carriage is under construction and will probably be completed some time next summer. The ballistics of the gun to go



WOODEN MODEL OF THE 8-INCH HOWITZER ON SPLIT TRAIL CARRIAGE  
The 155 mm. gun can be mounted on the same carriage



WOODEN MODEL OF 155 MM. GUN ON SPLIT TRAIL CARRIAGE  
The 8-inch howitzer can be mounted on the same carriage

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on this carriage will be the same as those of the gun on the split trail carriage. The carriage will embody the independent line of site principle. A hand wheel for site elevation will be provided on the left side, and a hand wheel for range elevation on the right side. The carriage will permit 10 degrees axle traverse, and elevation from minus 7 degrees to plus 45 degrees. The estimated weight of the gun and carriage in firing position is 2900 pounds.

\* \* \* \* \*

Two pilot guns and carriages of pack howitzer matériel are nearing completion, and will be proof-fired at Rock Island Arsenal during the month of January. The ballistics of this howitzer are the same as those of the model 1911 mountain gun, which was tested in the 4th Field Artillery in 1914 and 1915. The muzzle velocity with a 15-pound projectile is 900 feet per second. The two pilot guns will differ slightly in weight, because they are provided with different types of breech block; the one with the screw block will be about 25 pounds lighter than the one with the side sliding block. The carriages will be similar, except for the trails, which will differ slightly in the manner of attachment to the axles. Each carriage will permit of about 5 degrees axle traverse and 45 degrees elevation. The dependent line of sight is provided. There will be a hand wheel on each side of the trail for giving gun elevation. The gun and carriage are so designed that they may be quickly disassembled into four loads, no one of which will exceed 235 pounds in weight.

Two split trail carriages for the 105-mm. howitzer have been completed, and are being assembled at Rock Island Arsenal. Howitzers to be mounted on them will be completed and sent to Rock Island Arsenal during the next few weeks. The carriages are identical with those designed for the new 75-mm. gun, and provide 30 degrees traverse, and elevation from minus 7 degrees to plus 80 degrees. The howitzers are mounted on hydropneumatic, variable recoil recuperators. They are designed to meet the Calibre Board's requirements for a divisional howitzer, and are expected to fire a 33-lb. projectile with a muzzle velocity

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of about 1500 feet per second to a range of 12,000 yards. These two howitzers differ slightly, one having a breech block like that on the French 75-mm. gun, and the other a side sliding breech block like that on the German 77-mm. gun. The weight of the howitzer and carriage in firing position will be about 3600 lbs. A box trail carriage to mount the howitzer has been designed, and a pilot carriage will soon be constructed.

Designs of a 4.7-inch gun and a 155-mm. howitzer to meet the requirements of the Calibre Board have been completed, and the manufacture of pilot material is under way. A carriage was designed to mount either the 4.7-inch gun or the 155-mm. howitzer, only slight modifications being necessary to effect the interchange. Both gun and howitzer will have breech blocks like the one on the present 155-mm. howitzer. The carriage provides 60 degrees traverse and 65 degrees elevation. To obtain the required ranges and keep within a reasonable weight limit, it has been necessary to use a very high-grade steel in the gun and howitzer. The weight of each is about the same, and, with the carriage in firing position, will be about 13,000 lbs. The projectile for the 4.7-inch gun will weigh 50 lbs., and that for the 155-mm. howitzers 95 lbs.

A 155-mm. gun to meet the requirements of the Calibre Board has been designed and is under manufacture. It will fire the same projectile as the 155-mm. howitzer, and is expected to obtain a range of at least 25,000 yards. It will be mounted on a hydro-pneumatic, variable recoil recuperator and a split trail carriage. The carriage provides for 60 degrees traverse, and 65 degrees elevation, and will mount interchangeably the 155-mm. gun and the 8-inch howitzer. The weight of the gun and carriage in firing position will be about 24,000 pounds.

An 8-inch howitzer to meet the requirements of the Calibre Board has been designed and is under manufacture. It will fire a 200 lb. projectile that will be interchangeable with 8-inch railway gun, and is expected to obtain a range of at least 18,000 yards. The carriage is identical with that provided for the 155-mm. gun.

## CURRENT F. A. NOTES

Two 2½-ton tractors designed to meet the requirements of the Calibre Board have been completed, and will be tested during the months of December and January.

### **High-Grade Steels for Ordnance**

MAJOR JOHN B. ROSE, O.D., ARTILLERY DIVISION, OFFICE, CHIEF OF MANUFACTURE,  
ORDNANCE DEPARTMENT

Is it possible to prescribe the use of high-grade steels in the design and construction of artillery matériel? If the answer to this question is based on our experience during the World War, it must be "No." Seldom in the construction of the gun carriages which were manufactured for war use were steels prescribed which compared in quality to some of those used in even the lower priced types of motor vehicles, yet throughout the period of construction there was a continuous effort on the part of builders to bring about reduction in the grade of matériel prescribed for any particular purpose. Why this should have been is not at first glance apparent, but this pressure was in fact so strong that throughout the whole field of artillery construction reductions in specifications were demanded and obtained.

If we admit that it is not practicable to base our designs of artillery matériel on the use of steel of grade commonly in use by automobile and truck manufacturers, it immediately follows that it is not possible to obtain those reductions in weight of matériel which are just as desirable in artillery construction as in commercial construction. In fact, if anything it is more important in the former, since in time of war it must be assumed our very existence and future happiness are at stake. Yet our experience has shown that unless in the next war some radical improvement is made in the system of allocating matériel, we cannot hope to do better than in the past; and if our past experience shall govern, we shall be compelled to base all design work upon use of matériels which can be obtained from new or unskilled manufacturers, or from manufacturers whose capacity for good matériel is already overdrawn.



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Manufacture of artillery matériel during time of peace is very limited, and it is undoubtedly possible to procure during such period adequate supplies of high-grade matériel from those manufacturers who are supplying normal commercial needs. Immediately upon outbreak of war, however, it is very evident that, due to the accelerated rate of production of motor vehicles of all kinds, and speeding up of other industries which must be increased during time of war, the capacity of manufacturers of alloys and high-grade matériels will be immediately subjected to demands far beyond its ability to meet. If, added to this, there is increased demand for its normal field, it is apparent that the requirements for artillery construction cannot be met, and this has been demonstrated in the World War. It is believed that to this condition was due the great difficulties experienced in obtaining the kinds of matériel desired for artillery construction, which difficulty was very often hastily attributed to the severity of the specifications.

### **Correction of Fire by Measurement of Errors**

"K," IN RIVISTA DI ARTIGLIERIA E. GENIO, JUNE, 1920

4000 WORDS

The question constantly arises, whether it is desirable to measure the actual error in correcting fire, or whether we should content ourselves with noting its sign. This evidently depends in part upon the accuracy of the measurement. But to get some basis of comparison, it is assumed that the probable error in measurement is equal to the probable error of the gun; numerous calculations are then made as to the probable error in range determination after various numbers of shots, first by utilizing the measurements, and then by considering only the sign of the errors.

The writer's conclusions are as follows:

In general, simple observation of overs and shorts gives results practically equivalent to those obtained by measurements, and in about the same time. In general, therefore, the use of measurements gives no material advantage, and sometimes

## CURRENT F. A. NOTES

it has an actual disadvantage. There are, however, certain exceptional cases. For example, there is the case where errors can be measured readily, and with an error which is very small in comparison to the range, as by aerial observation at long ranges; or, in fire with heavy calibres, where saving of a few shots is desirable, even at the cost of a possible actual loss of time; or in certain preliminary adjustments, where it is important not to attract unnecessary attention, and where the time and means for measurements are available. In these cases it may be well to use the measurements; but it should be remembered that the advantage is only in the early stages of adjustment, before the normal bracket is obtained, and that it disappears later.

It might be objected that the calculations assume that the methods of fire based upon observation of signs only are theoretically perfect, so that the conclusions depend upon the theoretical correctness of the methods prescribed by regulations. However this may be, the criticism does not affect the calculations; the answer would be to improve the regulations. And, as a matter of fact, it is easy to demonstrate that the ordinary methods are so nearly in accord with the requirements of theory that no practical advantage would be gained by changing them.

# **The United States Field Artillery Association**

## **Annual Meeting**

THE regular annual meeting of the Association was held, pursuant to the call of the Executive Council, at the Army and Navy Club, Washington, D. C., at 4:30 P.M., December 18, 1920, with the President, Major-General William J. Snow, in the chair.

The chairman announced that a quorum for the transaction of business was present in person and by written proxies. The minutes of the last meeting were approved as published in THE FIELD ARTILLERY JOURNAL.

The Secretary-Editor and Treasurer presented his annual report, as follows:

Notwithstanding great increases in the cost of manufactured articles, including printing and binding, and the increased cost to the Association of publishing The Field Artillery Journal as a bi-monthly magazine instead of a quarterly, the books of the Association at the close of its fiscal year on November 30, 1920, show that the Association came through the year without loss, but instead with a small profit resulting from its operations during the year. There was a considerable decrease in the income of the Association as compared with the preceding year; but there was also a nearly equal decrease in the expenses. The total of the receipts, excluding the amount on hand at the beginning of the year, was \$15,443.27, which with the amounts due the Association, but not yet collected when the books were closed for the year, \$767.26, made the total of the business amount to \$16,210.53. The expenditures amounted to \$16,137.54, or \$72.99 less than the income. The Field Artillery Journal is not published for financial profit but for the good of the service; but the books for this year would have shown a larger profit than they do were it not for the greatly increased cost of printing and binding and the fact that a considerable number of members of the Association had not paid their dues and subscriptions to The Journal for the year 1920 when the books were closed. The following statement shows in detail the receipts and expenditures of the year:

THE U. S. F. A. ASSOCIATION

*Receipts.*

Balance on hand December 1, 1919 .....	\$740.75	
Certificates of deposit .....	16,000.00	
		————— \$16,740.75
Advertisements .....	\$8,729.46	
Subscriptions to THE FIELD ARTILLERY JOURNAL .....	5,363.33	
Interest on deposits .....	801.20	
Miscellaneous receipts .....	14.61	
Sale of books .....	74.25	
Sale of office machinery .....	460.42	
		————— 15,443.27
		————— \$32,184.02

*Expenditures*

Publishing THE FIELD ARTILLERY JOURNAL .....	\$9,877.75	
Miscellaneous printing .....	252.48	
Postage .....	113.00	
Personal services .....	1,035.00	
Office supplies and stationery .....	218.19	
Refunds .....	65.52	
Bad checks (all redeemed) .....	6.00	
Commissions on advertising business .....	4,414.07	
Books .....	45.65	
Miscellaneous expenses .....	109.88	
		————— \$16,137.54
Securities .....	15,000.00	
Balance on hand November 30, 1920 .....	1,046.48	
		————— \$32,184.02

The management has reason to again express gratitude for kind words of appreciation of its work and of the contents and appearance of THE FIELD ARTILLERY JOURNAL, which have been received during the year.

A committee, composed of Major T. D. Sloan and Captain T. W. Wrenn, was appointed to audit the Treasurer's financial statements. The committee reported that the financial statements were found to be correct, and on motion of Major King the report was accepted.

The meeting proceeded to the election of a member of the Executive Council, *vice* Major General William J. Snow, whose

## THE FIELD ARTILLERY JOURNAL

term of office had expired. The votes submitted by mail were announced and the vote of the meeting taken, and General Snow was declared reelected.

The President, General Snow, after calling Colonel Irwin to the chair, introduced the following resolutions, which were adopted:

Whereas, The character of THE FIELD ARTILLERY JOURNAL for some time past has been such as to reflect great credit upon the Field Artillery Association; and,

Whereas, The conduct of the affairs of the Association has been highly successful; and,

Whereas, The credit for these accomplishments is due to Lieutenant Colonel Arthur F. Cassels, Secretary-Editor, and Mr. Charles S. West:

*Be it Resolved*, by the U. S. Field Artillery Association, That the thanks of the Association be extended to Lieutenant Colonel Arthur F. Cassels for the extremely satisfactory character of THE FIELD ARTILLERY JOURNAL during his incumbency as Secretary-Editor;

*Be it further Resolved*, That the thanks and appreciation of the Association be expressed to Mr. Charles S. West for his loyal, faithful, and invaluable services to the Association ever since its organization;

*And be it further Resolved*, That a copy of these resolutions be spread upon the minutes of this meeting and published in the next issue of THE FIELD ARTILLERY JOURNAL.

The Chair placed before the meeting the question of the proposed amendments to the constitution of the Association, submitted and published in recent editions of THE FIELD ARTILLERY JOURNAL, in accordance with the provisions of the constitution governing its amendment. It was moved and seconded that the amendments be adopted. When the question was submitted, more than three-fifths of the active members of the Association voted in favor of the motion, in person or by written proxies, and none against, and the amendments were declared adopted.

After discussion of the affairs of the Association and of THE FIELD ARTILLERY JOURNAL, the meeting adjourned.

## BOOK REVIEWS

THE BATTLE OF THE MARNE. By George Herbert Perris. (Published by John W. Luce and Company, Boston.)

The study of the campaign of 1914 is of special importance to the American officer. War experience tends to the arrogant assumption by the participants that such experience embraces all that is worth knowing concerning the art of war, and that the events of the next war will duplicate the experience of the last

But even though experience were all-sufficient, we would do well to remember that in the last war our participation was limited to the final phases; and that next time we shall probably have to fight the beginning as well as the end. For these reasons we should study 1914 as an antidote to pernicious theories which we seem all too prone to accept, and which have as their only justification the very exceptional conditions which existed on the Western Front in 1918. In preparing for the future, the artilleryman is, of course, especially interested in the lessons to be drawn from 1914 in such details as the possibilities of ammunition supply in a war of movement, the availability of maps, the methods of coöperating with infantry, etc.; and he must not neglect to apply these lessons to American terrain, and ask himself such questions as: How many real "two-way" roads exist in Amercia? How many roads have we which would support an intensive traffic of five-ton trucks?

Mr. Perris' book does not attempt to discuss such artillery questions. Nevertheless his book is of value to the field artilleryman, for it is only in the frame of a conception of the whole that the details of the opening campaign can be profitably studied. As to the actual value of the book, it may at once be said that "The Battle of the Marne" is entitled to a place among the best two or three works on the First Marne which have appeared in English. But as might be expected of an Allied writer who throughout the war was a special correspondent of *The Daily Chronicle* with the French Armies, Mr. Perris is not unbiassed, and his analysis of cause and effect is not always impartial. Yet one of the most valuable features of his book is his contribution to the exposure of false legends, of this, that, and the other, all redounding to the credit of the Allies. Among the most important of the false legends are the alleged German superiority of numbers in men and machine guns, and the often-repeated story of the attack of the 42nd Division. The only criticism to be made of Mr. Perris is that he is too mild in branding these legends. For example, while setting forth the fact of approximate

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equality or, if anything, Allied superiority in numbers, he makes a point that the German reserve division was stronger than the French reserve division, but neglects to mention the fact that the French Active Army Corps counted 28 battalions of infantry as against the German 25. Mr. Perris dwells on the superiority of the Germans in heavy guns, but he overrates this superiority; and though he mentions at some length the French passion for attack, he fails to bring out clearly the true cause of German superiority—better tactical training and better coöperation between the Arms. Some of our officers have perhaps been inclined to criticize the French infantry of 1918 as having been too dependent upon their artillery. A far more important criticism, in view of some of our present tendencies, is the lack of coöperation between the French infantry and artillery of 1914, the doctrine that the infantry should always attack, and that it was of itself sufficient to overcome all opposition, provided only that it always attacked. A study in detail of any of the battles of August, 1914, is impressive in its revelation of the headlong impetuosity of the French infantry, the lack of coördination and coöperation between the arms on the French side, and the close coöperation, extending down in appropriate situations to single batteries and battalions, on the German side.

But a detailed tactical study of all this is beside the scope of Mr. Perris' book, and of this review.

With the single exception of the operations of von Buelow's and Franchet d'Esperey's Armies, the descriptions of the struggles on the several parts of the vast front involved in the Battle of the Marne are good. But while he points to the advance, with virtually no fighting, of the British and the French 18th Corps as the deciding feature of the battle, Mr. Perris is too loath to acknowledge the fact that Germany had greater or less tactical successes on every part of the field, and that the Marne was a strategical rather than a tactical victory. Still the book gives the distinct impression that the Germans were all but completely victorious, and it is a distinct disappointment that no clear analysis is made of the causes which brought about final German failure. It is true that many of these causes—such as the despatch of the Guard Reserve and 11th Corps to Russia, where they arrived too late to take part in the battle of Tannenburg; the movement begun on the eve of battle of the bulk of von Heeringen's Army from in front of the Trouée of Charmes to the right flank, where the troops arrived too late; the delay in sending the 5th Corps to attack the Heights of the Meuse—are mentioned, but in no case is to be found a clear discussion of the final effect of such mistakes. Other important causes of final failure, such as the movement of the Cavalry Corps from the region of Dinant, when an excellent cavalry opportunity offered itself just south of that place, around behind Namur and the 2nd Army, the discords between the three German Armies of the right flank, etc., are not mentioned by Mr. Perris.

## BOOK NOTICES

But outweighing any criticism of detail, Mr. Perris has written one of the best books in English on the First Marne, and I have no hesitation in saying that any one who reads it will wish to reread it.

FOX CONNER, Brigadier-General, U.S.A.

HINTS TO NEWLY APPOINTED OFFICERS. By Colonel Fred H. Sargent.

(Published by the United States Infantry Association, 1920.)

This is a valuable little book to the young officer who has recently been appointed in the Regular Army, and whose previous military experience has been only that gained as an emergency officer during a time when conditions were vastly different from those he is now to encounter. It deals very clearly with the subject concerning which he is very probably finding the greatest difficulty in gaining information, *i.e.*, "Customs of the Service," and should prove an excellent addition to his library. The book is small, and its size permits of its being read at a time when very likely his duties would not allow his wading through some of the bulkier volumes which the market offers.

### Book Notices

THE GENERAL STAFF AND ITS PROBLEMS: THE HISTORY OF THE RELATIONS BETWEEN THE HIGH COMMAND AND THE GERMAN IMPERIAL GOVERNMENT AS REVEALED BY OFFICIAL DOCUMENTS. By General Ludendorff, Author of "My War Memories, 1914-1918." Translated by F. A. Holt, O.B.E. 2 Volumes. (E. P. Dutton & Co., 681 5th Ave., New York, N. Y.)

For the serious student of the great war this is by far the most important work that has yet appeared. It has not been written in the light of subsequent events, nor is its purpose to vindicate any theory or to influence popular opinion in any particular direction. It consists of original and contemporary documents taken from the records of the German General Staff, including reports of such extraordinary importance and value as that of the conference between Bethmann-Hollweg, Hindenburg and Ludendorff at Pless, at which the unrestricted submarine campaign was finally decided upon, and the violent letters exchanged between the Chancellor, Hindenburg, Ludendorff and the Foreign Office revealing the internal difficulties of Germany in 1916.

These documents cover not only the actual period of hostilities up to and including the Peace Offers and the intervention of President Wilson, but commence in 1909, revealing the strenuous efforts made by Germany to prepare for war.

They would certainly never have seen the light at all if it had not been that Germany lost the war, and that the abolition of the General Staff was one of the terms of peace.



## THE FIELD ARTILLERY JOURNAL

This collection of secret and confidential communications between Hindenburg, the Chancellor, the Emperor and Ludendorff himself is a publication quite without parallel in modern times. It contains such illuminating documents as Hindenburg's letter to Bethmann-Hollweg demanding the raising of the military age to 50 and universal compulsory labor in Germany; Ludendorff's demand in 1917 that both war profits and wages should be limited; and suggestions or orders from Ludendorff to the different Government departments, showing that he was the real dictator of Germany throughout the latter part of the war.

The collection contains also the program of the German military authorities on such important subjects as the Food Question, the Coal and Transport Question, the Production of Nitrogen, Mercantile Shipbuildings, schemes for Helping Soldiers and Sailors during and after the war, for Patriotic Instruction for the Troops, and for the Handling of the Press, and the supply of Information to the Public.

**MILITARY MANPOWER: PSYCHOLOGY AS APPLIED TO THE TRAINING OF MEN AND THE INCREASE OF THEIR EFFICIENCY.** By Lincoln C. Andrews, Lt.-Col., Cavalry, Retired. With a Foreword by Robert M. Danford, Major, Field Artillery; Commandant of Cadets, United States Military Academy. (E. P. Dutton & Co., 681 5th Ave., New York, N. Y.)

This important work on the Psychology of Military Leadership has been written expressly for use as a text in training cadets in the psychology of the command, at the United States Military Academy.

Modern battle conditions demand modern discipline. Everything a soldier has to do is better done in proportion to the strength of his individual character. Training must develop a discipline of intelligent initiative and perfected teamwork.

In war it is the fibre of men's souls and nerves and bodies that must decide the issue. The quality of that fibre, which represents from seventy-five to ninety per cent. of the sum total of battle efficiency, is the particular care of the psychological phase of training, which thus assumes the greatest importance.

Every military student must hereafter study the principles of modern leadership and the requirements of modern discipline based upon the recognition and use of the self-respecting individuality of the men.

Headquarters, Fourth Division,  
Camp Lewis, Washington,  
November 15, 1920.

THE FOURTH DIVISION IN THE WORLD WAR has a special interest for army men. It is a book by soldiers for soldiers. It was begun in Germany

## BOOK NOTICES

and finished in the United States. It records the inside history of the Fourth Division (Regular Army), which suffered heavily in killed and wounded. Fifty-eight thousand officers and men passed through the Division, which normally contained about 27,000 men.

While in Germany, the Division Commander and 20,000 officers and men of the Division joined in a fund to pay for the compilation and printing of this memoir of an American battle unit. The book contains many photographs and five maps, illustrations by Leon Dabo, one of the foremost landscape artists of America, and intimate records and first-hand material not to be found elsewhere. There is material here for a thousand stories of men in the furnace of war.

Twenty thousand officers and men have subscribed for this book. A copy will be presented, free of charge, by the Division, to the nearest relative of each member of the Division who gave his life in France. We now earnestly desire to get in touch with those former members who, on account of wounds or other causes, were separated from the Division early in the war, and let them know that the book is published and where it may be secured. Our problem is to get this information to about 35,000 men. To attempt to find their addresses in the War Department records is too huge a task.

This book is not published for profit. It was written and is being published solely for the purpose of keeping green in the memory of each participant in the greatest war that was ever fought, the part played by himself and his Division in the supreme achievement. The Fourth Division is a regular army division. Its members came from all over the United States—from every State in the Union. Many of them and their families are among your readers. In view of the heroic services rendered by this unit in the World War, and of the absence of financial interest in the book by any individual connected with its publication, I venture to submit it to you for the favor of a notice or review. On behalf of the Division, permit me to thank you in advance for whatever notice you feel you can consistently give it. Inquiries regarding the book should be addressed to The Commanding General, Fourth Division, Camp Lewis, Washington.

JOHN L. HINES,  
Major General, U. S. Army,  
Late Commanding 4th Division.

## Index to Current Field Artillery Literature

Compiled from monthly list of military information carded from books, periodicals, and other sources furnished by the War College Division, General Staff.

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- AERIAL WARFARE.—Air warfare over the sea. Control of sea depends upon control of air; use of airplanes in naval warfare; carriers; aerial projectiles; what other nations are doing; American air problem; our coast defense. By Brig. Gen. William Mitchell. (*The American Review of Reviews*, October, 1920, p. 391.)
- AERIAL WARFARE.—Coöperation of aircraft with cavalry. By Maj. A. W. H. James. (*The Cavalry Journal*, October, 1920, p. 481.)
- AMMUNITION, MANUFACTURE OF.—United States; American production of military high explosives and their raw materials. With charts showing amounts of various components used in the manufacture of high explosives during each month of 1918. By Wright. (*United States Naval Institute Proceedings*, October, 1920, p. 1561.)
- ANTWERP.—The defense of Anvers (Antwerp) in 1914. By Lieut. Gen. Emile Dossin. (*Le Flambeau*, December 15, 1919, p. 864.)
- ARTILLERY.—Great Britain: Artillery development (British) in the Great War. The development of British artillery during the World War. By Lieut. Gen. Birch. (*The Army Quarterly*, October, 1920, p. 70.)
- ARTILLERY.—Great Britain. A history of artillery. Part III. British artillery from 1756 to 1783. (*Journal of the Royal Artillery*, October, 1920, p. 333.)
- ARTILLERY DRILL AND TACTICS.—Great Britain: Artillery development (British) in the Great War. The development of British artillery during the World War. By Lieut. Gen. Birch. (*The Army Quarterly*, October, 1920, p. 70.)
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- COAST DEFENSE.—United States: Railway artillery. The United States in the new war. In which an invasion is supposed and the needs for defense, coastal especially considered. By Brig. Gen. Johnson Hagood. (*Army Ordnance*, September-October, 1920, p. 67.)
- CO-OPERATION OF ARMS.—Great Britain: Aircraft co-operation with infantry. The various rôles which the (British) air service was called upon to play in conjunction with infantry before, during, and after the battle. By Wing Comdr. Chamier. (*The Army Quarterly*, October, 1920, p. 112.)
- EQUIPMENT.—United States: Types of artillery equipment used by the American Expeditionary Forces in France, with a brief discussion of their uses and the reasons for their adoption. By C. C. Williams. (*Journal of the Franklin Institute*, September, 1920, p. 301.)
- EUROPEAN WAR.—New lights on the origins of the World War—II. By Sidney B. Fay. (*The American Historical Review*, October, 1920, p. 37.)
- EUROPEAN WAR.—American Expeditionary Forces. Our greatest victory. Being the seventh of a series of articles in which Capt. Hanson tells the complete story of what the Americans did on the battle line of France. By Capt. Joseph H. Hanson. (*The Independent*, September 25, 1920, p. 368.)
- EUROPEAN WAR.—France: The Flanders battle ground in 1702–1713 and 1914–1918. A comparison on general lines, of the two campaigns. By Fletcher and Atkinson. (*The Army Quarterly*, October, 1920, p. 159.)
- EUROPEAN WAR.—Germany: The Brigade Kraewel (translation). A German document covering activities of German forces on September 8 and 9, 1914, from La Ferte sur Juarre to Nogent (France). (*Journal of the Royal United Service Institution*, August, 1920, p. 597.)

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- EUROPEAN WAR.—Western front: Some episodes during battle fighting on the western front. (*Journal of the Royal Artillery*, September, 1920, p. 308.)
- EUROPEAN WAR.—Egypt: The operations of the mounted troops of the Egyptian Expeditionary Force. (A serial article—Part 1 in this issue.) (*The Cavalry Journal*, October, 1920, p. 385.)
- EXPENDITURE OF AMMUNITION.—Artillery. The expenditures of artillery ammunition in recent wars. From 1854 to date, giving rounds per gun per day. (*Army Ordnance*, September-October, 1920, p. 82.)
- FARROW, EDWARD SAMUEL.—American guns in the war with Germany. New York, E. P. Dutton & Co., 1920, 223 pp.
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- FIRST DIVISION.—American Expeditionary Forces. Notes on the First Division in the Battle of Soissons. Lecture delivered by Maj. Gen. Summerall, U. S. A. (*The Field Artillery Journal*, July-August, 1920, p. 331.)
- FRANCE.—Frontiers. The doctrine of the natural frontiers of France. Tracing the history of France's occupation of the left bank of the Rhine and her present desire for same. By James W. Thompson. (*The Nation*, November 3, 1920, p. 513.)
- GENERAL STAFF.—United States: War Plans Division. War Plans Division, General staff. Its organization, functions and problems. By Maj. Gen. William G. Haan, Director, War Plans Division. (*Journal of the United States Artillery*, October, 1920, p. 333.)
- GUNS.—United States: A challenge to American engineers. Pointing out the necessity for all engineers to cooperate in the production of light and heavy artillery of greater range, mobility, and destructive power. Dealing with both infantry artillery (small artillery to accompany foot troops) and field artiller. By William I. Westervelt. (*Army Ordnance*, September-October, 1920, p. 59.)
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- LINES OF COMMUNICATIONS.—France: The liaison between infantry and artillery of French Army. By Lieut. A. Lemonnier, French Army. (*Revue d'Artillerie*, August, 1920, p. 133.)
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- MACHINE GUNS.—European war. Machine guns. The part they played in the World War. By Maj. C. A. Drave, 42d Division. (*Infantry Journal*, October, 1920, p. 319.)
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