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***THE  
FIELD ARTILLERY  
JOURNAL***

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**JULY-SEPTEMBER, 1914**

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5TH FIELD ARTILLERY, UNITED STATES ARMY

*Acting Editor*

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# The Field Artillery Journal

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## CONTENTS

Contemporaneous Notes on the Mobilization of a French Garrison Containing Artillery.....	337
Mobility of Field Artillery. Translated from "L'Artillerie Dans la Bataille" by Lieutenant Colonel Paloque.....	345
The Work of the Range Officer, by 1st Lieutenant Roger S. Parrot, 3rd Field Artillery.....	351
Tactical Connection between Infantry and Artillery during the Battle of Liao-Yang, by Major Generaz. Translated from the French by 1st Lieutenant Aristides Moreno, 28th Infantry.....	366
Proposed Methods of Carrying the Goertz Range Finder.....	390
Artillery Notes from Recent Wars in the Balkans, by Lieutenant Colonel Nikoloff of the Bulgarian Army.....	391
Heavy Siege Artillery in the European War.....	397
Contemporaneous Notes on the Procurement of Hay and Oats incident to French Mobilization.....	405
Sub-Calibre Practice of Battery "B," Third Field Artillery—1914, by 1st Lieutenant John S. Hammond.....	407
French Artillery. A Practical Test of the 65 mm. Mountain Gun, by George Nestler Trioche, Late Lieutenant, French Foot Artillery.....	413
First Impressions of the New Field Artillery Matériel, Model, 1911.—Translated from the Italian, by Major Herbert Deakyne, Corps of Engineers.....	415
Horses for the Field Artillery of the Organized Militia.....	422
Sub-Calibre Practice with Visible Bursts, by Lieutenant Francis T. Colby, 2d Field Artillery, National Guard of New York.....	427
Evolution of Ideas in the Method of Preparing Artillery for Battle, by Colonel Aubrat. Translated from the French, by 1st Lieutenant N. Pendleton Rogers, Coast Artillery Corps.....	430
Index to Current Field Artillery Literature.....	462
Field Artillery Directory.....	464
Book Reviews.....	468

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DESTRUCTION AT FORT LONCIN, LIEGE  
Caused by the German Siege Artillery

# The Field Artillery Journal

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## CONTEMPORANEOUS NOTES ON THE MOBILIZATION OF A FRENCH GARRISON CONTAINING ARTILLERY.

AUGUST 12, 1914.

The corps in which this regiment is serving varies slightly in organization from that considered normal for a French army corps and consists of three divisions of infantry, as follows: the ..th Infantry Division, of two brigades of two regiments each and one regiment of nine batteries of light artillery; the ..th Division, of one brigade of two infantry divisions and one battalion of *chasseurs à pied*, one brigade of two infantry regiments and two battalions of *chasseurs à pied*, and one regiment of nine batteries of light artillery; and the ..nd Division of one brigade of one regiment of infantry and two battalions of *chasseurs à pied*, one brigade of two infantry regiments and one battalion of *chasseurs à pied* and one regiment of nine batteries of light artillery. The corps artillery consists of one light regiment of twelve batteries, divided into four *groups* (battalions), the divisional regiments being divided into three groups. The cavalry of the corps formerly consisted of the ..st Brigade of two regiments of four *escadrons* (troops) each; but since the new cavalry organization went into effect the corps cavalry consists of one regiment of six *escadrons*. All the troops of this corps are frequently on a war footing as far as strength is concerned. The units are all stronger than those stationed in other parts of the country, as the reservists who serve for various periods of time throughout the year often bring the units up to a war strength.

The battery under immediate observation has the following strength: one captain, one *sous lieutenant* (2d lieutenant) of the reserve; two *adjutants* (1st sergeants); one *maréchal des logis chef* (senior duty sergeant); nine *maréchaux des logis* (sergeants); one *maréchal des logis fourrier* (quartermaster-sergeant); thirteen *brigadiers*

(corporals); four *maitres pointeur* (gunners); one *maitre ouvrier en fer* (chief mechanic); two *ouvriers mecanicien* (mechanics); one *bourelrier* (saddler); two *trompettes*; forty *servants* (cannoneers); seventy-one *conducteurs* (drivers) and one hundred and one horses.

All of the above men do not remain with the battery during war. Some of them form the nucleus of the *batteries de renforcement* (reserve batteries). For example, in time of war a battery is allowed but one *adjutant* (1st sergeant). The junior *adjutant* of the battery becomes the *adjutant of the battery de renforcement* of the third group when the regiment is mobilized.

#### FORMATION OF NEW UNITS.

The mobilization of the regiment consists not only in putting all its units on a war footing but also in creating new units. Upon receiving the order for mobilization each regiment of field artillery forms a new battalion. To form this new battalion there are always present with the regiment the battalion commander (major), the three battery commanders, three lieutenants, three adjutants, and a certain number of non-commissioned officers and men. During time of peace all this personnel, except the major and the three captains, are assigned to other batteries. This new battalion, together with the new battalions similarly formed by the other two divisional artillery regiments of this corps, becomes the artillery of the ..th Infantry Division, which is a reserve division. The infantry of this reserve division is formed by the infantry regiments of this corps in a manner similar to that described for the artillery. Later this reserve division will become part of the ..th Corps.

#### INCIDENTS OF THE MOBILIZATION.

At 5:30 a. m., Thursday, July 30, 1914, drill was held as usual in the ..th Battery, ..th Regiment of French Field Artillery. Although there had been a great many rumors concerning the mobilization, no one thought that it was to be the last battery drill at ..... The usual routine work was carried on throughout the day and nothing was known of the mobilization until midnight. Then it was learned that all the officers of the regiment had been called to the quarters by the colonel and told to be ready to start at a minute's notice.

There was then no excitement in the town, but the railroad station was crowded with officers and men returning from furlough. All furloughs had been recalled on the 28th and 29th. A few moments after midnight many officers were seen going to and from the barracks. They all admitted that they expected to start for the frontier shortly after daylight.

At 2 a. m. a non-commissioned officer and twenty privates from each battery left to requisition horses. The horses had already been inspected by a commission of officers and assigned to batteries; and a non-commissioned officer from each battery had visited the horses monthly to make sure that the horses were still available and in good condition. Upon arrival at the quarters the horses were immediately shod and fitted with harness. All this was done by 6 a. m., July 31. No officer supervised the fitting of the harness in the ..th Battery. On account of the simplicity of the harness this was done properly and quickly by the drivers themselves. With our steel collars it would have been very difficult, if not impossible, to have harnessed properly some of the horses that were received at ..... All the horses that were brought in on the 30th were large draft horses in excellent condition.

Reservists began to arrive shortly after midnight. All reserve officers who were questioned stated that they had received a telegram directly from the colonel of the regiment. The enlisted men showed postal cards which they had received from the colonel. The postal service in this case was exceedingly rapid, and these "call cards" were expedited before any other mail. If there was any difficulty in locating the men, the gendarmes assisted the postmen in finding them. Within a few moments of their arrival the reservists were in uniform and their packs made up. There was absolutely no confusion. Everything was done in an orderly manner; and no one seemed to be in a hurry. At 6 a. m. the first echelons of the regiment were ready.

It must be remembered that all the details of mobilization had been worked out in time of peace. In each regiment there is a captain charged with the mobilization of the regiment. He has the names of all officers, non-commissioned officers and privates assigned to the regiment. He does nothing in time of peace but keep the plan of mobilization up to date. Each battery commander has a small notebook which contains all necessary instructions relating

to the mobilization of his battery, and a table of operations to be executed each day. This is studied by the non-commissioned officers who go about the mobilization of their sections without any further instructions from their captain.

At 4 a. m. the corps commander left for ..... with his chief of staff in an automobile driven by the son of the richest and most prominent man in ..... Between 3 and 4 a. m. the ..th Regiment of Infantry with band and colors at its head left its quarters for the station. It passed through the principal streets of the city which were thronged with people, but there was no very great display of enthusiasm. There was an occasional cheer as the colors swept by, and somewhat of an ovation given the regiment just before the train left the station, but nothing like what would have been given a regiment in the United States under similar circumstances.

At 8.30 a. m. the ..st Battery, ..th Regiment of Field Artillery, left its quarters for the station without guidon or music of any kind. The townspeople looked silently on but displayed no feeling whatever. The old colonel with his only staff officer (a second lieutenant) and two trumpeters rode to the station a little in rear of the battery without receiving any applause. A great many men took off their hats as he passed but never uttered a word. Although it only requires twenty minutes to go from the artillery barracks to the station, the first battery did not leave until 11:30 a. m. There was no hurry whatever; and everybody went about his business in an orderly manner. A lieutenant had preceded the battery by about forty minutes and had marked on each car just what was to be placed thereon. Consequently each chief of section knew just where to put his carriages and men.

Just before the train left the colonel stated that he would have to face four German battalions with his three, but that he thought that he could give a good account of himself. As he was talking about fifty persons surrounded him and yelled, "*Hurrah pour le ..th et son colonel!*" This was about the only cheer given for the artillery.

The second battalion of the regiment marched to a railroad station about fourteen kilometers north and took the train for the frontier. This battalion had left ..... at about 9 a. m.

While the first battalion was loading the brigade of cavalry stationed



here was also loading in another part of the railroad yards. This brigade consisting of the ..th and ..th Chasseurs had all entrained and departed by noon. The group of cyclists stationed here left between 6 and 8 a. m., the men folding their bicycles and taking them in the cars with them.

The general commanding the artillery of the ..... Army Corps with his staff left ..... at 11:45 a. m. August 1. He was also accompanied by the lieutenant-colonel commanding the artillery park of the corps.

At 2:45 p. m. the last battery of artillery left quarters for the station. The battery marched through the principal streets, which were now crowded with people, but there was no general demonstration. Occasionally there was a cry of "*Vive l'Armee*," but nothing more. The captain's mother, wife and children were standing at one of the corners. The captain saluted with his saber, and his family returned quietly to their home without any sign of emotion.

The train carrying this battery left the station at 5:30 p. m. All the troops of the first echelons, consisting of four guns, eight caissons and one wagon of each battery, had left by this hour. At 6 p. m. men were sent out from the artillery to bring in the horses for the second echelon.

While this was going on there had been no order for the general mobilization of the army, and consequently all arrangements as to requisitioning horses, automobiles, etc., were made by the military authorities. At 4:30 p. m. August 1, the order for the general mobilization of the army was posted. The order was read throughout the principal streets, and gendarmes departed immediately for neighboring villages. Many of them were seen in automobiles going in all directions at a speed of sixty miles an hour or more.

On Sunday, August 2, horses were brought in from the surrounding country by their owners and were received by a committee of officers in front of the quarters of the artillery. This committee consisted of one major of artillery, one major of cavalry, one lieutenant of artillery, one veterinarian and one man in civilian clothes who was believed to be a reserve veterinarian not yet supplied with uniform. No examination was made by the officers to determine the condition of the horses, which were designated as belonging to certain classes, depending upon their height and weight.

The prices paid depended entirely upon their size; and no attention was paid to breeding or conformation.

At 8:30 p. m., August 2, the reservist complement of officers and men for the ..th Infantry left the station. All companies of this regiment left with a strength of two hundred men, and this reservist complement was for the purpose of bringing the companies up to a strength of two hundred and fifty men. This regiment formed the ..th Reserve Regiment which is commanded by one of the lieutenant colonels who is always on duty at regimental headquarters. The ..... Territorial was also formed by this regiment and sent to ..... on August 5.

At 8:30 p. m. August 3, the second echelon of the ..th Artillery left to join the regiment. This echelon consisted of the remaining four caissons of each battery, the battery wagons, forges, field wagons, led horses and sufficient men to bring the batteries up to the prescribed war strength. The proportion of high explosive shell and shrapnel was equal and was distributed as follows: the six caissons of the firing battery were mixed and contained equal amounts of shell and shrapnel; in the combat train there were three caissons of high explosive shell and three of shrapnel. One of the battalion commanders remarked that he was going to mix the shell and shrapnel in his combat trains as soon as they were detrained.

The headquarters of the Army of ..... left at 4:30 p. m. The general had an escort of about twenty-five mounted gendarmes, twenty gendarmes cyclists, thirty-five *chasseurs à cheval*, twenty *chasseurs à pieds* cyclists, fifteen soldiers of the Etat Major and fifteen men of the Commissary Department (*sous officiers et soldats d'Administration.*) All were armed with the carbine except the last thirty mentioned who were armed with the infantry rifle. Although the *chasseurs* are light cavalry and are supposed to be mounted on light horses, the platoon which was attached to headquarters were mounted on heavy horses requisitioned from the inhabitants of the surrounding country. However, about eight non-commissioned officers from the Cavalry School at Saumur were attached to this platoon and were mounted on fine thoroughbreds that had been brought from Saumur. There were three thoroughbreds per non-commissioned officer. The commanding general and

the greater part of his staff left by automobile, and the escort left by rail.

During the afternoon of August 6 a group of two hundred and eighty cyclists halted in front of the Commissary Department and an opportunity was offered to note their organization and equipment. The group was formed of reservists from the ..th Group of Cyclists. They had bicycles of various descriptions that had been taken from the surrounding country. Fifteen men of the group were as yet without bicycles. There were no carbines left after the departure of the regular troops and all these reserve cyclists were armed with the infantry rifle. There was no regular method of carrying equipment and rations, and each man was left to devise a method for himself. Each man was given one and one-half kilos of bread which he carried strapped to his bicycle, suspended from a string over his shoulder or in a sack. In this particular this group of reservists did not differ from every group of soldiers leaving ....., every man of which had one and one-half kilos of bread carried in one way or another.

As soon as the ..th Artillery left, the *group* (battalion) *de reinforcement* and the ammunition sections were immediately formed. The composition of the *group de reinforcement* was exactly the same as the *groups* of the regular army. The ..th Artillery formed six artillery ammunition sections and six infantry ammunition sections. The artillery ammunition sections were composed of twenty caissons, one battery wagon, one forge, two *fourgons* (ordinary wagons) and one forage wagon. Half of the caissons were of the ordinary type containing 96 projectiles each, the other caissons contained 140 projectiles each. Each section contained equal amounts of shrapnel and high explosive shell. The infantry sections contained twenty-eight caissons, one battery wagon, one forge, one *fourgon* and one forage wagon each. The caissons of these sections were the old fashioned caissons of the field artillery which have been modified for the transportation of infantry ammunition. The caisson bodies contained 28,520 rounds and the limbers 11,776 rounds of small arms ammunition each. It was impossible to discover the proportion of machine gun and carbine ammunition. In one caisson 19,600 rounds of machine gun ammunition in belts were seen and 900 additional rounds of the same ammunition was carried in the limber. There was also in each section one caisson containing

15,480 rounds of carbine ammunition in the body and 10,000 rounds in the limber. The ammunition for the carbine and the rifle is the same except that clips are used for the carbine and the rifles are loaded directly from the belt. The ammunition sections left at 11 a. m. August 8.

Monday night, August 10, the ..th Reserve Regiment departed. The *batteries de renforcement* left during the night of August 11-12 by marching, but it was supposed that they took the train soon after leaving the town.

During all the preparations incident to mobilization and during the arrival and departure of troops there has been no disorder whatever. The conduct of the people has been admirable. Every one looked sadly on, but the women did not weep and the men did not linger. All the officers had expressions somewhat sad but determined, but there was no word of complaint or rejoicing. Every one accepted his position without comment; and those officers left behind to receive recruits and perform various other duties went about them as willingly as did those who departed for the front.

This seeming lack of enthusiasm is probably due to the fact that in France every man is a soldier, and there are no non-military persons left to do the cheering except the women and they all have relations who are soldiers. But while there is no outward display of feeling, the entire population is extremely anxious. The women who have relatives at the front are continually asking, "Where are the English? Have they finished their mobilization?" All seem anxious to have the support of the Anglo-Saxon whose courage and sang-froid are greatly admired. When it was finally announced that the English were landing in Belgium, all seemed to have a feeling of greater security.

## MOBILITY OF FIELD ARTILLERY

Translated from "L'Artillerie Dans la Bataille" by Lieut. Col.  
 Paloque, Commanding the 18th Regiment of Field Artillery.

Let us compare, as regards mobility, the French and German matériel, at the same time making a distinction between the two forms under which mobility should be considered.

1. Maneuver Mobility, or the facility with which the matériel when hitched may be moved on the road or across country.

2. Battle Mobility, or the facility with which the matériel when in battery may be man-handled.

*Maneuver Mobility*—We will examine this question by comparing the weights of the French carriage with those of the German.

Let us first examine the gross weights.

The advantage is plainly with our neighbors, as is shown by the following table:

	<i>France.</i>	<i>Germany.</i>
	Lbs.	Lbs.
Without knapsacks or cannoneers.		
Weight of caisson and limber .....	4312	3986
Weight of gun, carriage and limber .....	4114	4083

But it is to be noted that the mobility of field artillery is of importance only from the point of view of its rapid movement from one place to another. When artillery moves rapidly, *it does not leave the cannoneers on foot*, but takes them along on the chests.

Consequently, for the reason that the service of the German gun requires more cannoneers than ours, the results are quite different.

	<i>France.</i>	<i>Germany.</i>
	Lbs.	Lbs.
Gun carriage and limber .....	4642	4686
Caisson and limber .....	4983	5060

The comparison is all the more to our advantage since the French caisson transports 96 rounds, while the German carries only 88; if we took 8 rounds from our caisson, it would weigh only 4824 lbs., or 236 lbs. less than the German, and that, too, taking it for granted that the alert French cannoneer weighs the same as the German, something that will have to be proved.

It should be noted that in both countries the caisson is sensibly heavier than the gun. This is not the effect of chance, for if the state

of the ground is such as to tax the strength of the horses to its limit, so that two carriages out of ten will have to be left behind, it is infinitely preferable to bring up 4 guns and 4 caissons, leaving 2 caissons behind, than to bring up 2 guns and 8 caissons, leaving 2 guns behind. We increase the chances of accomplishing the former by making the gun slightly lighter than the caisson by from 220 to 330 lbs. It would be useless to go further in this direction, for the gun and caisson must be homogeneous in order to keep together.

Does not this observation prove how much reason we have for saying that the best lesson for the artillery engineer will be found in the study of the use of the gun he is to build?

*Artillery of the future*—Such is the present condition of field artillery matériel from the point of view of its mobility on the road and across country.

It is not inappropriate in this study, the interest of which we do not desire to limit to the present condition of the evolution of the arm, to peer into the future and search for the path along which we shall probably be drawn in the construction of future matériel. Nothing leads us to foresee that it will be lighter than the present matériel. As a matter of fact, the mobility of the matériel when hitched is limited in the firing battery by the mobility of the heaviest vehicle which must accompany the unit, that is, the caisson.

If we can not lighten the caisson, there is little to be gained by lightening the gun; the arrival of the gun before the ammunition gives no advantage, unless it be the possibility of reaching with the gun certain emplacements that are inaccessible to the ammunition.

We are thus logically led to ask ourselves if the lightening of the caisson is probable. We do not think so.

The experience of the Russo-Japanese War, although the true rapid-fire gun was not used in that conflict, has shown the necessity of increasing the ammunition supply in the future. It will be necessary, then, to transport more rounds than were deemed necessary in the past.

Now, we can not carry more rounds except by using heavier caissons or by using more caissons.

The latter solution—more caissons—seems to us to be *a priori* unacceptable. The artillery column of a French army corps takes up nearly 20 kilometers of road space. This is already excessive.

Being unable to increase the number of vehicles, we shall be forced by the force of circumstances to make each vehicle carry the greatest

possible number of rounds up to the weight that can be drawn by six horses over all kinds of ground under average conditions.

We often hear it said that the problem of reducing the weight can be solved in a simple way by reducing the caliber. We must beware of believing this!

Every artilleryman knows that to produce a given destructive effect, other things being equal, a weight of ammunition is required that must be increased in proportion as the caliber is reduced.

Has it not been proven by recent experience that to procure a given destructive effect requires *four times the weight* in projectiles of small caliber than in the high explosive shell used in the field gun?

Matériel of small caliber can not, therefore, claim equality. No matter what be the nature of the explosive, the number of balls in the projectile or their density, *except by carrying a greater weight of projectiles.*

Moreover, are we not obliged to increase the weight because of the fact that a matériel of small caliber is fired more rapidly and that greater rapidity of fire necessitates a greater consumption of ammunition?

Nothing indicates that we are tending towards the diminution of the weight of the caisson. On the contrary, to all appearances we shall continue to demand of the caisson the maximum return of which it is capable.

Under average conditions, our present caissons, in reality rather heavy, are nevertheless able to be moved at rapid gaits and in exceptional cases can be drawn by four horses.

It does not seem to us, therefore, that the caissons of the future will be very different, and, *since this fixed weight of the caisson fixes in a certain way the weight of the gun*, it does not appear that we are on the road to reducing the caliber of the field gun.

*Battle Mobility*—Let us now examine the question from another point of view.

The artillery vehicle comprises a front and a rear carriage, separable from each other.

The rear carriage alone remains in the position after the horses have taken the front carriage to a place of shelter. It is clear that the ammunition is as well placed as possible, alongside the gun that is going to use it, and everything would be all right if the rear carriages,

abundantly provided with ammunition, did not have to be moved during combat.

But we have to move them at times, and since the horses are not available, we are compelled to examine the question of handling the rear carriages by man power.

This mobility is required when it becomes necessary to move the gun or the caisson: 1st, over a distance of 25, 50 or 100 meters, for example; 2d, backward or forward a few paces; 3d, to change the direction of fire, the carriages remaining in their places.

Let us compare, from this point of view, the French and German caissons:

	<i>France.</i>	<i>Germany.</i>
	Lbs.	Lbs.
Weight of the gun and carriage .....	2497	2156
Weight of the caisson body .....	2695	2275

Movement over a long distance: It is undeniable that the German gun in battery is lighter than the French, *but this lightness has not been obtained except at the expense of something.*

*In this case it is at the expense of ballistic qualities.*

The service rendered by the German gun tube, retained in the new matériel through motives of economy, puts the weapon in last place among the up-to-date guns.

This is the gun tube which, with equal weights, gives proportionally the minimum energy to the projectile, as is shown by the following table:

	<i>France.</i>	<i>Germany.</i>
Muzzle energy, ton meters .....	E 1031 m.	761 m.
Weight of gun in battery .....	P 1140 kgs.	979 kgs.
Ballistic coefficient.....	0.090	0.077

With an efficiency equal to that of the French gun, the German gun should weigh only = 844 kgs. instead of 979.

Moreover, while the French bullets weigh 12 grammes, the German weigh only 10, and are thrown from the projectile with a velocity notably inferior to that which in France is deemed indispensable.

Their lightness makes them lose their velocity still more rapidly, and we can form some idea of the number of ineffective bullets by remembering that the accusation is made against the French bullets



that they are too easily stopped by insignificant obstacles, such as haversacks, meat cans, etc.

If we must pay particular attention to mobility "by hand," above all things it is necessary that the gun shall be capable of producing upon objectives the desired effect, *for there is no remedy for this defect.*

On the other hand, when we have to move a gun in battery, a difference of 175 to 200 lbs. does not have any appreciable effect, provided we use successively with each rear carriage all the men of the platoon.

Better still, if in exceptional circumstances or on account of a surprise or a lack of foresight on the part of the commander, the guns have to be moved over a long distance, and our comrades of the infantry offer them help as often happens, the question of battle mobility is settled.

Another cause of the increased weight of the French gun in battery is the weight of its brake and of the mechanisms which in the operation of "abatage," contribute to the stability of laying.

The essential quality of the rapid-fire gun is that it must not require relaying after firing, so that only the weightiest reasons should make any changes in the way of reducing the weight of the mechanisms which insure this characteristic of the French gun and which contribute so much to its superiority.

Let us now consider the caisson body:

The difference of weight is 420 lbs. in favor of the German gun. *That is also at the expense of something.*

*This time it is at the expense of the number of rounds carried.*

The caisson body of the German gun carries 52 rounds.

The caisson body of the French gun carries 72 rounds. or 20 rounds more, which is an increase of about 396 lbs. in weight.

If we consider the ratio of the weight of ammunition carried to the weight of the caisson body, we find:

	<i>France.</i>	<i>Germany.</i>
	Lbs.	Lbs.
Weight of ammunition (in round numbers).....M =	1430	924
Weight of the caisson body loaded....C =	2838	2275
Efficiency..... =	0.50	.406

With an efficiency equal to that of the French caisson body, the

German should weigh only:  $924 \times 2 = 1848$  instead of 2275 lbs.

These numbers, as was the case with the gun, are strongly in favor of our matériel, from the point of view of the correctness of the study made, and it may be said that the German matériel transports gratuitously as a pure loss:

2154—1857 = 297 lbs. too much for the gun.

2275—1848 = 427 lbs. too much for the caisson body.

Better still, if we should give up carrying 72 rounds in the French caisson body, under exceptional cases we could increase our mobility "by hand," by leaving 20 rounds in the battery wagon or in a caisson taken out of the combat train and then carry a weight equal to that transported by the German caisson.

Admitting that this case will occur once in ten times, we, therefore, preserve in France the advantage of providing, nine times out of ten, 20 more rounds per caisson body.

It has been proposed to equip the firing battery only with light caissons of a special design. We shall confine ourselves to calling attention to this solution without dwelling too much upon it, its drawbacks being manifest. Complications: decrease of available energy; frequency of journeys from front to rear and vice versa, almost insurmountable difficulties of ammunition supply.

Movements backwards or forward for a few paces: This will be the most frequent case. The difference between the two matériels will not be noticed in this case.

Modifications in the direction of fire: Changes in the direction for the guns are complicated in France by the brakes and in Germany by the size of the trail spade which is with difficulty removed from the ground, and has a tendency to fall back into the large hole which it makes.

Therefore, whether we consider battle or maneuver mobility, we must acknowledge that, when once the question has been separated into its elements, that the French matériel possesses no disadvantage which is not compensated by a corresponding advantage, and that, when everything is well considered, we should reflect carefully before sacrificing the advantages that we have, in order to get rid of disadvantages that we merely expect. \* \* \*

From this difference of opinion between the partisans of light and of heavy vehicles, we conclude that the mobility of field artillery is not on the point of being changed.

## THE WORK OF THE RANGE OFFICER.

BY 1ST LIEUT. ROGER S. PARROTT, 3D FIELD ARTILLERY.

After an experience extending over two and a half years of range work at the School of Fire for Field Artillery, the following suggestions are made for the improvement of our present method of conducting this work in regimental target practice. It has come to be considered almost unavoidable that long delays, misunderstandings and general inefficiency should characterize our annual target practice. We have become resigned to going out at 7 o'clock in the morning, waiting around until 10 before the first shot is fired, and then taking two or three hours more for the firing of three problems, each one of which consumes, perhaps, five minutes from the firing of the first shot to the last.

That this gross inefficiency is totally unnecessary is shown by the work at the School of Fire where firing is usually commenced within fifteen minutes after the arrival of the officers at the firing point and proceeds from problem to problem without interruption except for the necessary comments and criticisms. Of course, weather conditions sometimes cause delay and, occasionally, accidents happen, as they will under the most favorable conditions, but these are only the exceptions that prove the rule.

On the other hand, in regimental practice, the targets are seldom ready and the range clear anywhere near the time set for firing. There is continual misunderstanding between the Officer Supervising the Practice and the Range Officer as to changes in position of battery or Range Party, order in which targets are to be fired on, location of targets, or similar points, all of which serve to delay the firing. It often happens that one target is fired on and Range Party observations are, through misunderstanding, taken on another target. If the error is not discovered until the Range Party comes in, it is then impossible to transfer the observations to the proper target.

In general the Range Officer's observations are taken in rather a perfunctory manner. His instruments and methods are rough and inexact and, therefore, there is little advantage in using care. The observing station is often at quite an angle from the flank of the targets, which makes it impossible to tell whether bursts close to

the target are short or over. Distances are measured either in mils with a B. C. ruler or directly by flags placed one, two and three hundred yards in front and rear of targets. Both methods are very inexact; but, of the two, the first is the better, even if necessary to estimate the distance from Range Party to target.

The distance flag method is an old favorite but it is worse than useless. The small flags are hard to see. When a burst comes a desperate effort is made to pick up the nearest flag. By the time this is found the smoke ball has drifted or disappeared entirely and the observation is valueless. Or if the Range Officer does miraculously pick up the flag and burst at the same time, he generally mistakes which flag it is. The method was tried at the School of Fire due to the insistence of some of the Student Officers, with the above results.

With the ruler some of the same objections apply. The wrong hundred mil point is often read, there is difficulty in placing the zero on the target promptly and it is hard to read closer than twenty mils instantly.

Another source of error is the fact that only one man takes observations and, in addition, often records them himself. He may, and often does, make a mistake of a hundred mils and no one knows the difference.

So much for the disease. But it is useless to diagnose a case without proposing a remedy, and I have a remedy to propose. The majority of Field Artillery officers have taken the course at the School of Fire, or have heard it pretty thoroughly discussed and know the accurate methods of plotting shots and triangulating distances in use there. The results of this work are compiled by the Statistical Officer into service range and probability tables. I do not advocate these methods for Regimental firing, for they would be impossible to apply. The instruments, the trained men and the time are lacking and, if they were not, such accuracy is too refined for general use. But I do believe that School of Fire methods of Range work can be applied in a modified form to great advantage. They will give us greater efficiency in handling our target practice and greater accuracy in our Range Party observations. From these better observations we can obtain a greater knowledge of the errors of the particular matériel in use and be prepared to discount these errors. They would make the target practice reports of permanent

value in the solution of various questions at issue—the "drop back" for instance—and in the compilation of service probability tables under varying conditions. At present the reports are worthless for any statistical purpose.

The first of our troubles is the Range Officer and his detail. It is customary in most regiments to detail a different Range Officer for each day's firing and to call on the battery commanders in turn to furnish so many men for the Range detail. The object, of course, is that each officer may see as much of the firing as possible. It is undoubtedly very desirable that no officer or enlisted man should be absent from the firing point more than one or two days during the season's firing. But this result is hardly so desirable as to pay for the waste of time and energy which it causes. Each officer, when he takes charge of the range, has a new problem confronting him and must work out the solution. If he is on the work permanently and has a permanent detail, after a few days firing he has solved his problem, corrected his mistakes, eliminated the causes of delay and reduced everything to an efficient working system.

On the other hand, if a different officer, with a new detail, has the work each firing day, the problem is never solved. Each Range Officer makes the same mistakes as his predecessor. Everything goes wrong and no one knows why.

It is hardly fair to saddle the whole work on one officer and so prevent him from seeing any of the firing from the battery end. Therefore, there should be detailed a Range Officer and an Assistant Range Officer for the season's practice. These officers should work together in all the preliminary work; that is, in instruction of details, putting out targets and preparation of the range for firing. During firing one should take charge of the Range Party and the other report for duty with his battery. By thus alternating, neither will lose touch with the firing battery and yet both will have learned thoroughly the details of the Range work. The following season the Assistant should be promoted to Range Officer and a new Assistant be detailed. The Range Detail should consist of at least two non-commissioned officers and eight or ten privates. The Color Sergeants and the Battalion Quartermaster Sergeants should be available for this work, but if it is deemed desirable, any other non-commissioned officers may be detailed. The senior can be relieved about the middle of the season and a new man put on the

detail, so that each may get his share of work at the firing point. However, I believe it to be more desirable to have the same two non-commissioned officers on the detail for the entire season, and to have one of them for the following season. Similarly the privates should be permanent men, or at least should be changed one at a time throughout the season, so that there will never be more than one green man on the detail at one time.

Before target practice begins this detail should be thoroughly instructed in its duties. The new targets for the Field Artillery, on the order of those used at the School of Fire and adopted from the German system, are extremely simple and easy to set up and operate. But it is very easy to spend an hour on a target that should be put up in ten minutes, if the men are not trained in their work.

The entire detail should be taught to set up all the targets in use, the positions of the figures, proper way to drive stakes, adjustment of guys and so forth. The details of this work cannot be gone into here further than to say that there is a best way to do everything, even to driving stakes, and an officer who experiments and gives it thought, will quickly discover this way and will be amply repaid in time saved and efficiency gained.

Loading and unloading of wagons is apt to be one of the greatest squanderers of time. In the first place proper wagons must be provided. The escort or army wagon is a poor vehicle for handling the new targets. The gun and caisson targets are too wide for the body and must be leaned up against the sides, taking up twice their legitimate space and necessitating putting figures, stakes and guys in an indiscriminate jumble in any hole that can be found for them. Most Post Quartermasters will be able to furnish a "float bed," or platform body extending out over the wheels. If it cannot be furnished, it will pay to have one made up for the purpose of hauling targets. It consists merely of a solid platform, seven by twelve feet, of one-inch boards, with an edging of two by fours laid flat, spiked to three four by six cross pieces; these being bolted to two four by six stringers resting on the bolsters of an army or escort wagon running gear. It is well to add a box in front, forming the driver's seat, in which can be carried sledge hammers and other necessary tools.

On this wagon can be loaded two complete battery targets and

probably an infantry or machine gun target, besides. It should be loaded so that everything can be handled in the order it is needed without disturbing anything else. Load the gun and caisson targets in two piles side by side across the front of the wagon and extending out over the edges; first a gun, then a caisson in each pile, so that the target wanted is always the top one. The two by four edging will keep the pile from slipping off. Behind these stack the kneeling and standing figures in separate piles, and boxes containing iron stakes, guys, or supports for prone figures, each kind in its own box, on top of the load or on the sides where they are easily reached. Then, on reaching the target position, the wagon can be driven along and each part dropped just where it is to be set up, with the smallest expenditure of time and labor.

Proper instruction in handling, setting up and taking down targets will lengthen the life of the material one hundred per cent. Never pull up an iron stake by bending it to one side. If it is tight in the ground, tap it with a sledge on both sides near the ground and then pull it straight up. Do not throw the wire guys into a box just as they are taken off the target. Have each one coiled up and the end twisted around so that it will stay in a coil. It will save time in the end. Never allow the gun and caisson targets to be dropped off the wagon. Always have a man on the ground to take them as they are passed down to him. Repairs take longer than careful handling. Have boxes made to fit each different kind of stake, for guys, for each different kind of canvas target for simulated fire, and for the smoke bombs. The stake boxes should each hold just a sufficient number for one target.

Handling the moving targets requires special training. For this reason one non-commissioned officer should be put in charge of the "movies" and should have two or three men under his direction. They should understand thoroughly the construction and operation of the targets and appliances and the cable carts. If possible, one man should know something of splicing wire cable. They must know how to put in the snatch blocks, how to drive the stakes to get the maximum holding power and how to brace them in soft ground by driving a line of slanting stakes, wiring the top of one to the bottom of the next.

The laying out and reeling up of cable requires special care to avoid kink, for on this depends the life of the cable, the most expensive

part of the target equipment. Once a kink is tightened the cable is permanently weakened at that point in spite of all the straightening you can do. It must be taken out before any strain is put on the cable.

The moving target detail should supervise the handling of the cable under the non-commissioned officer, but they will require the assistance of the rest of the detail in reeling up. The quarter-inch cable furnished, attached to a moving cavalry or infantry sled, if laid on a curve, on most ground will not straighten itself out. That is, the sled will follow the curve on which the cable was laid. Therefore, it is important to see that the drivers have two points to march on in laying the cable and that they keep a straight line. Otherwise there will probably be trouble in the operation of the target.

Until cable has had considerable use it always has a tendency to roll and twist due to the twisting of the strands. It is therefore unsafe to drag two cables with free ends close to each other, for they will inevitably twist themselves together in such a way that it will take half a day's work to untangle them, before they can be reeled up. It is often desirable to pull two sleds with one limber. In this case the difficulty of twisting up can be obviated in the following manner: From each sled run a separate cable through its release stake and over its own block. About fifty feet beyond the last block, towards the pulling limber, join the two and run a single cable from this point to the limber. Then take a good stout piece of two by four about four feet long, bore holes in each end and wire one end firmly to each cable about thirty feet back of where they join. When the cables are released at the end of the run, this spreader will keep them separated sufficiently to prevent twisting, while they are pulled to a safe distance to reel up.

A thousand yards of cable cannot be reeled in by turning the spool on a stationary cable cart. The cart must be driven back over it, reeling up as they go. It will seldom be possible to drive back over the entire length of cable before the firing is entirely completed. So it will become necessary to reel up say a hundred yards, turn and pull up again, make another turn and drive back over the next hundred yards, and so on. It is in making these two turns that most of the kinks occur. If the drivers make an about in the same direction at both ends of this hundred-yard stretch, it is evident that they have put one complete turn in the cable, which



shows itself as a kink. It is therefore necessary to turn to the right at one end of the run and to the left at the other in order to keep the cable straight.

Coming down to the commencement of service practice, I will attempt a brief outline of the Range Officer's work and the method of doing it. The Commanding Officer will probably have a definite problem to give to the battery commanders in which some of the troops will be represented by the targets to be fired at. This, of course, will limit their number, kind and position. He will give his instructions to the Range Officer in one of two ways, either in the office, from a map, or by actually riding over the ground with him. In either case he will, of course, explain the problem to be solved and the general location of targets and firing point. The more general these instructions are made, the better, leaving the selection of definite positions to the Range Officer. When the Commanding Officer specifies exactly the location of the targets, the firing point and the Range Party, it leads the Range Officer into many unforeseen difficulties and so causes delay and trouble in the firing. The Commanding Officer cannot give the time or thought that this matter requires.

Let us assume then that the Range Officer understands the problem to be worked out, what troops are to be represented, their general location and the location of the firing point.

He then makes an inspection of the ground in order to determine exactly the firing point, position of targets and range station. At the School of Fire this work is done largely on a map in the office, for a week in advance. It is possible to do this because of good, large scale maps and very accurate familiarity with the ground. In regimental practice, it will rarely be possible, for a fold of the ground too small to be shown on the map may destroy all calculations. The Range Officer should take with him two mounted men carrying a marker for the firing point and several small white flags. A map should also be taken so that approximate ranges to any point on the ground can be determined. He selects first the exact firing point in accordance with his instructions as to locality and terrain and places a marker there, facing in the general direction of the targets. A good marker is made by taking two light wooden stakes about five feet long, shod with iron, fastening them at the top to the ends of a piece of white target cloth

three feet wide and five feet long, and attaching two sash cord guys with iron pins attached, to the top of each stake. This can easily be rolled up into a bundle convenient to carry, and when erected and guyed will stand in a stiff wind and will indicate from the target position the height of a man's eye at the exact position of the guns. This permits the Range Officer to know, before he puts out his targets, exactly how much of them can be seen from the firing point. He then selects a range station. It is important to do this before selecting the target positions, otherwise he may find when his targets are all placed that some of them are invisible from any possible range station.

The station selected should be not less than five hundred yards from the nearest target and, if possible, not more than fifteen hundred yards from the farthest one—the former limit on account of safety, the latter for good observation. It should be high enough above the targets to clear all intervening obstacles and to be conspicuous from the firing point, but a very high point close to the targets makes a poor observing station. It is impossible to estimate heights of burst from such a station and smoke is apt to obscure the target for a considerable time. The Range Party should, of course, be as nearly on the flank of the targets as possible, but do not hesitate to get a little off to one side if a much better station can be found in that position. Corrections for obliquity can be quite easily made, as will be shown later on.

Having selected the firing point and range station, he next picks out the exact position of the targets. Get the supposed tactical situation clearly in mind first and look over the available ground with reference to this. Having decided on the approximate position for an Infantry target, let us say, the Range Officer gets down on the ground so that his eye is lower than the top of the target will be and makes sure that he can see the marker at the firing point and the range station. He tries this at several points on the proposed line before adopting the position. If one line of the target is visible from the guns, that is enough. The other lines may be hidden or visible, as the ground requires. In case it is impossible to find a position which is plainly visible from the range station, he has one figure placed on the line from target to station, with its back to the latter, and uses this to observe on. This is a good idea in any case for an Infantry target, as the

small figures are very hard to see from the flank. Before leaving the position he marks one or both limits with a small flag, and then lays out the other targets in a similar manner.

A good rule for defilading a battery target is to take such a position that standing erect you can just see the ground at the firing point. This will generally allow six inches or a foot of the target to be visible to a man standing there.

With the help of the map, find the points at which it will be necessary to post range guards, selecting, if possible, well known points which it will be easy to designate to the men. The guards should be posted in pairs. One man can then always be at his post in case a horse gets away, some one appears in the danger zone and must be gone after, or one man is hurt. Two men are more likely to get their instructions exactly and have more confidence than one, when a difficult situation arises. It must be remembered that it is the duty of the range guards not only to warn but absolutely to prevent at any cost, persons entering the danger zone. This sometimes gives rise to situations which require two men to handle. A non-commissioned officer should be detailed in charge of the guards. It is his duty to see that they are properly posted and instructed, to report to the Range Officer when this is done, to remain at the range station and watch for people or cattle in the danger zone, and to relieve the guards when the firing is over.

All stationary targets should be set up and ready for firing the afternoon of the day before practice. Moving targets can be placed and stakes driven, but cable should not be laid out until next morning, as lying on the ground over night will cause it to rust inside and greatly reduce its life.

While the Range Officer is doing the preliminary work just gone over, the senior non-commissioned officers of the range detail should be getting his targets loaded and have instructions to bring the wagons to some designated point in the vicinity of the targets at a certain time. He should make a list of all parts of every target needed,—number and kind of figures, guys, stakes, hooks, etc.—and should personally check all this material on the wagons, loading each target complete by itself. Boxes should be provided for holding the material for each target, a separate box for each article and each target. For instance, targets will consist of:

## INFANTRY:

- 80 wooden figures,
- 1 box containing 80 wood supports.

## ARTILLERY:

- 4 gun shields,
- 6 caisson shields,
- 1 box containing 30 wire guys, with hooks and rings attached,
- 1 box containing 30 iron stakes for guys,
- 40 wooden figures,
- 1 box containing 40 iron stakes for figures.

If the order in which the targets will be unloaded is known beforehand, wagons should be loaded in the reverse order. At least two sledge hammers must be taken—more if possible.

When the wagons arrive, the Range Officer joins them and gives instructions where each one is to go. Ordinarily two wagons will be used, and he may either take one himself, putting the other in charge of the senior non-commissioned officer, or put a non-commissioned officer in charge of each and himself supervise the whole job. In any case he should personally check up each target after it is set up.

Let us suppose one wagon is loaded with a Battery target, a Machine Gun target and an Infantry target in the order named, and is in charge of a non-commissioned officer. The Range officer points out the positions selected and flagged, or, if necessary, conducts him to them, having the wagon follow. The wagon is halted at the position for the first flank caisson. Two men are left on the wagon to pass the material down and the rest dismounted to handle it on the ground. A non-commissioned officer or selected private and two men are then detailed to set up this target. One caisson shield and three figures are taken off the wagon, the non-com. in charge selects the spot for it, has it raised to see that this point gives the proper defilade and then paces off twenty yards to the position of the first gun selection. Meantime the boxes of guys and stakes and one or two sledges are put on the ground and the wagon drives on to the next selection, the three men remaining behind to put up the shields and figures. In this manner the entire target is laid out, it being necessary for the wagon to stop but a few seconds at each point, leaving the detail of three men behind to put up the target

exactly as laid out. The wagon and men then proceed to the Machine Gun position, lay the target on the ground in the same way, leave two or three men to put it up and go to the Infantry position. Here the wagon drives down the position selected for the front line, the two men tossing figures and supports off the wagon at the proper intervals, then back down the second line, and so on, the rest of the men following and setting up the figures.

I have gone into this in so much detail simply to show the advantage of an efficient division of labor, every man having a definite task assigned. If moving targets are to be put out, the work is done by special detail assigned to that work. The beginning and end of the run and direction limbers are to move, are indicated to the non-com. in charge of the detail and he puts in his stakes and blocks. The next morning, with as many men as he can use, he places his sleds in position and lays out his cable, before the batteries arrive at the firing point.

When the stationary targets are all placed, the Range Officer takes one non-commissioned officer and goes to the firing point, making sure that every target can be seen and pointing them out to the non-com. This man should then be sent to the firing point next morning to assist in identifying the targets, if necessary.

On the morning of firing all details should start out in time to be on the ground half an hour ahead of the batteries. The moving target man, with six horses to each cable cart, and his detail mounted on the off horses and on the carts, goes directly to the ground, places the targets and lays out the cable. He then sends the detail to a place of safety where the cable is to be reeled up and reports for final instructions to the Range Officer. A mounted man with a guidon or red flag should always accompany the towing limber for safety.

Before starting, the non-commissioned officer in charge of range guards reports to the Range Officer with his detail. He should be given written instructions, giving the posts and special duties of each guard, and the detail should be cautioned verbally as to their general duties and responsibilities. The non-commissioned officer then personally posts each guard, gives him his instructions and then reports to the Range Officer at the range station. One wagon with one non-commissioned officer and necessary detail

is sent direct to the range station with the flags and instruments, with instructions to put them up. The reel cart, with two telephone operators, lays a line from firing point to range station.

Telephone communication with the range party is often neglected, but it is of vital importance both for safety and efficiency. Flag signals are often misunderstood or not seen at all, and it is essential that the Range Officer be able to notify the firing point immediately and surely when the range becomes unsafe. It is also essential that he should know what target is being fired on, when a problem is finished and when a volley is to be fired. If he does not know these things, worthless observations are the result.

Having sent out his range guards, moving target detail, telephone detail and wagon to the range station, the Range Officer should look over the targets put up the day before to see that they are intact, look over the moving targets and then go to the range station. Here he will receive the report of the non-commissioned officer in charge of the range guard. When the non-commissioned officer in charge of moving targets reports, he gives him instructions as to when his target is to move out, what the signal will be and what other signals are to be given, in order that there may be no confusion. The direction the limbers are to move and where they are to go to reel up, will necessarily have to be settled beforehand. The best plan is to have all moving targets fired at before the fixed targets in order that the teams may be gotten out of the way and reduce the chances of accident. This also permits the detail to get their cable reeled up by the time the firing is over. In case more than one moving target is used, the runs must be very carefully planned so that all teams will be out of the danger zone at all times. It will often be necessary to unhook the limber from one of the later targets and send it back to hook on after one or more of the other targets have made their run. The non-commissioned officers must understand definitely just how each target is to run and in what order. The target should be started by a signal from the range party. A good signal is to run the range flag up and down the staff. When the run is over the red flag is run up.

Having received all his reports and given his instructions, the Range Officer looks carefully over the range with his glasses to

assure himself that it is safe, orders the white flag run up and reports over the telephone that the targets are ready and the range is clear. If he has not already done so, he arranges with the Officer Supervising the Practice, the order in which the stationary targets will be fired on and gives him the necessary sequence of moving targets. Firing can then proceed, and we come to the second part of the Range Officer's duties, namely: Observation.

At the School of Fire this work is handled entirely by the Statistical Officer and his assistants. In Regimental practice an additional officer for this work is rarely available; and, as the work is much less elaborate, the work of the Range Officer is less, I believe a very satisfactory system of observations and range reports can be carried on by the Range Officer himself. If he be given an assistant, as before suggested, the matter is simple.

The desirability of more accurate observations has been already discussed and we will now take up the method of obtaining this accuracy.

Before, or during the firing, set up a B. C. telescope as near the position of the right gun as possible and with it measure the angle from the range station to the center of each target and also the width of the target in mils. From the range station, take the angle from firing point to center of each target, with a B. C. telescope. If firing point and range station cannot be accurately located on the map, locate them by resection on prominent points or by any other convenient method. When these points are plotted on the map we have one side and two angles of a triangle given by which the targets can be definitely located. By War Department orders an officer is required to record the deflection from the target of every shot fired. The Range Officer records the deflection of every shot, from the range station. If these two deflections are referred to the same point of the target, then having located the firing point, range station and target, we can plot the exact position of every burst, with respect to the target, within a limit of error of perhaps five yards, and this regardless of whether the range station is exactly on the flank of the target or not. This plotting should be done on a sheet of drawing paper on which the position of range station and firing point have been pricked through from the map.

Range party observations should be taken by the Range Officer

and by at least one other man, preferably two. Each observer should have a recorder so that he can devote his whole attention to locating bursts. The mean of the observations should be taken for plotting. They should not attempt to take heights of burst, as these can be taken up much more accurately from the firing point. If distances short and over, grazes, and "no bursts" are accurately obtained, their work is well done.

A large "B. C. ruler" has been devised by Capt. Leslie J. McNair for taking observations, which does the work accurately enough for the School of Fire work and which can easily be made by any battery carpenter. It will be found much more efficient than the issue ruler for this purpose. It consists of a strip of hard wood  $\frac{1}{2}$ " by  $1\frac{1}{2}$ " and about 24 inches long. It is graduated from zero at the center, 550 mils each way, in five mil divisions. The divisions are cut with a knife and inked in, each twenty mil point being plainly marked in large figures. A small block is nailed to the back of the ruler at the center and a  $\frac{3}{8}$ " hole drilled through it perpendicular to the length of the ruler and parallel to the  $1\frac{1}{2}$ " face. Into this hole fits the top of an iron stake about two feet long, pointed on the lower end and having a small shoulder to prevent the ruler from slipping down over it. A string is attached to each end of the ruler and the two joined together into one string at about a foot from the center. By this means the ruler is kept perpendicular to the line of sight. It revolves freely on the iron stake stuck in the ground. The length of string must be adjusted for the man who is to use it, and also the length of strings attached to the ends. For instance, if the right eye is used, the left hand string must be a little longer than the right to make the ruler normal to the line of sight. The ruler must be graduated by trial, on points fixed with a B. C. telescope, as the size of the five mil graduations will vary, due to the length of the ruler.

The observer, sitting on the ground, lines the stake up with center of the target and puts the ruler on it, where it revolves freely. Then as long as he keeps this position his zero is always on the target and he has to look only for the burst and read the angle directly from the ruler.

The use of this system of observation and plotting should eliminate the heated discussions so often heard in a critique, whether



a certain shot was short or over, the Range Officer having been at such an angle that his observations could not be relied on with the old methods.

Some of these suggestions may prove impracticable on certain ranges and under certain conditions. The majority of them can be carried out anywhere and all of them under most conditions. No radical changes are proposed, merely advance steps in our general advance towards efficiency, and I believe they will be found to be truly steps in advance.

# TACTICAL CONNECTION BETWEEN INFANTRY AND ARTILLERY DURING THE BATTLE OF LIAO-YANG.

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## INTRODUCTION.

For several years, numerous military writers have called attention to the necessity that exists of assuring the tactical connection on the battlefield, between infantry and the artillery, if we desire to co-ordinate the work of these two arms. Several schools have been founded. Some desire that this connection be established only upon orders from the higher commander; others, that this connection be established from the infantry firing line to the artillery firing position without passing through the higher commander. A great majority now admit that it is necessary to employ all possible means in order to assure this tactical connection.

In studying the history of Russo-Japanese War, compiled by the Russian General Staff, I have investigated how the Russians made sure of tactical connection between these two Liao-Yang arms during the battle of Liao-Yang (August 30 to September 3, 1914).

I shall now try to show: first, that this tactical connection is indispensable, which some still doubt; and then that the best results are obtained when it is established not only through the higher commander, but directly at the same time, also; that is to say, through the information furnished by the infantry firing line and the troops of the command.

This study embraces three parts:

1st. General sketch of the battle of Liao-Yang, locating the troops present.

2nd. An extract from the Russian history, touching on the tactical connection between the two arms during the battle.

3rd. Conclusion drawn from the incidents of the battle.

## FIRST PART.

### GENERAL SKETCH OF THE BATTLE OF LIAO-YANG.

August 30th.—The Russians occupied an advanced position to the south of the fortified town of Liao-Yang, and defended with the

1st and 3d Siberian Corps and the 10th European Corps, the 2d Siberian Corps being held in reserve. The Japanese attacked this advanced position with the 2d Army (3 divisions and 1 brigade in reserve), 4th Army (2 divisions and 1 brigade in reserve), and the 1st Army (3 divisions and 1 brigade in reserve).

The Russians successfully defended their works but were compelled to make use of their reserves in order to avoid a Japanese enveloping attack along the right flank. This resulted in fierce fighting along the positions at Ma-ye-tun and Zo-fan-tun. During the night part of the 1st Japanese Army crossed over to the right bank of the Tai-tsy-ho for the purpose of cutting the Russian line of communications.

August 31.—Along the left bank there were unsuccessful attacks on the Russian advanced positions. The principal battle was at Ma-ye-tun—Sin-li-tum. Along the right bank two divisions from the 1st Army prepared the attack against the 17th European Russian Corps. At night, the Russians evacuated the advanced position and crossed over to the right bank, with the exception of the 2d and 4th Siberian Corps, which were left to defend the position.

September 1st.—Along the left bank attack on the town was prepared. Along the right bank the 1st Separate Army seized an advanced position of the 17th Russian Corps.

September 2nd.—Along the left bank the Japanese attack against the fortifications of Liao-Yang was repulsed. Along the right bank three army corps reinforced the 17th Corps and took the offensive against the 1st Japanese Corps, recapturing the position lost the previous day, but lost it again that night. The detachment guarding the Russian left flank at Orlo was annihilated.

September 3rd.—The Russians decided to retreat during the night of the 3rd and 4th. During the retreat the town was victoriously defended.

## SECOND PART.

### TACTICAL CONNECTION BETWEEN THE TWO ARMS DURING THE BATTLE.

After a consideration of several months, the defensive works of the town were commenced on the 23rd of August; the Russians made it a point to have, in each corps, a telephonic system, not only to maintain communication during the battle between the different corps and their sectors, but also to direct the artillery fire. This,

without taking into consideration the telephonic communications with the commander-in-chief.

History shows the following relative to tactical connection during the battle:

BATTLE OF AUGUST 30.

*Preparation for the Battle.* Towards 5 o'clock, the movements of three or less Japanese Infantry battalions, advancing under the protection of the fire from four batteries posted to the northeast of Soueitchero, were noticed in front of the position held by the 3rd Battalion of 23rd Rifle Regiment. When the enemy was between 20 to 30 paces, the 9th, 10th and 12th Companies rose from their trenches and made a counter attack with the bayonet. The first Japanese lines immediately lay down while those in rear opened a violent fire, resulting in our three companies being compelled to return to their trenches. Immediately the Japanese threw themselves into our trenches and a hand-to-hand fight ensued. The enemy's artillery kept up its fire, inflicting losses on our troops and also their own.

*Combat at Zo-Fan-Tun.* (Attack of the 23rd Rifle Regiment.) In addition to the 3rd and 4th Batteries of the 6th Brigade (which had pushed their pieces in advance of the epaulments, to cover the Japanese assembled in a dead angle), half of the 1st Battery contributed with its fire to the repulse of the Japanese attacks along the sectors assigned to the 23rd and 24th Rifle Regiments, advancing its pieces and firing by the flank on the advancing enemy's infantry. The captain of this battery, who was at the firing position, received from the 21st Rifle Regiment information showing the ground occupied by the enemy, and upon which firing was to be directed.

*Combat at Min-Dia-Fan.* (Attack of the 11th Rifle Regiment at 3 p. m.) Seeing that the left companies were suffering considerably in this uneven struggle, the regimental commander sent his adjutant to the brigade commander, with a request that the fire from one of the Russian batteries be directed on the Japanese battery that was cannonading with impunity the position of the 11th Rifle Regiment. About 4 p. m. the adjutant brought up a battery. As soon as it opened fire on the Japanese battery the latter's fire became less intense and the enemy's infantry, overwhelmed by shrapnel, began to

give away. The positions of the 11th Rifle Regiment were then saved.

## BATTLE OF AUGUST 31.

*Combat at Ma-Ye-Tun.* (Attack of the 1st Rifle Regiment at 9 a. m.) The Japanese, undoubtedly preparing for a new attack, increased their artillery fire along the sector of the 1st Rifle Regiment. Their projectiles overwhelmed not only our trenches and the ones occupied by the Japanese lines in front of our positions about 500 meters away, but also the Kiao-Lang fields in which their infantry was located. The Japanese, receiving at the same time a frontal fire from our trenches and a rear fire from their own artillery, were compelled to abandon the positions they were occupying, and rapidly leave the zone of fire in which they had suffered such severe losses.\*

The Russian trenches were along the railroad embankments, almost to the level of the Japanese batteries. The ranging was done by observers pushed well forward, almost within the lines of the friendly infantry.

*Attack of the 3rd Regiment.* At daybreak two battalions of the 34th Japanese Infantry occupied the advanced trenches of the 3rd Rifle Regiment. At 7 a. m. the 1st Battalion of the 36th Rifle Regiment received orders to support, without delay, the 3rd Rifle Regiment, and to repulse the Japanese. By that time two battalions of the 34th Japanese Infantry had suffered considerable losses, not only from the fire and bayonet charges of our troops, but also from their own artillery, which continued to shell our positions.†

*Combat at Sin-Li-Ton.* (Attack of the 34th Rifle Regiment.) About 10 a. m. more than 200 Japanese guns fired upon the positions occupied by the 34th and 35th Rifle Regiments. In a short time the trenches of the 3rd Battalion of the former regiment were greatly damaged. Those of the 5th Company of the 34th Regiment and of the 11th Company, 35th Regiment, were almost completely destroyed. Above our almost completely destroyed and shapeless trenches there arose a thick cloud of stifling smoke and dust, raised by the high explosive shells. Under cover of this frightful artillery

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\* Note:—The Japanese artillery was located on the plain. One regiment 3,000 meters from the Russian trenches, and the other 4,000 meters.

† Note:—The 3rd Rifle Regiment occupied positions along a two-peak hill. This point was high enough to be seen from the emplacements of the Japanese batteries, about 3,000 meters away, and consequently too far to distinguish friend or foe.

fire, masses of Japanese infantry threw themselves into the attack, covering the defenders with a storm of bullets. The 33rd and 6th Japanese Regiments surrounded the trenches of the 3rd Battalion (34th Rifle Regiment) and occupied a line of *troups-de-loups* dug in front of the trenches. From this position, a most deadly rapid fire was opened on the defenders while the Japanese artillery increased the violence of its fire along this flank. All the shells fell into the trenches, destroying the parapets and killing the men. Soon the trenches were completely razed. The Russians made a counter attack, but were repulsed with great losses. The Major of the 3rd Battalion of the 34th Rifle Regiment then gave the order to fall back on the next crest.

The 33d Japanese Infantry, followed by the 6th Regiment, occupied the abandoned trenches and took possession of the next crest. From this position they opened fire upon our retreating forces and enfiladed the neighboring trenches.

Hardly had the remnants of the 3rd Battalion reached the next height, when volleys from three directions and the fire from two guns were concentrated upon the peak occupied by the Japanese.

But the Japanese artillery (which evidently had not been informed) opened up a very brisk fire, and continued to shell with marked activity the trenches occupied by the Japanese. The enemy, riddled by its own bullets, did not show any further signs of activity. After 1 p. m. the issue of the fighting along the left wing had been settled. Unable to withstand any longer this terrific fire, the whole Japanese infantry, leaped as if it had been plucked, and dashed to the rear, throwing away their arms, crushing one another at the same time.

The Japanese tried several times to reoccupy the trenches with their reserves that had been brought up. But each time they were swept away by the fire from our two guns, from their own artillery, and by the skirmishes of the 34th and 35th Rifle Regiments; also by the fire from the troops of the 19th Rifle Regiment that came up later.\*

As stated in the Russian account, the Japanese artillery had evidently

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\* Note:—The 34th Rifle Regiment occupied positions along a height. The Japanese artillery was about 2,500 meters away and also on an elevated piece of ground. The objective could be plainly seen, as shown by the accuracy of the fire.

not been informed that their infantry had just captured the position. For at least an hour it fired upon its own infantry.

On the 30th and 31st of August, the 3rd Japanese division lost about 3,172 men. The 6th, 33rd and 34th Regiments, sent to support the artillery fire, formed part of this division.

## BATTLE OF THE 1ST OF SEPTEMBER.

*Observation of Artillery Fire.* For the defense of Liao-Yang, and in order to facilitate the adjustment of the artillery fire, field observation stations were built along the front, to the west of the town. Besides, a captive balloon ascended about 3 p. m.; but evidently the observations made were not very useful, for at about 11 p. m. the aeronauts received orders to fall back as far as Mukden.

*Sector of the 17th Rifle Regiment.* The artillery brigade of the 5th Division of Rifle regiments replied to the fire from the Japanese artillery located on Ma-ye-tun hill (about 5 kilometers away). Due to the lack of elevated observation stations, it was at first difficult to return the fire. At 3:30 p. m. the fire increased along this sector, but our batteries replied energetically until dark. The infantry officer assisted our artillerymen in locating the enemy's position by making observations from the infantry firing line. The commander of the 2nd Company, 17th Rifle Regiment, himself sent a note to the commander of the 1st Battery, in which he gave the location of three Japanese batteries.

## BATTLE OF 2ND OF SEPTEMBER.

*Frontal Attack to the South of Liao-Yang.* Between 9 and 10 p. m. the Japanese again opened a terrific artillery fire upon the line of intrenchments extending from Fort No. 5 to Fort No. 1. At about 10:00 p. m. a Japanese rocket was fired in front of the position occupied by the 124th Infantry, and the infantry began to attack.

## BATTLE OF THE 1ST OF SEPTEMBER (ALONG THE RIGHT BANK).

*Combat at Nieshinski Peak.* Towards 1:00 p. m. the Russian general detached from his general reserve four batteries from the 1st and 3d Siberian groups, and ordered them to post themselves to the east of Sahoutouen. In the event that our troops should have to evacuate Nieshinski Peak and it should be occupied by the Japanese, these batteries were to cover the enemy with their fire to avoid firing

upon our own troops, these batteries were not to fire except upon a direct order from the general commanding the sector, who had arranged that the word "Sunday" sent by him, would be the signal to go into action, and the word "Monday" the signal to open fire.\*

General Okasaki of the 15th Brigade decided to attack the peak. He directed the 2d Regiment of his divisional artillery to prepare the attack and to communicate his decision to the commanders of the neighboring troops.

BATTLE OF THE 2D OF SEPTEMBER (ALONG THE RIGHT BANK).

*Russian attack on Nieshinski Height.* The attack on Nieshinski Height and on Sy-kwan-tun was prepared as follows: About 7 a. m. by three batteries from the 35th artillery brigade located at Fan-schi-go-schin (range 2,000 meters, target visible); about 8 a. m. by the first group of the Siberian artillery, located at west Sa-chu-tun (range 2,500 meters, observation good) which had received orders not to open the battle, but to delay as long as possible, the return of any fire to which they were subjected; at about 11 a. m. by two batteries of the 31st Artillery Brigade, located near Yan-dia-tun (range 4,000 meters, observation fair) and by a battery at Eultahokeou (range 2,000 meters); about noon by one battery from the 3d Brigade (at Sa-chu-tun); about 3 p. m. by five batteries from the 35th Brigade (at Yan-diu-tun).

The attack was made by the 35th Division (17th Corps) and a part of the 10th Corps.

The offensive attack of the 10th Corps, directed in person by the commander of the army, was isolated. The lack of knowledge of the situation, and the unknown location of the units of the 35th Division, made it difficult for the artillery to prepare the attack. For fear of firing upon our own troops, the artillery of the 31st Brigade could not sweep the top of the peak or the slope towards the enemy, and did not cover the west slope, nor its foot which were then occupied by Japanese troops. The two infantry columns, supported by five batteries, started for the attack between 9 and 10 a. m. Between 1 and 2 p. m. the Russian infantry was only a few hundred meters from the Japanese trenches.

The 35th Division had orders to attack at 5 p. m. The general

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\* The position of the battery was about 2,000 meters from the peak, which could easily be seen from the firing position.



commanding the 35th Brigade of Artillery (eight batteries in two groups, four kilometers apart) received orders to bombard briskly between 2 and 3 p. m. the position occupied by the enemy; to stop firing between 3 and 4, to resume firing at 4 p. m. and at 5 p. m. to cease firing simultaneously along the whole line. Immediately after, the infantry column would begin the assault.

But five of the batteries, those at Yan-dia-tun, did not get into position until 2 p. m., while the 1st Battery of the 3d Brigade (at Sa-chu-tun), which has been firing up to 3 o'clock, received orders to change its position, and did not open fire again until after 5 p. m., because the infantry had to begin the attack about the time it was established in its new position. It must be added that the five batteries that arrived late did not receive clear and concise instructions regarding the operations of the day, nor of the location of our infantry. These batteries had hardly opened fire when they received orders to cease. The commander of the 17th Corps, misled by a premature explosion, thought that the batteries were directing their fire, not on Nieshinski Height, but on the eastern slope of Hill 131, already occupied by the 121st Infantry.

At 4 p. m. the infantry firing, which had then reached its maximum intensity, had to be reduced because of instructions from the commander of the 9th Brigade, who sent the following message: "There are no more Japanese on the peak, which is already occupied by the 121st Infantry." The preparation of the attack by the artillery had been a weak one.

The officer commanding the attack of the 35th Division, not having heard the expected cannonade, requested the general commanding the division to have the artillery fire reinforced. About 5 p. m. he was informed that another bombardment would begin at 4 p. m. and would last until 5 p. m., when he should begin the assault. The artillery having failed to make a suitable preparation, this same officer requested that the bombardment be continued even for half an hour longer. The real shelling of the height did not take place until after 5 p. m. As darkness was fast approaching the cessation of the firing was requested at 6:30, but it was continued for about half an hour longer. Shortly before 7 p. m. the columns received orders to make the assault. At about 4:30 p. m. the firing was reinforced along the 10th Corps, by the 6th Battery of the 28th Brigade and by the 1st Group of the 9th Brigade which had taken up a position to

the east of Eultahokeou. The latter established an observation station on Hill 131. Five minutes after the fire had commenced the batteries received the following message: "Good, accurate, increase the fire." Hardly had 15 minutes elapsed when the commander of the attack gave the order to cease firing immediately, because the 10th Corps was going to make the attack, and it would be impossible to undertake it if the firing continued over the heads of the troops. The officer commanding the artillery was opposed to obeying this order; for he could see plainly from the observation station the enemy's position, and he could stop firing in plenty of time for our infantry to make the attack. Again he received orders to cease firing immediately, which he obeyed, stopping a very effective fire that offered no danger to our infantry.

(The 35th Division made the attack about 7 p. m. and a detachment of the 10th Corps at about 6 p. m.)

*Orlov's Detachment.* About 8 a. m. Orlov's detachment started to effect its junction with the 17th Corps. The mountain artillery had orders to go into battery in the midst of the kiaolang fields and to assist the infantry in the attack. Until about noon the infantry operated alone and without receiving any assistance from its artillery. About this time the artillery took up a position on the railroad embankment, and in compliance with the orders of the brigade commander, opened fire upon the advancing Japanese infantry. Three rapid-fire salvos by quadrant elevations, with the rear sights at 30, 40 and 50, were fired from this position; that is to say, the battery had a bracket from 1300 to 2200 meters, and consequently, covered with its shrapnel the Kiaolang fields through which the 215th and 216th Regiments (Russian) were advancing. As a matter of fact, the firing was stopped upon orders from the colonel of the 216th Regiment, who sent the following message: "Do not fire any longer, our troops are being struck."

From the firing position it was impossible to see the ground over which the Russian infantry was attacking. It would have been necessary to have had observers with the infantry firing line; and even then the tactical connection and the transmission of signals would have been very difficult on account of the kiaolang fields.

## THIRD PART.

## CONCLUSION.

The thirteen studies of the Russian account of the battle of Liao-Yang may be grouped in the following manner:

Five refer to a request for assistance from the artillery.

Four bring out the fact that no tactical connection had been established between the infantry and the artillery.

Three refer to signals employed to start the artillery fire, or on the contrary to stop same.

One refers to the use of balloons to observe the effect of the artillery fire.

(A) TACTICAL CONNECTION BETWEEN THE TWO ARMS IS NECESSARY.

Article 137 of the decree regulating field service states the following regarding the duties of the commander-in-chief during the battle. "Before the struggle the commander should proceed to the head of the column in order to orient himself as quickly as possible, through the action of the advance guard. He will then communicate to the chief of the larger units his aim, his estimate and all his plans. He will fix the limits of the zones of action, the objectives and the roles of each."

Let us consider an infantry division. The general commanding has been informed as to its zone of action, objective, and mission. He will have his artillery commander report and will point out to him the zone over which the division is to operate, the dispositions to be made by the infantry in carrying out the mission assigned to the division, the final objective to be gained, as well as the immediate points to be occupied before making the assault, and the particular role to be assigned to the artillery throughout the successive phases of the battle.

When the battle has commenced the division commander should follow, at some distance, the troops charged with the preliminary work along the sector assigned to him. Unfortunately, he must separate himself from his artillery and take up his post as commander of the troops. Following the preliminary engagements, and just as soon as he can determine the place and probable time for the decisive attack, he will give the necessary orders for the preparation of this attack and for bringing up his reserves.

What are the supplementary instructions that the division commander

must send to his artillery commander during the battle? They will be along these lines: Such organization will attack, at such an hour, such point—stop a counter attack being made on such point . . . the reserve is on the way to attack such . . . support our infantry with your fire.

Under Article 135 of the above mentioned decree, what must the artillery commander do? He will employ all his available artillery to support at any cost, materially and morally, the infantry during the successive phases of the battle.

But these successive phases of the battle have a beginning and an end. In certain cases the general could fix the beginning of a period by saying: At such an hour, such a unit will attack such point. The artillery will be able to open fire on this point, but from whom will it get information as to the effectiveness of the fire, and at what moment must the fire cease? Who will keep him posted of the happenings at the infantry firing line, of the unforeseen obstacles that should be overcome, of the reverses to be retrieved without delay, or of the successes that must be quickly followed up? It cannot be done by the commander-in-chief; that is to say, the tactical connection through the higher commander.

It is also the rule to locate the artillery on ground, more or less open, so as to give the greatest possible view of the terrain over which the division is to attack. But there will be certain portions of the sector which the division is to attack which the artillery will not be able to see, and to cover them properly it will have to be furnished with the necessary data for the firing.

Even admitting that all the terrain can be seen, it will often occur that the artillery will be at such distances from the infantry line that it cannot distinguish whether it is the friendly or the enemy's infantry, even with our conspicuous uniforms, which at least will be useful in making us visible at long distances from our gunners.

At Liao-Yang, the Japanese artillery had established perfect tactical connection through the higher commander, and the targets were clearly visible in the attacks of the 3d and 34th Rifle Regiments on August 31. However, they brought on the defeat of their own infantry by firing upon it.

The results cannot be better when the artillery does not see the terrain over which its infantry is to operate and when there is no tactical connection with this arm.

During several attacks, both on the Japanese and Russian sides, the commanders tried hard to co-ordinate the work of the artillery with that of the infantry, by using signals to indicate the beginning of one of the periods of the battle. Thus we see the Russians making use of a conventional word—or fixing an hour to co-ordinate the work of these two arms. The Japanese used rockets under similar circumstances. But here we have the right to ask the question. How is the commander to stop in time the fire of his artillery? Take the case when there is danger of striking the friendly infantry.

Up to the present we have only considered the work of the artillery in supporting the troops within its own sector; their position and method of employment being known by the artillery. How much more delicate will be the role of this artillery when the commander charges it with the task of supporting the infantry of adjoining sectors, and whose position is completely unknown. We can readily understand how on the 2d of September, during the Russian attack on the Nieshinski positions, the batteries brought up to an unfamiliar sector during the progress of the battle, with a target 4000 meters away, and the Russian infantry at the foot of these positions, could not have had any effective result. The report of the battle shows conclusively that this artillery had not been informed by the commander as to the progress of the operations. But it could not have been otherwise, as the commander did not know what was happening at the infantry firing line; he himself was not familiar with the location of the attacking troops. Furthermore, this will almost always be the case; the commander who disposes of some artillery after the infantry attack has been launched and has advanced two or three kilometers, will have to remain at his post as commander; after a very short time, he is not familiar with the exact situation of his infantry. How can this commander give adequate instructions to the artillery, specially to the artillery located in adjoining sectors?

Of all the successive stages during which the artillery should support the infantry there is one that is more important than all others, and this is the final stage. The opposing infantry lines are close to each other, a few rushes are still to be made, and the one acting on the offensive is about to undertake the assault. Who is going to signal to the friendly artillery whether or not the works of the defender have been destroyed? Who is to tell him to

increase his fire? Who is to ask him to use high explosive shells in place of shrapnel? Who is to signal the moment the infantry starts to make the assault and captures the position? And how is the artillery to be informed as to counter attacks?

At this moment when the delay of a minute may lead to a defeat the commander is unable to have the artillery act at the right time. Will our French infantryman, like his Japanese confrère, be able to withstand unshaken the hail of French bullets, which an artillery, not informed of the situation, may scatter over their heads?

General Percin undertakes to solve this problem by proposing to give the infantry a large number of machine guns that would follow the infantry up to within a short distance from the defender's positions, and compel the latter, by means of brisk rafales, to keep under cover. But just as soon as these machine gun batteries have shown themselves, how long are they going to last against the artillery that the defense will sacrifice up to the last stage? And if, at the time of making the assault, it develops that the enemy's defenses have not been reduced, a fact that cannot be discovered until at close quarters, it will then be very necessary to fall back on the artillery. Furthermore, at present, the invisibility of our machine guns is due to the fact that they operate only in detached sections, placed in ambush under the most favorable cover. The day that groups of machine guns are organized, they will become a target for the artillery.

Tactical connection through higher commanders is necessary to fix the zones of action, the objectives and the role of each; but it is not sufficient, because the commander-in-chief does not see what is happening at his infantry firing line, and he will receive too late the reports which he should have, in order to act judiciously, specially as to the timely employment of the artillery.

#### HOW SHOULD THIS TACTICAL CONNECTION BE MADE?

With the exception of a few officers still imbued with peculiar ideas and who do not approve of having direct connection between the two arms, it is generally accepted that a close cooperation should exist between the artillery and the infantry throughout all the stages of the combat.

Throughout the Manchurian War, the Russians did everything imaginable to assure this tactical connection under all circumstances.

It is true that for them the problem was somewhat simplified, since they only fought defensive battles. Consequently, the telephone was able to give marvelous and unique results. In all the descriptions of the battlefield we run across this phrase: "The firing line had telephonic communication with the different sectors of the line and with the artillery."

It is well known that the colonel of the 21st Rifle Regiment brought some extra telephones to be used in maintaining communication with his artillery and with his battalion commanders. Also, during the battle of Yen-ze-ling, he was able to furnish information to the artillery, which the latter used in firing upon a Japanese column that could not be seen.

The telephone can render considerable service, specially on the defensive. But there will be time when the fire from the enemy's artillery will have so shaken the defensive works that telephonic communication will be uncertain, even with telephone men as brave as those of the Russian army, who repaired the broken wires in the face of fire.

Consequently, we should not depend entirely on this convenient method. We also see from the examples mentioned in the second part of this paper that the Russians simultaneously employed several methods. On August 30th the 21st Rifle Regiment sent information to the artillery relative to the enemy's forces, and upon which the artillery opened fire. On the 1st of September the officers of the 17th Rifle Regiment sent to the artillery information giving the location of the Japanese batteries which the Russian gunners were unable to discover. On the 30th of August the 11th Rifle Regiment sent an adjutant to change the direction of fire of the artillery attached to the sector and to direct it upon a counter battery.

Besides, from the beginning of the campaign, the Russians practiced direct tactical connection between the two arms. We do not have to limit ourselves to the battle of Liao-Yang, for which preparations had been made for several months in advance; during the battle of Tu-schu-bin (July 31st), a captain of the 122d Rifle Regiment guided the artillery in order to point out the march of a Japanese column that, on account of the brush, could not be seen from the artillery position. That same day the colonel of the 121st Regiment sent to his artillery the reports submitted by his scouts relative to the march of the enemy's columns. On the 26th of

August, at Lientiasan, the colonel of the 24th Rifle Regiment informed the artillery as to the effectiveness of their firing, and the targets to be fired at. In the same regiment, the battalion commanders and the captains sent to the captain of the battery soldiers who placed their rifles on the parapet and directed him to the points upon which it was desired to have the artillery cover with its fire.

Numerous quotations from official reports show that in the Russian Army the tactical connection between the two arms had been practiced and that always the infantry firing line was the one that had gone directly to the artillery for any support. It appears that the problem should be solved in this manner.

The infantry operating in a certain sector, with an artillery support, will not always have the same need for this artillery. If it be incumbent on all units to notify the artillery as to the effect of its fire, the supporting points to be demolished, the enemy's troops to be fired upon, the unforeseen incidents, etc., it is necessary that any request for assistance be made only by such units as really need it. The artillery commander who knows the final objective through the higher commander will make use of the information received from the infantry direct tactical connection, to act at the proper time within the scope fixed by the commander-in-chief. These supplementary reports of things which can not be seen from his observing station will enable the artillery commander to use his initiative in a good many cases arising during a combat.

In certain instances the artillery will be able to establish tactical connection with part of the infantry; take the case when the mission is to support the action of a certain infantry unit, regiment, brigade, etc. In order to be sure of supporting the infantry at the right time, in order to be in touch with the different incidents that may develop during a combat, the supporting artillery should detach the agents of communication (noncommissioned officers or ground scouts) to go with the infantry. These mounted agents would assure the rapidity of tactical connections. To be sure, their lives will be greatly exposed, but they will save a large number of infantrymen and contribute largely to the success of the operation.

It hasn't been very long ago, since the principle of tactical connection was known by a large number of officers, that the idea was to link the artillery with the infantry unit to be supported. That was known as the accompanying battery. Under favorable conditions



this system assured tactical connection between the two arms, since the artillery had to operate within the zone of infantry combat; but it had the great inconvenience of withdrawing from the general fight a large number of batteries. Exaggerating some, if each battalion having an important mission within a sector of a division be accompanied by a battery charged with the duty of assisting this one battalion, the result would be that the commander of the Divisional Artillery would have no batteries left, unless we go back to the great artillery lines of the last century, which were the skeleton of the battlefield—the support of the infantry. We must remark that in modern fighting the artillery will be stretched out along the whole field of operations.

Thus on the 2d of September, at Liao-Yang, the attack of the 35th Division on Nieshinski Height was supported by an artillery tier of six groups, located in five different emplacements, which made very difficult the tactical connection through higher commanders. The greater part of this artillery was massed at two points. With the present range of the guns the division of the artillery offers no obstacles to the artillery duel; it rather helps it. This disposition has, besides another advantage, that of covering better all the points of the battlefield, which is not the result with only one position for the artillery.

By separating the artillery every infantry unit is sure of having some guns close by. Consequently, the tactical connection of the two arms is easier than if the artillery fights in mass, and the commander-in-chief finds it impossible to have his timely orders reach his scattered artillery. It will be better for the latter to seek information from those who know, from those who see—the infantry firing line. Direct tactical connection is then absolutely necessary for the following reasons: In order that the artillery may step in at the right time and fire upon the targets which have been assigned to it; in order that it may not prove a danger to its own infantry; in order to have an accurate observation of the effect of fire; to watch quick and unforeseen movements; to obtain from the artillery a sure and quick support, in order to locate targets, it is unable to see, on account of being too far from the infantry firing line.

#### MEANS OF TACTICAL CONNECTION.

From the foregoing considerations it follows that the artillery must be tactically connected, at the same time, both with the commander-in-chief

and with the infantry. The former is of special importance at the beginning of the action, the latter becomes more important as the final stage is reached.

For connection with the commander-in-chief the artillery will employ its mounted agents and telephones. If, as we have seen in the Manchurian war, the commander-in-chief establishes a telegraph system, linking himself with the artillery, the telephones may be used in obtaining information from the front, that is, from the infantry firing line. This is particularly true of the artillery charged with the mission of supporting a certain infantry unit, which may use the available telephones to establish connections as far as possible, with this infantry. We must admit that the telegraph and telephone will be useful only within the zone in the rear of the battlefield, over ground not covered by the enemy's bullets. The employment of these perfected means of communication appear to be set apart for communications between the Commander-in-Chief and his artillery.

The artillery has no means by which it can be connected with all the infantry troops that must be supported. Neither its telephones nor mounted agents of communication could undertake this task. It will only be connected directly with a certain infantry unit on very special occasions.

The tactical connection must then be assured by the infantry. The material means at the disposal of the infantry are: The telephone, the signal flags and the agents of communication. Each infantry regiment has three telephone stations and six kilometers of wire. The Commander of the Regiment must remain in constant touch with the Brigade Commander, so one of these telephones must be set apart for this purpose. On the defensive this will be an easy matter; on the offensive the problem is a more difficult one, and the experience gained from maneuvers are not very conclusive. But we must take into consideration the rapidity with which maneuvers are unfolded.

Two telephones are still left, one of which could be used in connecting the regiment with the artillery of its sector. But we must not rely greatly on this method of communication for the reasons given before in speaking of the artillery; the wires will be still more frequently broken, not only by the enemy's bullets, but also by the movements of the troops in the rear of the firing line. Signalling

appears to be a reasonably sure method, provided it is limited to a few simple messages, such as: "increase the fire," "cease firing," and the like. If the artillery takes the precaution to locate a signal station from which the greater part of the infantry can be seen, a constant communication may be maintained with most of the battalions on the firing line, and which can give most useful data for the artillery engaged in firing.

But we must not be too much enthused with what can be expected from signal stations while under fire. Being very visible, they will draw the attention and fire from the enemy, and their report will be read by the adversary. If they secure cover it will be difficult to establish communications, and the number of stations will be limited. The situation will be specially difficult and dangerous for the station located near the artillery, which is bound to be in the open,—if communication must be kept up with the advanced stations.

This method of communication is more flexible than the telephone, and permits the assurance of contact up to the infantry firing line; it is also more quickly established, specially over covered or hilly ground. Finally, the number of stations is pretty large (32 for an infantry regiment and 7 for an artillery group). On the other hand, signal communication is not very quick. In the zones more exposed to the enemy's fire, we can only count in transmitting short sentences—or conventional signs—of little use to the artillery.

Telegraphy, telephones, and signal stations are subjected to weaknesses—which will increase as the struggle becomes fiercer; it is at the time when communications are most needed that they will fail. There remains to discuss the agents of communication, embracing in this term all military men employed in connecting units and those who are bearers of messages. The number is inexhaustible, since it can be made to apply to all combatants. It is a sure method of communication, if care be taken to make them sufficiently numerous to replace the losses that may occur. It is a quicker method of communication than signalling, provided that the personnel is on horseback or bicycles. Finally, they can assure a service that all other methods of communication are unable to furnish, such as, carrying to the artillery sketches of the enemy's positions, which nearly always is more useful than the best edited dispatch. Furthermore, as it is always best to have additional communication by means of agents (mounted or dismounted), it will always be necessary to

establish tactical connection through agents of communication. We should therefore practice this method constantly.

Officers form the most valuable agents of communication. We have seen that at the battle of Liao-Yang an adjutant jumped on his horse and rode to a battery of artillery to request its assistance. This officer, who had just come from the firing line, was better able to explain the situation to the captain of the battery than would have been possible through a message. Better still, this adjutant led the battery to a position from which its fire was most effective. Under the regulations there are only three officers in each regiment who are agents of communications. We speak only of those who have the right to keep their horses by their side.

One must not hesitate to send a dismounted agent to the artillery whenever the circumstances are serious, as was done by the 122nd Rifle Regiment at Yen-chu-ling, when the bivouac of the regiment was surprised at 500 paces by the Japanese troops.

The general rule should be tactical connection through orderlies. Officers have a paramount duty to perform, and this is, to lead their units. When there is no urgent need, requests and reports should not be sent by officers of rank. Whether they are on foot, or horseback or bicycle, they will only be orderlies carrying to the artillery reports and sketches made by the officers commanding the troops on the firing line.

Summing up, all possible means of tactical connection between the two arms on the field should be employed. No one method is perfect, and we should use at the time all possible means to attain the best ends. More than in other branches of instruction, it is impossible to fix rules for the establishment of tactical connections. The main thing is to establish them. Judgment will always be the best guide as to the choice of methods, if there be little familiarity with the two arms, due to constant practice: By reasoning, we can arrive at some idea of what tactical connection means on the battlefield, with our present appliances of transmitting information. Let us take the most difficult case, that on the offensive, and let us study how the service can be organized for an infantry regiment occupying the firing line. This regiment executes its march of approach, hidden as much as possible from the enemy's observation. At the beginning, not having any difficulties to overcome, there will be no need for the artillery. As soon as the regiment comes within the

enemy's effective range, it deploys, with two battalions in the advance and one as support. These units will continue to march, taking advantage of protected roads and of the cover afforded by the terrain. The only duty that the colonel may ask of the friendly artillery is to stop as soon as possible such of the enemy's fire (artillery and infantry) as hinders the march of the regiment. But the presence of the adversary's troops will be more or less revealed by their own fire, without the colonel of the regiment in question having to intervene. If, however, the artillery has not fulfilled its mission, if from its position it has been unable to locate the troops retarding the march of the regiment, then the colonel should send the necessary instructions. Communications of this kind will be rare, and the agents of communication (on horseback or bicycles according to the terrain) could be furnished from the battalion support, or from the personnel attached to the commander of the troops. The part of the battlefield over which these agents have to move, still offers certain security.

The regiment reaches the last shelter—the last cover, which it will leave to make the fire attack. This is a serious moment in the struggle; upon the manner in which the attack is made will depend success or failure. It is the last opportunity for the colonel to give his instructions to the battalion commanders; afterwards these instructions will be valueless and inopportune. The struggle will be delayed here for a few minutes and it is then that it is necessary to establish tactical connection.

From now on, the terrain will include two distinct zones. In front of the last sheltered position there will be a zone more or less opened, and in which fire will have great effect. Here, tactical connection can not be established except through signal men and dismounted agents—very seldom through telephones. Naturally and unfortunately it is to this last covered position that all information from the firing line must come.

The zone back of this last covered position will have curved roads and often will be defiladed. Here the tactical connection can be established through all possible means. At the edge of this last covered position the colonel finds all the elements that can not be used in the zone of effective fire; all or part of the mounted scouts, bicyclists, telephones. It is with these available means that he is going to organize and complete his tactical connection with the

brigade commander and the artillery. If he has two available telephones, and he has not already done so, he will have one connected with the brigade commander and the other with the artillery; he can establish flag communication with the artillery, etc. For some time the colonel will remain with his battalion in support, and from this position he can establish a solid and fixed base for his tactical connections.

From this point on, the infantry will have almost constant need for the artillery. At the moment when the infantry leaves this last covered position, at the moment when it captures and advances from the supporting points, successively occupied by the advanced troops of the enemy, the nature and location of the adversary's forces are known exactly only to the infantry. The accidents of the ground or the unforeseen maneuvers of the enemy, the time for the assault or retreat, the counter attacks, the regulating of the firing, etc., all these are important points that should not be ignored by the artillery. Some of these facts may be observed imperfectly from the enemy's position. The others should be furnished, but as the infantry is not conversant with what is or is not visible from the artillery's position, all of this information should be sent *in toto*.

Back of his battalions on the firing line, the colonel, less confused by the details of the struggle, will classify the reports received from the front, and forwarding to the commander and to the artillery those that may be useful. For this double tactical connection, the colonel will have at his disposal a considerably large personnel,—to wit: 12 mounted scouts, 18 bicyclists, 3 telephones, and a signal station—this without taking into consideration the elements from the battalion in support. Up to the time when the battalion in support will leave its last covered position, the colonel has at his disposal the necessary personnel and matériel to assure a double tactical connection with the brigade commander and with the artillery. Then the colonel will enter the zone of most effective fire; this effectiveness will diminish, as the enemy will undertake to concentrate on the immediate dangerous point, that is to say, on the battalions on the firing line. The colonel will be able to send communications from his station at the last covered position by the personnel not employed elsewhere or by foot messengers. On the other hand, it will always be difficult to find the colonel when he is at the front; the advantage of having a station at the last covered position can be

readily seen, as all reports are sure to reach this point,—the location of which is known to everybody prior to the launching of the fire attack.

Without desiring to praise any one system, or above all, to undertake to find a fixed method to be used in war and under all circumstances, it can be seen that the problem may be solved practically, with more or less success. The main question is, to think of tactical connection, that is to say, to practice it in our daily drills.

It is necessary that this idea be so familiar, that its execution be the result of natural agencies, without the commander being compelled to give other than general directions. Every time that we stop, we seek cover without waiting for the command. The same automatic action should be employed in establishing tactical connections, upon orders from subordinate commanders. The adjutant, as assistant to the colonel, if the personnel is well trained, will be already in position, and ready to take action whenever any reports should be transmitted.

The object of tactical connection is to increase the effectiveness of the troops, to secure co-ordination of the efforts of the different arms. This advantage should not be gained by imposing an additional care to the responsibilities of the commander.

It is necessary then that everybody realize the importance of this service, and that everybody train the personnel under his command to the automatic establishment of tactical connections, which every one is supposed to organize, according to his rank.

#### CONCLUSIONS.

In one of his maneuver critiques, General Pau said that the first duty of the infantry in battle should be to locate the enemy's artillery. As a matter of fact, the choice of the zone of attack and of the roads leading to it, of the formation of the troops, and of the successive objectives, all depend upon this accurate location.

We shall add that the second duty of this infantry is to know the location of the friendly artillery. If the selection of the attacking zone has been one over which the enemy's artillery will have the minimum effect, it should, nevertheless, be known how much assistance can be given by the friendly artillery in the zone in question. If the successive supporting points to be occupied are such that the enemy's artillery can cover them pretty effectively, we should be

assured that our artillery will assist us during the progress of these attacks. The artillery, then, should be in tactical connection with the infantry. The battle of Liao-Yang teaches us that the Russian infantry generally maintained a constant and direct tactical connection with its artillery, this connection having been established by the infantry, and using all possible means. The result of this cooperation is convincing. In the same army, during the battle of the 2nd of September (along the right bank) we have seen that the attack failed, due to the fact that no direct tactical connection had been established. It was impossible, at that particular moment, to orient the artillery by means of the tactical connection through the higher commander.

On the Japanese side, we have seen that the only success gained on the left bank was turned into defeat, because the artillery had annihilated its victorious infantry—no tactical connection had been established between the two arms.

Tactical connection between the artillery and its infantry is almost as important as that with the commander-in-chief. It is necessary then, that this idea be familiar to us through applicatory exercises. It is desirable that at all maneuvers the two arms be represented or outlined at their real positions, and that tactical connection be established.

Artillery officers should not fear that their independence and initiative are going to suffer on account of this tactical connection with infantry commanders. During the battle the role of the artillery is fixed by its chief; no one else can change it. But in order to fulfill this role in an effective and opportune manner artillery officers need additional information which can only be given by infantry officers,—when they are pretty close to the enemy's positions. In an army where joined responsibility is the main idea, it is the duty of the infantry to furnish the additional information, and of the artillery to demand it if it has not been received. In other words, there are no orders to be given by one arm to the other, it is only an interchange of information for the purpose of reaching a common end—victory. As to the class of information that should be exchanged, the needs of each arm should receive first consideration. If the commander-in-chief has forgotten to give the artillery any support the latter should ask the infantry for it. Reciprocally, every time that the infantry has an obstacle to overcome, she should ask



the artillery for support. Tactical connection assists in securing these results quickly.

In a good many cases this exchange of information cannot be kept up. It is important, then, that artillery officers be conversant with the progress of the battle. Knowing the objectives and the different phases of the combat of the infantry units, the artillery officers should follow the battle, step by step, so long as they can see it from their observing stations, in order to assist the infantry with appropriate firing during each phase of the combat. A tactical connection will confirm their own observations, or complement them.

But in order that artillery officers may give timely assistance to the infantry, in order that they may successfully follow the different phases of the battle, it is indispensable that they should be thoroughly acquainted with infantry tactics, and with the needs of this arm throughout the successive stages of a combat. This is why all artillery officers should serve a tour with the infantry.

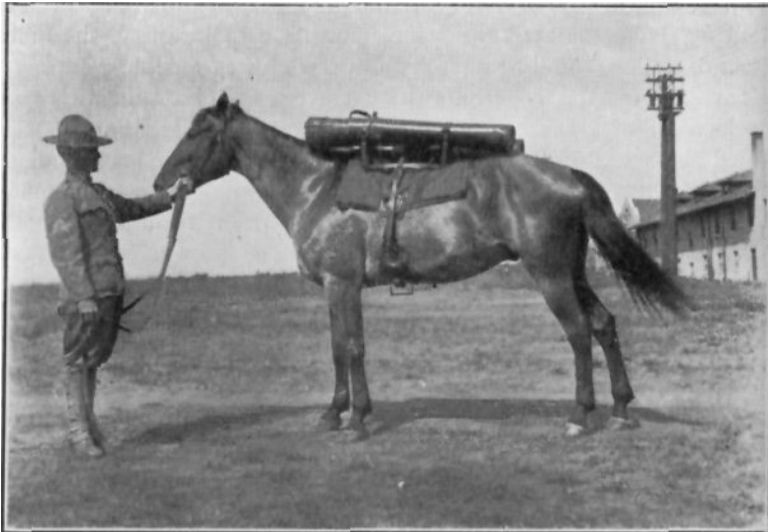
It is necessary to give great importance to the tactical connection between artillery and infantry during combat; *and that it should be established through all possible means*. Such disposition permits, above everything else, the assurance of co-ordination in the effects of the two arms, with victory as the goal. It also prevents disaster resulting from the artillery firing upon its own infantry, the moral effect of which would be terrible with our impressionable troops.

Tactical connection permits the correction of errors in the range, the increase of efficacy of the artillery's fire, the signalling of well-aimed shots, and of taking action at a particular time. It regulates the expenditure of ammunition, and gives confidence and calmness to everybody. In order to obtain such important results, we should practice tactical connections in our drills.

## PROPOSED METHODS OF CARRYING THE GOERTZ RANGE FINDER.



This illustration shows the experimental pack attachment in use on the saddle of an off team-horse, as recommended by the Field Artillery Board. The one under test at Fort Sill has not proven satisfactory. The load is too long and too low and has caused sore backs. It also interferes with the management of the off-horse. Tests with similar pack attachments are also being conducted at Rock Island Arsenal.



An alternative method of carrying the Range Finder and all the Reconnaissance Instruments of a battery is shown in this illustration. By this method the Range Finder is carried on a led-horse. This has given good results in practice. The Scissors Instrument, Telephones, Buzzer Wire and Semaphore Flag Kits have been added to this load without causing any trouble when horses with straight backs were used.

## ARTILLERY NOTES FROM THE RECENT WARS IN THE BALKANS.

*These notes by Lieutenant Colonel Nikoloff of the Bulgarian Army, based as they are upon the actual experiences of a nation in a recent war, commend themselves not only by their brevity and conciseness, but also on account of the closeness with which the organization recommended corresponds to that proposed for our own army in some essentials and varies from it in others, particularly in the provision for combining inspection in time of peace with command in time of war.*

### ORGANIZATION AND QUANTITY OF ARTILLERY.

*Field Artillery.*—During the war each infantry division, with few exceptions, had two artillery regiments, one non-quick-firing and one quick-firing, or a total of fifteen batteries. But during some periods some divisions had reduced complement of artillery—some had quick-firing batteries only, some non-quick-firing only. Our experiences, however, helped us to fix the right proportion between guns and bayonets. The rule is emphasized that one battalion (1,000 men) should have a minimum of one battery (four guns), not counting the various batteries attached to the armies. The results of the war showed in a striking manner that, owing to moral and physical causes, a strong artillery, capable of preparing the infantry's operations, is absolutely necessary. The artillery must clear away the infantry's obstacles, fire on and silence the men of the enemy's out-works and positions, fire on and silence the enemy's artillery, prepare the attack of our infantry by neutralizing the enemy, destroy or silence his dreadful machine guns, follow a retreating enemy with its fire or check his advance if he attacks—in short, to render all aid possible to the infantry. These results can only be obtained when the necessary minimum of artillery is present and when it can obtain a marked superiority over the enemy, both in quality and quantity. It is a mighty factor in the wars of this nervous age. New conditions of life have made it necessary to avoid as much as possible the cruelties and horrors of the battlefield, and it is clear that the modern, tender-hearted, nervous soldier does not possess the qualities of the old, raw, rough, brave campaigner. It is difficult to advance

against the present rapid-firing artillery, and the only infantry which can hope to engage with the bayonet is that which feels itself well protected by its own artillery.

The future infantry division, if it is to be independent and efficient, should have a minimum of as many quick-firing batteries as it has infantry battalions. If we assume that the division will have three brigades, each of two regiments of three battalions, then twelve field batteries will be needed. These should be grouped into a brigade of two regiments, each of two battalions, each battalion of three batteries. In time of peace all batteries should be officered and equipped as far as matériel is concerned. At least two of the three batteries of a battalion should be manned and horsed. Larger economies would lead us to make the same mistake we made before the last war, with well known results.

*Field Howitzers.*—We saw during the two wars, especially the latter, what could be accomplished with howitzers. Although the effects of their fire were not greater than those of the field guns, they far surpassed the expected results. They reduced our infantry to inactivity, and disheartened, puzzled, exhausted and terrified it. They displayed their power at great ranges, and when the fight was severe or long-continued they were the deciding factor. Many times we felt their need. The future wars, in plains or mountains, will be decided by the fire of heavy guns, with long range, great rapidity of fire, and great explosive effect of shell.

The future infantry division, if it is to be independent, should have a minimum of at least one battalion, of three batteries, of field howitzers.

*Mountain Artillery.*—Our mountain batteries had a regimental organization before the war. On mobilization, however, it was necessary to increase their personnel fivefold in order to utilize them—an improvement in the full sense of the word. We had no batteries of mountain howitzers. Our enemies, however, had them. The Servians, who did not possess them, had to use field guns and howitzers in the mountains. They were quite successful, although it required a great deal of effort in the way of making special roads, and so forth. The Greeks had mountain howitzers, and we envied them. They were superior to our quick-firing and non-quick-firing mountain batteries. Their shells were almost as powerful as those of field guns. They had a greater range than our

mountain batteries. They combined the advantages of the field gun and the howitzer in the mountains. Our experience showed clearly the need of a more powerful weapon of larger caliber for mountain warfare.

Every infantry division should have a certain quantity of mountain batteries, as well as field batteries, and the arguments in favor of field howitzers apply equally well to the mountain howitzers when the theater of war is mountainous. Each infantry division should have at least one mountain battalion of three batteries, and each army (three divisions) should have at least one battalion (three batteries) of mountain howitzers.

*Horse Artillery.* Our war experience showed that we need horse batteries with our cavalry. Many accusations have been made against our cavalry. Much has been said about its unsuccessful operations, its want of perseverance and its unreaped fruits and laurels after Lule Burgas. Some explain these defects by our lack of horse artillery. Our neighbors have horse artillery, and we should supply ourselves likewise. A regiment of three battalions, each of two or three batteries, should be formed as soon as possible.

*Heavy Field Artillery.* The present need is for larger guns, of greater range. In modern wars we will meet many strongly fortified positions. To overcome them, guns of larger caliber will be required. Our war experiences also emphasized the necessity for longer ranges. We should have four and seven-tenths-inch guns and six-inch howitzers. Each army (three divisions) should have a certain minimum of these guns and howitzers, organized in two or four-gun batteries. Each army should have at least one battalion, of three batteries.

*Proportion of Guns to Bayonets.* It therefore appears that each infantry division should have eighteen batteries (twelve field, three field howitzer and three mountain) for the eighteen battalions of the division, or a proportion of four guns to 1,000 bayonets. The army artillery will increase this proportion to about five guns per one thousand bayonets.

Here the question of army artillery arises. We must have it, since without it a separate army cannot perform its varied duties in modern war. The shifting of divisional batteries from one position to another during the battle can only be avoided by the use of army artillery. The army artillery should be formed from

the divisional artillery on mobilization, by raising a battalion of three batteries from each artillery brigade in the army (three divisions). The three battalions so raised would be formed into a regiment of nine batteries, as army artillery. In this way the entire artillery of the army (or inspection in time of peace) would be on the same footing.

To the above field batteries for the army, should be added the mountain howitzer batteries, one battalion of three batteries, or twelve guns per army. To the army artillery should also be added the various kinds and calibers of heavy field artillery, formed in independent battalions.

The non-quick-firing artillery should no longer appear in the battle line, but should be sent to fortresses of no special importance.

In an army (three divisions), therefore, there should be the following artillery: (a) Army artillery: nine field batteries, three mountain howitzer batteries, and nine or ten heavy field batteries, total of between eighty-four and ninety-six guns and howitzers. (b) Divisional artillery: to each division, twelve field batteries, three field howitzer batteries and three mountain batteries, total of seventy-two guns, or two hundred and sixteen guns per army. There will therefore be in the army a total of from eighty-four plus two hundred and sixteen and ninety-six plus two hundred and sixteen, or between three hundred and three hundred and twelve guns and howitzers for the fifty-four battalions in an army. The proportion of guns to bayonets will therefore be 5.5 to 1,000.

#### SUBORDINATION AND TRAINING OF THE ARTILLERY.

All the artillery should be subordinate to the artillery inspection in the ministry of war. This inspection should be divided into three parts, for the field, mountain and fortress artillery. The field artillery department should be charged with the equipment and training of the field, howitzer and horse batteries; the mountain department, of the mountain and mountain howitzer batteries; and the fortress department of the siege and fortress artillery.

It is necessary, however, to insist that the closest intimacy should exist between the infantry and the artillery, and that, therefore, far from being freed from subordination to the higher infantry commanders, the artillery, in all tactical matters, should be under the orders of the divisional commanders, both in time of war and peace.

The artillery inspectors appointed for the several inspections (armies) should, in time of war, become the commanding officers of the army artilleries. They should unify the training of the various artillery groups within their districts. They should not be merely administrative officers, but tactical commanders as well. There should likewise be chiefs of divisional artillery, who should command, tactically as well as administratively, their groups in time of peace and war.

During the last wars there was entirely too much shifting around in the artillery command. This must be avoided. The men training in peace for certain positions must step into those positions as a matter of course in time of war.

All infantry officers, from the divisional commanders to the battalion commanders, should be intimately acquainted with the special features and uses of the various kinds of artillery which come, or which may come, under their permanent or temporary command in time of peace or war, and with which they will be closely associated on the battlefield. This can only be attained by a manifestation of greater interest in the common cause and by continued training and coöperation. We should no longer pay any attention to the antiquated argument that "the artillery knows its own work." The tactical direction and use of the artillery is entirely in the hands of the infantry commander: thus, it has been, and thus it will be. So we may do away with the stupid and arbitrary handling of the artillery by the infantry commanders—with such things as occurred during the last wars; the forcing of the artillery to place their guns at certain fixed points, regardless of the mission, when the batteries could have fired better and with less losses from positions farther to the rear; the demanding of immediate fire from the guns before they could possibly be prepared for fire; the orders for uninterrupted fire to strengthen the morale of the infantry, without thought of the waste of ammunition involved; and the orders for the batteries to come out into the open, so that the infantry could see them and be encouraged, without thought of the relative advantages of the positions from the point of view of artillery fire. If there had been more extensive work in coöperation between the infantry and artillery before the war, such things could not have been. I believe that the war has convinced everyone that the necessary intimacy between the infantry and artillery is such that their training

should not be limited to occasional manœuvres together, but should be extended throughout the entire year. Without closer coöperation and more intimate knowledge of each other's powers and limitations, there can be no success on the battlefield.

The howitzers and mountain guns should function, in time of peace, in independent artillery battalions, as they will appear in the battlefield. The highest tactical unit for howitzers and mountain guns is the battalion, and the existence of a mountain artillery regiment in time of peace is unnecessary.



## HEAVY SIEGE ARTILLERY IN THE EUROPEAN WAR.

Three types of European Siege Artillery are shown in the illustrations on the following pages. The enormous development of protecting cover, due to the employment of armor plates and ferroconcrete in the construction of fortresses, has resulted in such a resistance to high angle fire that everywhere larger calibers are being introduced in order to reduce the time limit required to reach the protected defender and his guns. The extent to which this tendency toward large calibers is relevant to the needs of the United States is an interesting one. Ordnance designed especially for the purpose of reducing permanent fortresses in Europe does not necessarily have any place in our own armament; but we should not lose sight of the fact that this is an age of concrete, and that railroad iron and concrete can be quickly employed to strengthen any field work.

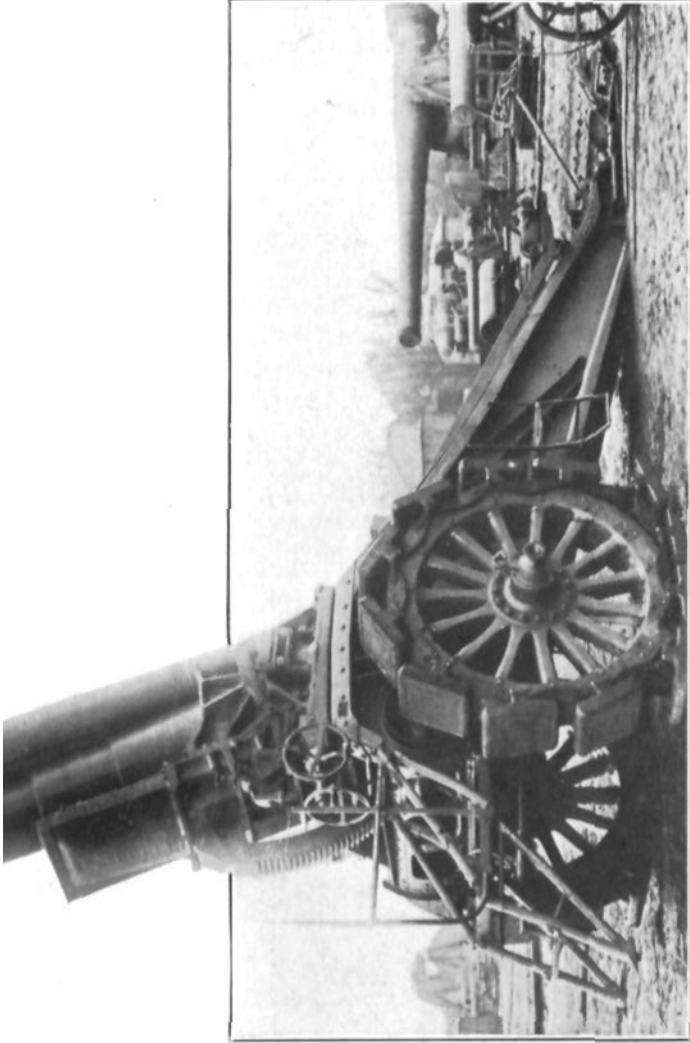
Some of the available information in regard to three European systems is tabulated below:

COMPARATIVE TABLE SHOWING THE CHARACTERISTICS OF THE THREE TYPES OF SIEGE HOWITZERS AND MORTARS.

	Schneider Mortar.	Krupp Howitzer.	Ehrhardt Mortar.
Caliber, inches .....	11.023	11.023	11.023
Extreme Range, yards.....	11,045	11,045	10,827
Common shell, pounds .....	758 <sup>1</sup>	750 <sup>1</sup>	760.6 <sup>1</sup>
Weight of powder charge, pounds.....	.....	10 to 30	16.53 to 23.14
Muzzle Velocity .....	853 f.s. <sup>2</sup>	1115 f.s. <sup>2</sup>	885 f.s. <sup>2</sup>
Limit of Elevation.....	10° to 60°	0° to 65°	20° to 60°
Limit of Traverse .....	20°	10°	10°
Weight of Mortar, pounds .....	8692	13,514	8818.5
Weight of Mortar and Carriage complete, pounds.....	33,082	30,644	22,928
Number of Loads after dismounting for transportation .....	4	2	2
Weight of Loads, pounds.....	Gun-load 10,837	Gun-load 19,687	Gun-load 13,117.5
	Chassis-load 10,660	Carriage-load 17,990	Carriage-load 14,109.5
	Carriage-load 8,750	.....	.....
	Platform-load 11,220	.....	.....

<sup>1</sup> High explosive shells of less weight are also used.

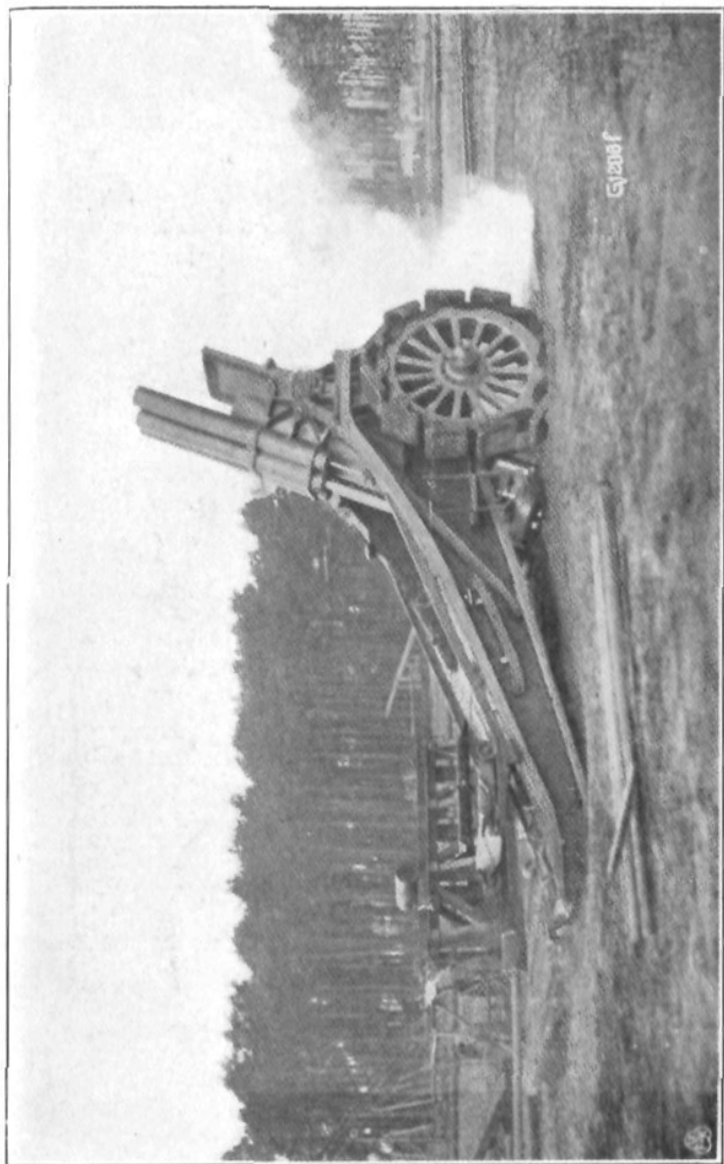
<sup>2</sup> Variable, according to weight of ammunition used.



*Reproduced through the courtesy of the New York Times.*

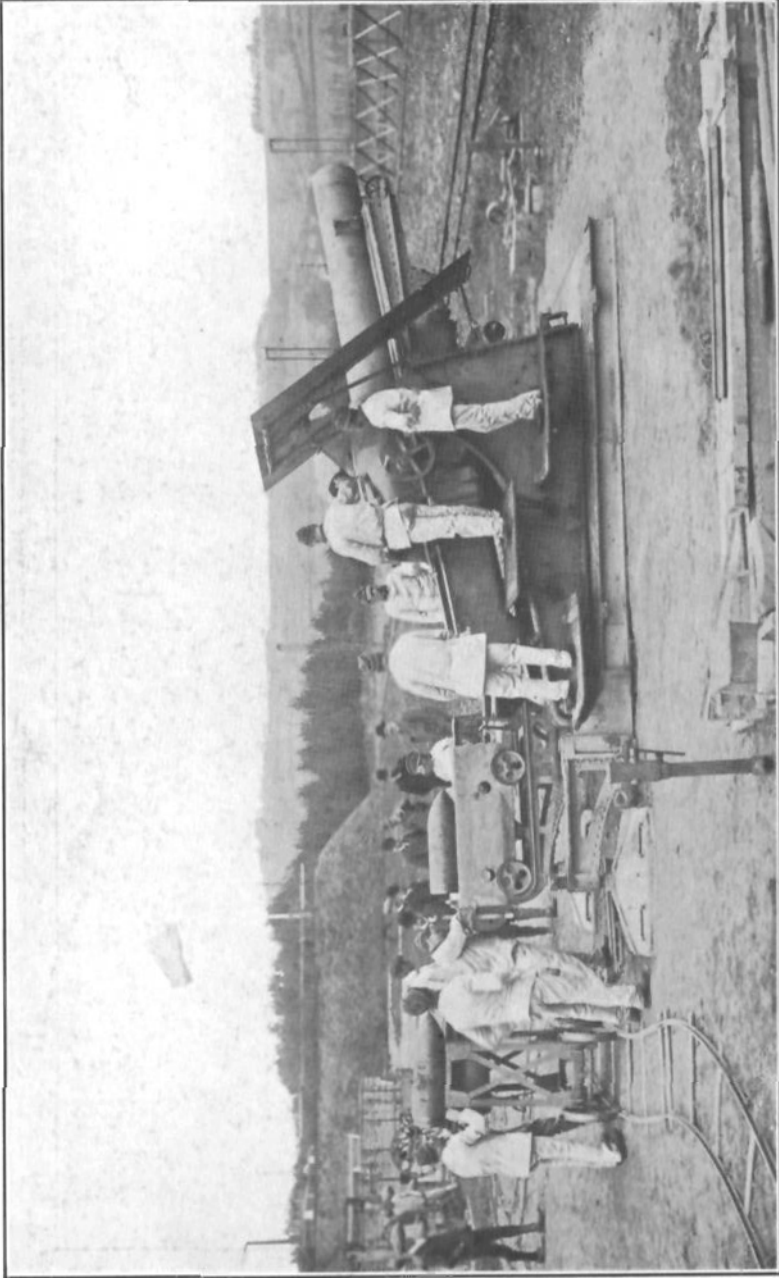
**KRUPP SIEGE HOWITZER, 11.023 INCHES (28 CENTIMETERS).**

This illustration has appeared in the public press with the title: "17-inch German Siege Gun." The 28-centimeter howitzer is the largest German siege howitzer of which there is any authentic record. This photograph appears in a

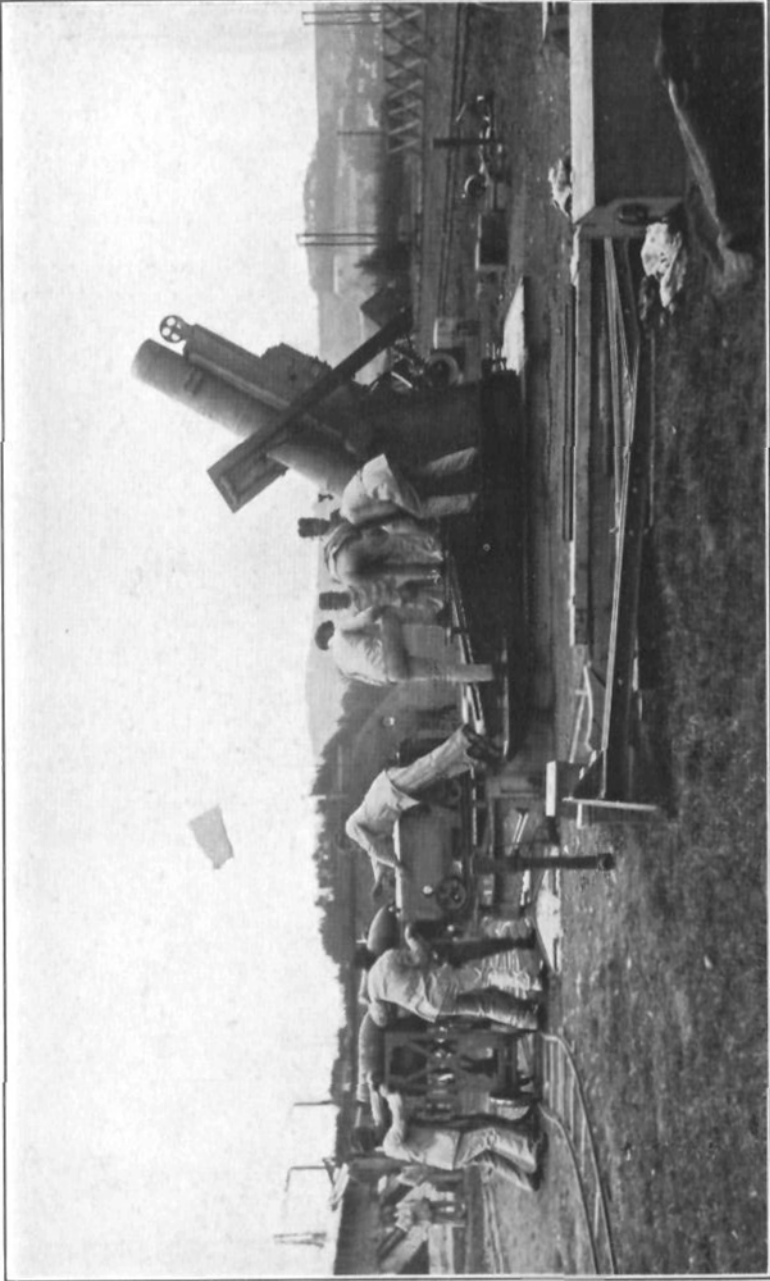


KRUPP SIEGE HOWITZER, 11.023 INCHES (28 CENTIMETERS).

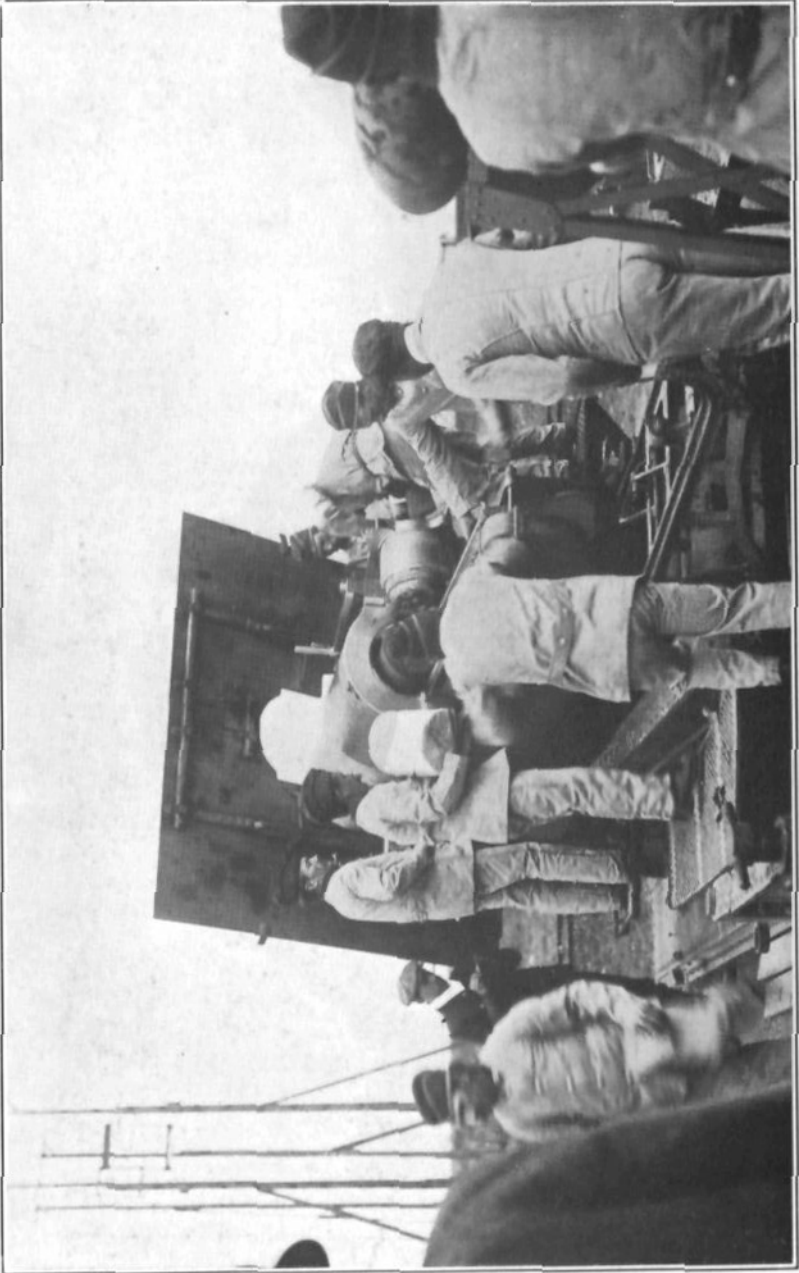
Taken at instant of firing, showing full recoil.



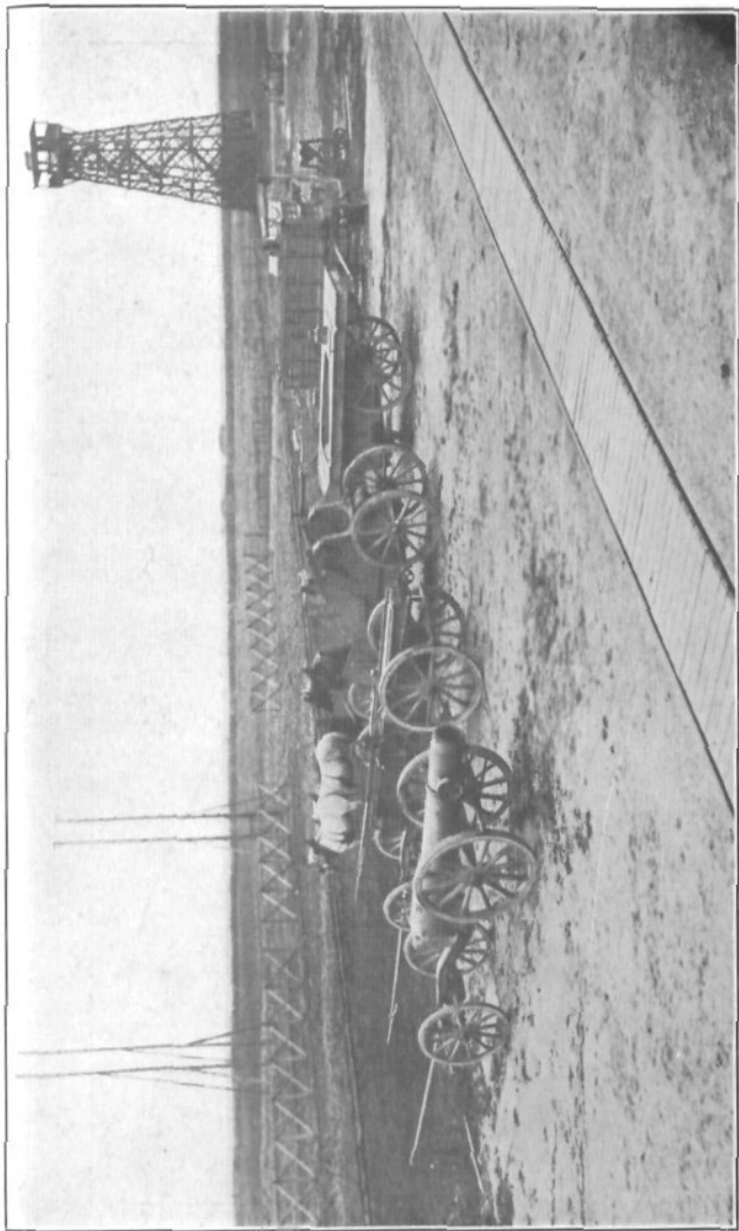
SCHNEIDER SIEGE MORTAR. 11.023 INCHES (28 CENTIMETERS).



SCHNEIDER SIEGE MORTAR.

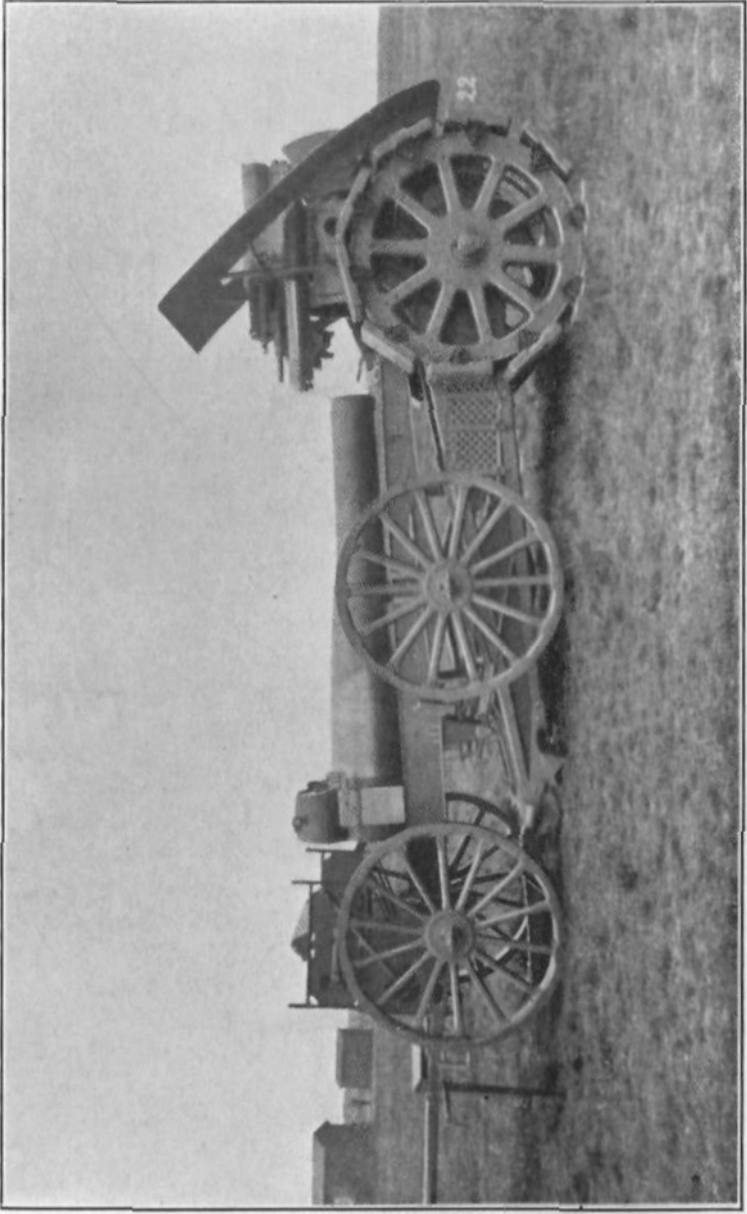


SCHNEIDER SIEGE MORTAR, SHOWING OPERATION OF LOADING.



**SCHNEIDER SIEGE MORTAR.**

Disassembled and prepared for road transportation in four loads. Time required to mount or dismount: 56 minutes.



EHRHARDT SIEGE MORTAR, 11.023 INCHES (28 CENTIMETERS).

Showing method of disassembling mortar from carriage and placing it on wagon for transportation.





## CONTEMPORANEOUS NOTES ON THE PROCUREMENT OF HAY AND OATS INCIDENT TO FRENCH MOBILIZATION.

AUGUST 19, 1914.

On August 11, 1914, the tenth day of mobilization, hay was called for from each supply district. A general order was issued based upon the provisions of the manual on this subject published in 1898 and revised in 1901. This manual set forth in great detail all the instructions for purchase, baling, and shipment of baled hay. The presidents of villages were given authority to call upon individuals for the amount of hay each one was expected to furnish. This manual also covered every step of the routine from the time war broke out to the moment the baled hay was shipped from the central receiving station. It prescribed the exact amount to be on hand for the first shipment, the supply for two days for such number of horses as the district was accountable for, the number of hay presses in the district, the number of men required to work each press, and the fact that the men designated for the hay presses must be members of the territorial reserve, that is, men over forty-two years of age. The dimensions and weight of bales were prescribed and the work of loading and delivery covered in detail. The duties of the station agent, the military officer of the Quartermaster Corps, the checker, and of all other persons connected with the railroad and concerned in the handling of the hay were carefully described. Even the construction of the hay press, its care and operation, and a list of spare parts were covered in the manual, and show the great particularity with which every possible contingency was covered.

All hay was procured by cash payment upon delivery; but all hay was also subject to the most rigid inspection as to quality.

Two villages about thirty kilometers from in opposite directions were the designated substations of this district and were numbered Sub-District 3 and 4, respectively. There was one press in Sub-District No. 3 and two in Sub-District No. 4.

On the 14th day of mobilization, Saturday, August 15, the military agent at ..... shipped out a train of 945 tons of hay consisting of ten cars each loaded with 9,000 kilos. On each succeeding day up to date the hay has continued to come in.

The exact manner of collecting the hay is as follows: The farmers of the district having been notified, a certain quantity of hay is put through the press. The carts then start for ..... at the same time, each cart drawn by one horse and loaded with about thirty-five bales at about 50 kilos each (3,850 pounds). Ten carts, requiring but ten horses and ten men, draw 17,500 kilos, or the contents of two cars each carrying about 9,000 kilos. The cars were loaded by the drivers of the carts. When one thinks of an escort wagon with four mules and a teamster who (at least before the days of the Quartermaster Corps) does not help load or unload, the difference makes one continue to think.

The time required to drive thirty kilometers was about seven hours; this was done under the best of weather conditions and over the best of French roads.

When the car was loaded it was covered with a paulin which exactly covered the load. All paulins were tarred and in the best of condition, and in this way the danger from sparks from the engine was carefully guarded against.

On the 18th day of mobilization, August 19, oats were called for. No manual covering the delivery and shipment of oats could be obtained; but undoubtedly one exists, as every detail was as carefully provided for as in the case of the hay.

Sacks are furnished by the state and are marked with the letters of the department and the number of the cantonment. Each sack contained 75 kilos. I saw between three and four hundred sacks received this morning at the freight depot. A commission of three members made up of the president of the commission of purchase of hay and oats, and two inspectors, all officers of the Territorial Reserve, and all over fifty-five years old, received the oats and most minutely inspected them, opening about every fifth sack. Sacks were not sewed up at both ends, as with us, but were simply tied with string. When they were packed in the car the men stood each sack carefully and methodically on end.

Freight cars were of two lengths, with floor space of 11.87 square meters and 18.56 square meters each. They were loaded with seventy and one hundred and twenty-five sacks, according to size. The load of the larger cars amounted to 9,375 kilos.

Each cart hauled twenty sacks, less than half the weight of hay carried on the same carts. Undoubtedly they could have doubled the load.

## SUB-CALIBER PRACTICE OF BATTERY B, THIRD FIELD ARTILLERY—1914.

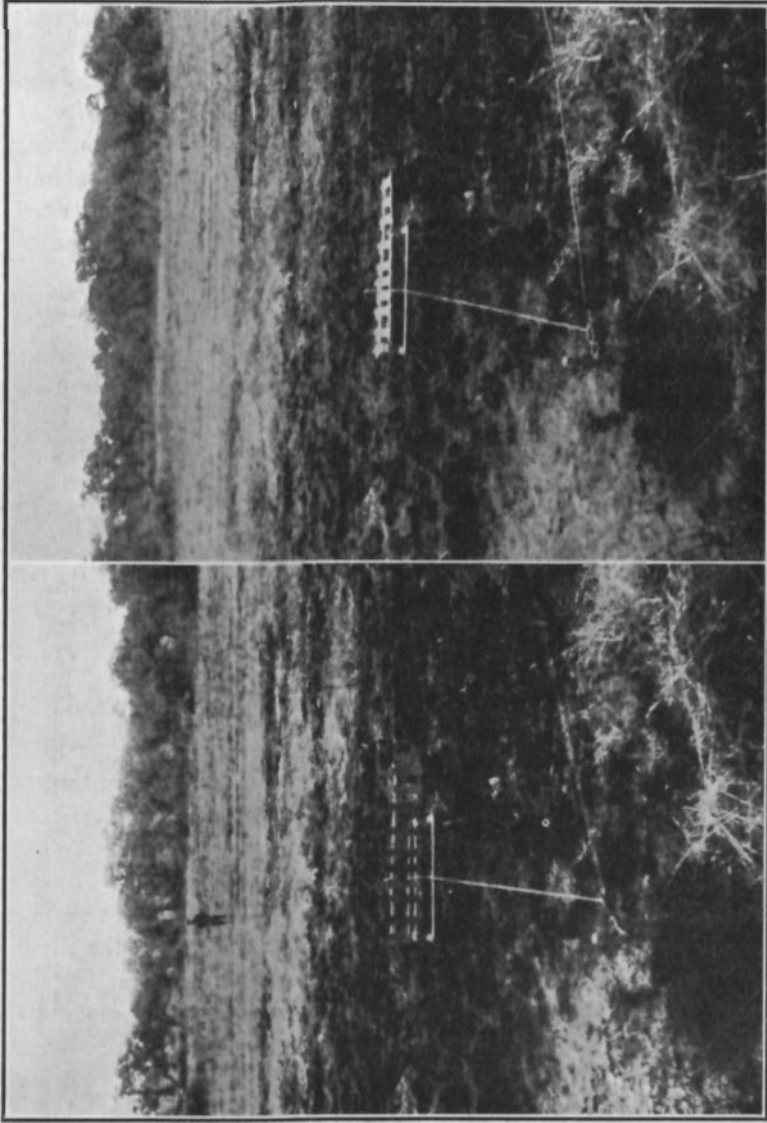
*The following extracts from the report of First Lieutenant John S. Hammond, 3rd Field Artillery, upon the sub-caliber practice of Battery B, 3rd Field Artillery, for the current season, illustrate the amount of valuable instruction which it is possible to obtain from this class of practice which is too often either totally neglected or else conducted in a perfunctory manner and with no adequate return for the ammunition expended.*

The value of sub-caliber practice is directly proportional to the similarity between sub-caliber targets and ranges and service targets and ranges and to the practicability of observing the impacts and acting upon the observed results.

The range which gave the most satisfactory results consisted of about two acres of ground in the form of a sector which was cleared of grass. The miniature targets were so placed that they could be seen from the firing point at the apex of the sector. The slope for some distance in front of the firing point was gradual, becoming more abrupt nearer the targets. A change in site elevation of about eight hundred yards could readily be observed. The soil was a white limestone formation which gave almost ideal white dust clouds about two feet in diameter for each impact.

The accompanying photographs show the various appearing, approaching, flank, staff, and miniature battery and infantry targets which were used. All moving targets were drawn by means of small windlasses, placed near the range officer so that the speed of the targets could be directly under his control at all times.

The problems for the morning were conducted as follows: The battery having moved out was met by a messenger from the range officer, whose duty it was to outline the tactical situation for the exercise. The messenger brought to the acting battery commander a written estimate of this situation and a panoramic sketch showing all targets visible from the firing point. The sketch showed the targets numbered from the left to right. A duplicate of the sketch was kept by the range officer. After the message was received, the position was scouted and occupied in conformity, as nearly as possible, to service conditions.



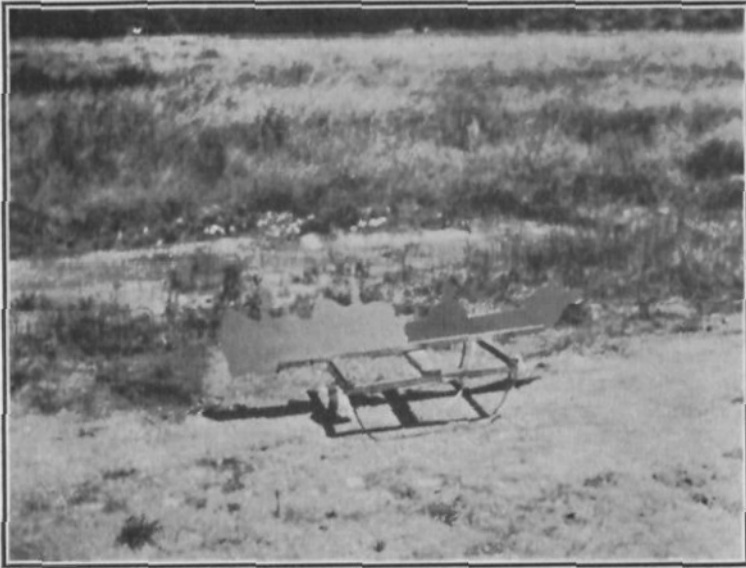
Appearing and disappearing infantry target. This target approached from the line of trees as a line of advancing skirmishers. Photograph was taken at a distance of fifteen feet



This photograph illustrates the visibility of the targets. It was taken at a distance of about fifteen feet. At 250 to 300 yards (sub-caliber range) the targets could be picked up only by the aid of field glasses.



The four artillery gun sections shown in this picture were spaced with four and a half foot intervals, which corresponds to twenty-yard-intervals between gun sections at mid-artillery ranges.



This photograph shows a flank artillery target. By the use of the windlass the target was moved at a rate corresponding to a trot or a gallop. In view of the large allowance of sub-caliber ammunition it is believed that sub-caliber practice at this target affords the best method of training gunners for direct fire.



This photograph shows the position of the guns for firing, with one foot interval between pieces. This formation gives a dispersion which corresponds to service conditions for mid-artillery ranges. The observation ladder was found useful in picking up difficult targets and in recording results of fire.

After the position had been occupied telephonic communication between the firing point and the range officer was established by the battery signalers. The range officer recorded overs and shorts throughout the firing. After the first problem the fire was shifted to other targets for the succeeding problems without change of position.

The officer designated as safety officer announced the Angle of Site for each problem, and the Angle of Site data announced by the officer conducting the fire was disregarded. This angle of site was taken anywhere between 235 and 280. It developed ranges on the range disc of between 1,700 and 2,800 yards. Quadrant elevation was, of course, used in both direct and indirect problems.

All officers fired five problems, the non-commissioned officers averaged slightly better than three problems apiece. Overs and shorts were taken by the range officer, dispersions and deflections were taken by the chief of the fifth section with the battery commander's telescope. All officers and non-commissioned officers not actually serving at the guns were required to observe and record in order that they could intelligently discuss the problems at the critique. All problems were put on blackboards and discussed at the after-supper critique as nearly as possible after the School of Fire method of holding such discussions.

In conclusion, it is believed that sub-caliber practice, with the present equipment, can be made of more value than has previously been the case. I went to this practice with the idea that our present sub-caliber equipment was practically useless and that one pounder tubes and sub-caliber equipment, such as is now used at the School of Fire, Fort Sill, was the only substitute for service practice worth considering. I returned with the firm conviction that unless four of these one pounder tubes are available for each battery and unless at least 1,000 rounds of this ammunition is allowed per battery that a great mistake would be made if the present sub-caliber equipment were to be discarded.

The sub-caliber range must be selected and prepared with care; it may be even necessary to plow in front and rear of the posit on where the targets are to be placed in order to get observable impacts. The practice can only be conducted at dry seasons. The present sub-caliber ammunition is defective. (A special report to this effect has been made to the Ordnance Department.) Despite

the above-mentioned disadvantages, the advantages of a practically unlimited amount of ammunition and the advantage of being able actually to show again and again the result of changes in deflection differences makes this practice, where conducted under even fairly favorable circumstances, the best method obtainable for instruction in handling the sheaf.





## FRENCH ARTILLERY.

### A PRACTICAL TEST OF THE 65 MM. MOUNTAIN GUN.

BY GEORGE NESTLER TRIOCHE, LATE LIEUTENANT, FRENCH FOOT ARTILLERY.

Strange as it seems, the mountain gun, caliber 65 mm., which has been used by the French for several years in Morocco, is comparatively little known in France and even among the forces operating in Africa. According to military authorities, this condition of things arises from the fact that there has been scarcely any time, so far, for testing the gun in regular target practice. No technical problems connected with this material have been studied to any profitable extent. It is, moreover, openly admitted that the instruction of the non-commissioned officers and cannoneers of these batteries has been somewhat neglected, because of the strenuous character of the field operations in Morocco. However, one cannot but wonder why technical tests and extensive target practice have not been made by the mountain batteries of the "Alpine groups" stationed in France, along the Italian frontier. Be it as it may, this mountain matériel appears to be still in an experimental phase. The official reports on the numerous skirmishes or battles in Morocco deal mostly with the operations at large; little mention is made, as a rule, of artillery work as far as technical details go. From the rather meager information imparted by these reports and private correspondence, we may gather, nevertheless, that the 65 mm. gun does not seem to deserve the criticism made from time to time by staunch supporters of the other French mountain guns—the 75 mm., and the old 80 mm. Three objections were raised against the present material: First, its machinery is too delicate; second, its projectiles are lacking in power; third, its range is too small.

The first two objections are easily disposed of. During the operations in Africa, there has been no complaint about the working of any part of the gun, in spite of trying climatic conditions, and especially of the desert's dust. The projectiles have been satisfactory. It must be remembered that African fighting differs from continental operations. The *objective* consists, as a rule, of thin firing lines of unmounted or mounted troops, of poorly built walls, of garden hedges, etc. The 65 mm. shell has always been efficient

against that kind of targets. Therefore, the gun answers its purpose, especially since in European mountain warfare it would not be expected to perform the heavier work of the ordinary field gun. As regards the range, it is true that the 65 mm. cannot compete with the 75 mm. mountain gun. It is generally admitted that with the 65 mm. gun one should not expect good results above 400 meters (about 4,374 yards). Yet the sight is graduated up to 5,500 meters (about 6,013 yards); and, in several instances—particularly last June against the Ahl-El-Oued tribe—firing at even greater range was very successful. In that case, the sight proper is disregarded, and the angle of site is modified at a guess. Of course, at such distances, only high explosive shells are used. On June 16th, a battery fired at 5,700 and even 5,800 meters (over 6,340 yards), and put to flight some Arabs who were entrenched behind a wall.

Therefore, it may be safely asserted that the 65 mm. mountain gun is sufficient for mountain warfare. As the projectiles are small, the battery is able to carry more rounds of ammunition than the 75-caliber battery. As for the old 80 mm., its only advantages were its durability and simplicity. The range was too small, and did not exceed 2,000 meters (2,186 yards). In short, the 65 mm. is fulfilling the expectations of its inventor, and it is not likely that the Technical Commission of Artillery in Paris will advocate a return to a larger caliber.

We may add that the use of the Barr and Stroud range finder is spreading rapidly among the batteries fighting in Morocco and has been a great help to battery commanders, especially during the operations under Generals Baumgarten and Gouraud in the Riata region.

# FIRST IMPRESSIONS OF THE NEW FIELD ARTILLERY MATÉRIEL, MODEL 1911.

FROM THE RIVISTA MILITARE ITALIANA, MAY 16, 1913.

*Translated by Major Herbert Deakyne, Corps of Engineers, February, 1914.*

TRANSLATOR'S NOTE: The most important features of this article appear to be the discussion of the large horizontal and vertical sectors of fire, with the resulting advantages of being able to fire from any kind of ground or from cover, and to use curved fire with reduced charges; the necessity of instruction to secure full advantage of the improved matériel; the need of improved means of observation and control of fire; the importance of reliable and accurate action of fuses; the reduction of the number of pieces in a battery to four; and the use of the new gun against dirigibles. The brevity of the paper prevents the discussion of any of these subjects at length, but the points raised are valuable as suggestions for study.

After a first brief glance at the new matériel adopted for our Field Artillery, model 1911, Deport system, the observer is quickly and firmly convinced that its choice constitutes an important and intelligent decision on the part of the competent authorities.

To face the tactical and logistic inconveniences of a double type of armament (if not of ammunition), to face the expense of new patents, to lose the time necessary to prepare in Italy for the construction of new matériel, without reaching the result of having a gun that should represent a notable and decided advance over the present excellent Krupp matériel in service (which would have happened by adopting one of the other systems presented to the board), would have constituted an undeniable mistake.

Instead, the matériel chosen really shows a decided step in advance in the technical construction of artillery matériel, as is shown in several very important and characteristic new qualities pertaining to the employment of the arm.

These qualities are essentially the following:

(a) Absolute, complete and effective independence of the piece, and also of the battery, with respect to the conformation of the ground on which it is placed.

(b) Large sectors of horizontal fire.

(c) Large sectors of vertical fire.

(d) Rapidity of fire, resulting from the first two characteristics, from the perfection of aiming mechanism (line of sight practically independent), and from the real and immediate stability of the pieces in battery.

This rapidity of fire is shown, in practice on targets of varying

character and distance, to be greatly superior to that of other kinds of matériel tested to deformation.

Now we may be permitted to express from this point some of the first considerations suggested by a study and analysis of these general characteristics.

The possibility of firing from any ground whatever is given to the matériel, model 1911, by the fact that the piece rests on a solid and ample quadrangular base (the two wheels and the two spades of the divided trail), of which the sides are completely independent.

Such an advantage is increased by the fact that the ample sectors of vertical fire allow the battery to fire from a covered position behind obstacles which the other systems would not be able to overcome with the trajectories permitted by their maximum angles of elevation.

Moreover, this is combined with the characteristic of ample sectors of horizontal fire, by reason of which it results that with a small mechanical movement the fire of each piece can be moved along a hostile front equal to the range; that is to say, at medium and normal distances of battle the gun dominates from its initial position, whatever that may be, the whole battlefield within its range, and can swing its fire on any point whatever of this in a moment and without change of position.

The artillery is, therefore, rendered completely independent of the ground. The great problem of the choice of a position, from the standpoint of the necessity of its use and of the technique of fire, has almost ceased to exist. Any locality whatever accessible to the weight of the carriage is an artillery position. But on the other hand, the great relative weight of the piece and carriage compared to that of the piece alone is less to be regretted, since the occasions for choosing positions difficult of access not only will not present themselves, but it will be even necessary to avoid them, and the difficulty of maneuvering the piece by hand on uneven ground is avoided by the construction.

The old dilemma, power or mobility, has found its solution in elements foreign to the terms on which we have previously based it. The independence of the artillery with respect to the ground, the resulting possibility of executing fire from any locality whatever, the placing of batteries in any disposition and the distribution of

fire securely and effectively from such localities over the whole front of the battlefield, should quiet our apprehensions and make us feel gratified that the mobility of the new artillery is essentially understood in its logistic aspects, permitting virtually the maximum limits obtainable with the ammunition.

We have, therefore, obtained great results in the adoption of this new type of artillery matériel; but we maintain that such results will be destined to remain largely fruitless if they are not completed with proper provisions for instruction and organization.

The first technical problem that we consider should be energetically forced is that of automatic fuse gradulators. It is a fact already known and recognized by all that the gradulators now in use for timed fire do not meet the requirements of the matériel, model 1911; they will not suit, because when used by troops in the haste of rapid fire, they will not graduate the fuse exactly and securely. It is, therefore, necessary to look this fact squarely in the face; it is perfectly useless to introduce into the service guns capable, at the time of need, of covering the targets in a few moments with numerous timed projectiles, if the gradulators are not such as to assure the uniformly effective burst of the said projectiles. Nor is the problem to be considered difficult of solution for our experts. We believe, however, that the present grave deficiency is due to not having attributed proper importance to the question and not having met it with a deliberate purpose to solve it.

Another question upon which it seems to us all the attention of the experts should be drawn is that of means of control and of observation for field artillery. We have already indicated above that one of the most important characteristics of the new matériel is that of having almost abolished the problem of the search for positions and of having permitted the batteries to be located anywhere. Now it would be an anachronism if, for reasons foreign to the quality of the matériel, the batteries should be placed in the position of not being able to make use of this new and important characteristic on account of the deficiency in accessory means given to them, and on account of the resulting necessity in which they will find themselves of seeking positions where it will be possible to keep them under direct command, and where not only fire but

also observation will be possible. The only means of avoiding such an anachronism is to render at once independent and controlled all the elements relating to the execution of the fire and those relating to command and observation; that is, to give the batteries all the means recognized as necessary for the establishment of observing stations and for the connection of these to the pieces. We hold, therefore, that when the distribution of the new matériel is undertaken, it is indispensable, if the said matériel is to have complete success, that there should be a simultaneous distribution of the observation wagons furnished with all the means and all the tools recognized as indispensable by modern science.

Another question of a technical character which seems to us worthy of great consideration and solution, in order that the step taken by us may be really a giant's step, is that relating to the execution of curved fire. The guns of model 1911 permit the execution of fire with an angle of fire up to about 65 degrees; of this angle, the part up to 38 degrees is utilized for the execution of horizontal fire, up to a maximum range of 3500 meters; a few more degrees may be considered useful in the case of high angles of site, due either to great super-elevation of the target or to proximity of the batteries to the target on occasions (in the future rather frequent) when the batteries accompany closely the infantry in the assault of an elevated position.<sup>1</sup> But aside from this, several other degrees of the angle of fire would remain entirely useless, and it would be a great mistake if we should not also solve the problem relative to the simple and rapid use of reduced charges, which permit curved fire.

It is said that in France this question is an object of study and that good results have already been reached there; and it is to be hoped that in Italy this important problem will be met with force and energy, seeking to solve it before the distribution of the new matériel, so that it will not be necessary later on to introduce changes in the matériel or its employment. In this way, we see that we can add to our new matériel for field artillery a new characteristic, upon the importance of which, in regard to its field use, it is necessary to insist.

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<sup>1</sup>This is also to be considered a notable quality of the new matériel; with the previous matériel, the batteries were not allowed to approach close to an elevated hostile position, beyond certain limits, on account of the impossibility of executing their fire because of a deficiency in the sector of vertical fire.

The matériel, model 1911, cannot be called complicated or delicate, but it is certainly very complex technically.

The parts of the gun mechanism, the instruments of precision which regulate its operation, and the methods of fire are all complex; the problems that require a prompt and exact solution to obtain good use of the fire are numerous and varied; and even more numerous and varied would these problems become if a definite solution had to be given to the technical questions which we have emphasized above. Taking it altogether, the new matériel, in order to give all the great results of which it is capable, requires in those who use it a technical culture, a skill and a readiness of intelligence, and a combination of unusual qualities superior to those that were formerly necessary.

The problem for the Captain of Artillery is, therefore, increased enormously as regards his professional training.

In Russia the batteries are commanded by Lieutenant Colonels or Colonels, the groups of batteries by Major Generals; far be it from us to ask such a solution for our artillery, because we do not hold that competence results from grade, nor do we wish to be blamed for getting ahead of the times. We simply hold it necessary to make preparation of a practical character: namely, that at the time when the new matériel is distributed and in expectation of the entrance into office of the officials who will organize a special course in the recruiting school with the new matériel, the commanders of batteries should receive a special and thorough technical instruction either at the Central School of Fire at Nettuno<sup>1</sup> or by other means that may be considered suitable. If we do not do this, I fear that we shall find ourselves forced to pass through a long period of transition, during which, after having furnished half of our artillery with matériel far superior to that of other powers, we shall not be fortunate enough to reap the benefits of its characteristic qualities because of the deficiency of the personnel charged with using it.

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<sup>1</sup>It seems to us that in the next few years the Central School of Fire at Nettuno (for the Field Artillery it really would be better Bracciano) should enter upon a period of great activity, becoming the training school to which the battery commander should be sent for technical study of the matériel and of fire, with a unity of management, of method and of purpose.

As to this subject it may be permitted to ask: Why not indeed establish at Nettuno a permanently organized division, composed of batteries armed with the new matériel, fit to become an instrument of effective training for the officers of the Army?

We are spending fifty millions (lire) for the construction of the new batteries. Let us spend one million for ammunition, for special courses, for exceptional preparations intended to insure quickly that the new and difficult machine shall be usefully and fully employed in training those who are to use it.

The recent glorious campaign of the war in Libya has furnished an excellent field of experience to a moderate number of our artillery officers, who in large part have found in the said daily experiences of the war the means of training and perfecting themselves in the use of the matériel then in service. But everyone sees how, especially facing a campaign in another theater, it will not be only useful but indispensable to have the battery commanders able from the very beginning to use most effectively the means that are placed in their hands; and every one sees how all this constitutes an absolute duty and an unavoidable necessity at a time when we are introducing into service a new matériel, of which the technical employment presents notably greater difficulties.

And together with the question of personnel, it seems to us that an old and important organic problem calls now more insistently to be solved, and that is the question of the constitution of batteries with four pieces. Such a transformation is particularly required as a consequence of what we have already considered, in view of the greater difficulties which surround the duty of the battery commander and make it desirable to reduce the size of the mass that is under his control.

But aside from this, it is to be considered and maintained that in the future, either from the greater ease with which the batteries can find means of firing usefully in all the various phases of combat, or by the greater insistence with which the immediate support of the artillery will be demanded by the infantry during all the development of their attack, as has been demonstrated in Libya, or by the great use that is made on the battlefield of hasty fortification, or by the natural tendency to the consumption of ammunition resulting from the fact of having in hand a rapid-fire gun, the supply of projectiles in the immediate presence of the batteries should be increased. Now the only way not to render absolutely monstrous the mass of carriages under the control of the Captain is to reduce the number of pieces to four and increase the number of caissons.

To the problems which seem to be raised by the adoption of the



matériel, model 1911, we consider it may be useful to add one of our impressions in regard to fire against dirigibles.

It is noted how this important question already occupies the technical and tactical experts, and how numerous have been the recent attempts to solve it; attempts founded on the search for a special gun, capable of high angles of elevation, of horizontal sectors of fire of 330 degrees, or rapid fire, and of other very special characteristics in the system of aiming and in the means of rapid transport from one point to another on the field of action, in which the flying craft may present themselves.

We may state modestly that it seems to us that such solutions, especially regarding the principle upon which they were founded, possess little practicability, and this seems especially so after having seen the matériel, model 1911, in action.

Before all, it is to be observed that aside from the practical difficulties of the execution of the proper fire of these guns against their natural targets, they can not be so numerous and, therefore, so densely and uniformly distributed over the battlefield, as to guarantee that the units of the numerous modern aerial fleets can be certainly sighted and brought under aim in time to prevent their passage; but especially will it never be possible for them to be numerous enough to permit a fire so densely distributed as to assure its efficiency against the swift and agile targets.

Moreover, it does not seem to us practicable that complete sectors of 360 degrees can be utilized by guns situated in any point of the firing line or of the reserves of numerous modern forces; since, with the exception of the zone that extends directly in front of the firing line toward the prominent points of the enemy, it will always be dangerous or even impossible to fire for fear of striking either the other troops or the supply services of our own army.

The true solution of the problem seems to us that of a field artillery armed with cannon of the Deport type. With a line of numerous batteries densely distributed over the whole front, such as the field batteries normally assigned to troops, it will always be possible to create in space a barrier of bursting shrapnel impossible to cross.

We hold, therefore, that with the adoption of our new field matériel we have solved clearly and in the most practical manner the problem of the struggle against aerial means of offense and reconnaissance, at least as far as dirigibles are concerned.

PERELLI IPPOLITE, Captain, Staff.



## HORSES FOR THE FIELD ARTILLERY OF THE ORGANIZED MILITIA.

It is obvious that a mounted organization is mounted in name only if no horses are provided continuously through the year for drill and instruction, and that it is unjust to compare the efficiency in mounted work of such an organization with that of others for which horses, stables and a riding hall have been provided. No battery commander in the regular army would willingly consent to have the efficiency of his battery as a mounted command reported upon if for several months or years previous to the inspection he had no opportunity for training men and horses. And yet this is just the unfair condition which is annually forced upon many officers of field artillery of the Organized Militia.

The federal government can properly have but one standard for the inspection of the organized militia—efficiency for field service. Militia batteries are inspected annually in the field by officers of the regular army, whose duty it is to report upon saddling, fitting of harness, riding, driving, maneuvering, stable management, grooming, and all of the many other details which concern the efficiency of a battery of field artillery as a mounted command. They have no authority to lower the standard of efficiency or to make allowances for unfavorable local conditions or lack of local support. As a result of this system, batteries which receive little or no mounted instruction except at the annual encampment are necessarily judged by the same standard as other batteries which have had more or less adequate opportunities for mounted training throughout the year. Great credit is due the many field artillery officers of the organized militia who for years have worked patiently under such disheartening conditions.

Under existing laws the number of horses provided for instruction and the facilities for their care and use are solely matters involving local support, either state, civic, organizational, or individual; for although federal funds for the support of the organized militia are allotted to each state under the provisions of Section 1661, Revised Statutes, these funds are not sufficient to provide for the purchase and maintenance of an adequate number of field artillery horses. It thus appears that the federal government looks upon the organized militia as a federal asset, but leaves the question

of the mounted efficiency of the militia field artillery dependent upon local conditions over which it has no control.

State support is often difficult to obtain because many states consider their militia first from the viewpoint of a local force in which field artillery has but little local value and in the support of which the same amount of money required to provide and maintain horses for a field artillery organization would entirely support several infantry organizations. Civic support has frequently been extended most liberally; and in some states, the cities and not the states may justly take the credit for the relative efficiency of their local batteries; but civic support is from its very nature entirely local and very variable. Organizational and individual support both depend upon the financial ability and the generosity of the officers and men concerned and involve a greater personal sacrifice than any government should rightfully demand of an individual in time of peace.

It would seem just that if the federal government demands equal efficiency from all batteries it should provide for all the necessary means for attaining this state of efficiency. It is true that equal efficiency will not result from equal opportunity alone; for the efficiency of a military organization depends largely upon the character, ability and industry of its officers and non-commissioned officers. These qualities are variable because they are human factors and cannot be provided for by any law or regulation; but equal facilities for the progress of efficiency which depends upon them should be provided for every organization independent of local conditions or local support.

It is for these reasons that the officers of the militia field artillery have for several years been convinced that some federal provision for the forage and care of artillery horses must be made which would justify the state authorities in purchasing such horses from the funds allotted under Section 1661 of the Revised Statutes. They believe that in this way only can their branch of the service continue the progress toward efficiency which has already been begun but which has varied so greatly from state to state and has depended in some cases almost entirely upon the amount of local support provided for it.

In this view, they have had for some time the support of the War Department, but they have had difficulty in obtaining the

support of the organized militia as a whole. Pursuant to the authority vested in the Executive Committee of the National Guard Association of the United States at the Buffalo convention in 1911, the chairman appointed a committee to formulate a definite plan for the maintenance, training and tactical instruction of the field artillery of the organized militia and to confer with the Secretary of War and the Division of Militia Affairs. The committee, consisting of Colonel George C. Lambert of Minnesota, chairman; Major Roy C. Vandercook of Michigan, and Major John H. Sherburne of Massachusetts, met in Washington December 18-19, 1913, with Major William J. Snow of the Division of Militia Affairs. The committee also conferred with the Chief, Division of Militia Affairs, the Chief of Staff, and the Secretary of War.

The committee came to the unanimous conclusion that for the proper maintenance, recruiting and instruction of the existing units of field artillery of the organized militia at least a small nucleus of suitable horses must be acquired. For that purpose, federal provision should be made for forage as well as for the proper care of the animals to be provided for these organizations. A draft of the proposed legislation in the form of a separate bill was prepared by the committee and approved in a general way by the Chief, Division of Militia Affairs, and by the Chief of Staff. It was then presented to the Secretary of War, who suggested that the matter be formally considered by the Division of Militia Affairs and the general staff as to policy, and referred to the Judge Advocate General as to form, in order that, when approved, the provisions of the bill might be included in the next estimates and incorporated in the Army Appropriation bill to be considered at the next session of Congress.

The conclusions of the committee were submitted to the National Guard Association of the United States at the Boston convention, held September 14-15, 1914, and were approved in the following language:

"For the proper training of field artillery, a small nucleus of suitable draft horses is essential. The expense of foraging and caring for the same, as well as the care and upkeep of the matériel, should be met by specific federal appropriations, and the Secretary of War is requested to make provisions therefor in his estimates."

Acting upon the suggestion of the Secretary of War, the provisions

of the separate bill as originally drafted have been condensed in order that they may be more conveniently embodied in the estimates for the coming year, and have been submitted for the formal approval of the Chief, Division of Militia Affairs, the Chief of Staff, the Judge Advocate General and the Secretary of War.

The text of the proposed provision of the Army Appropriation act of next year is as follows:

"For the purchase and issue of forage, bedding, shoeing, and veterinary supplies for field artillery horses of the Organized Militia, that may be owned or acquired by, or issued to any State or Territory, or the District of Columbia, or an individual, a battery, a battalion, or regimental headquarters, and for the compensation of competent help for the care of the matériel, animals, and equipment thereof, under such regulations as the Secretary of War may prescribe, Two hundred thousand dollars; *Provided*, That for the purpose of this section the total number of horses shall not exceed 32 to any one battery, or four to each battalion or regimental headquarters, and that such horses shall be used exclusively for field artillery purposes, and *Provided further*. That the men to be so compensated, not to exceed five for each battery, shall be duly enlisted therein and shall be detailed by the battery commander under such regulations as the Secretary of War may prescribe, and shall be paid by the United States disbursing officer in each State provided for in the act of January twenty-first, nineteen hundred and three, entitled 'An Act to promote the efficiency of the Militia and for other purposes,' as amended; and *Provided further*. That the funds appropriated by Section sixteen hundred and sixty-one, Revised Statutes, and by the act entitled, 'An Act to promote the efficiency of the Militia and for other purposes,' approved May twenty-seventh, nineteen hundred and eight, as amended, shall be available for the purchase, under such regulations as the Secretary of War may prescribe, of horses conforming to the regular army standards, said horses to remain the property of the United States and to be for the sole continuous use of the field artillery of the Organized Militia, and *Provided further*. That the Secretary of War may, under the provisions of this Act, and such regulations as he may prescribe, issue to the field artillery organizations hereinbefore mentioned and without cost to the State, condemned army horses which are no longer fit for the service but may still be suitable for purposes of instruction, the same to be sold as now provided by law when the latter purpose has been served."

It is to be noted that all the provisions of the legislation proposed are to be carried out under such regulations as the Secretary of

War may prescribe, and in this way, provide that the Division of Militia Affairs shall have the supervision of all the expenditures and purchases made under the law in question. This restriction will insure that no horses, forage, or care are provided except for organizations which have or can maintain suitable facilities for their use; and that the care and utilization of the horses will be subject to the inspection of officers of the regular army. It is interesting to see that it is not proposed to provide horses from a specific federal appropriation and that only forage and care are to be so provided. The horses themselves must be purchased from funds allotted to the states under Section 1661, Revised Statutes. In this way the duty of taking the initiative in providing adequate support of their field artillery still remains with the Adjutants General of the states concerned, the specific federal appropriation being only for the maintenance which has before proven to be an intolerable burden. The provision whereby condemned army horses which are still suitable for purposes of instruction may be issued to a state for the use of the field artillery of the organized militia is one which will meet with the instant approval of both the regular army and the militia and will provide an honorable and useful old age for many an honest artillery horse who has endeared himself to the officers and men of his battery but who, without some such provision as the one in question, would necessarily be sold on account of old age and thus pass into unknown hands and possibly be worked to death. No more suitable horses for drill or instruction could possibly be found; and their unfitness for hard field service will have no bearing upon their suitability for the use to which it is proposed to put them.

Wise legislation to increase the efficiency of the organized militia increases the military assets of the nation. We are just beginning to realize that, under our existing laws, the country must in time of need depend upon a combined force of regular and militia field artillery, and that whatever measure benefits one service benefits the other. It is believed that this proposed legislation, if approved, will not only increase the efficiency of the existing militia field artillery units but will also make possible the formation of some of the new units which are so urgently needed, if the country is to be provided with an adequate force of field artillery for use in a national crisis. For this reason it merits the support of every patriotic officer of the regular army and of the organized militia.

## SUB-CALIBER PRACTICE WITH VISIBLE BURSTS.

BY LIEUTENANT FRANCIS T. COLBY, 2ND FIELD ARTILLERY, N. G. N. Y.

For some time the problem of instructing the firing batteries of the organized militia with a form of sub-caliber matériel designed to allow the personnel to see graphically the effect of various changes in firing data has perplexed militia officers who are forced to drill at night in indoor armories.

The .30-caliber sub-caliber cartridge issued does not answer the conditions satisfactorily, although large landscape targets are provided at a range of about one hundred yards in the larger armories. This cartridge is unsatisfactory for several reasons. In the first place every shot has to be spotted, that is to say, a man previously concealed in a safe place at one side of the ring has to walk out to the target, find the bullet hole and point it out. If another officer conducting the fire has made a considerable, and possibly an incorrect change in the firing data in order to fire upon a new part of the landscape thus causing a change of some twenty yards on the target, or if the data is incorrectly taken at the guns, the spotter may take much time in finding the shot. This results in loss of valuable drill time, which is at best all too short, and, moreover, slows down the gun squads to a point where all interest in speed is lost. The officer firing must give his data so slowly and with so many breaks that he gets little practice for service firing. Furthermore, the present sub-caliber cartridge when fired indoors is very dangerous; for it is easy for a green gun squad to get off the target in spite of safety officers, and I have seen at least one shot fired too close to the spotter. Again the power of this ammunition is much too great for indoor purposes and the cost is excessive.

We have tried somewhat to reduce the necessity for spotting by the use of small targets made of plaster-of-Paris which break upon being struck, but these of course give no indication of the shots which do not strike them.

What is needed for militia use is a sub-caliber cartridge of the weight of the service cartridge with a fuse on the nose or muzzle, firing a small cheap cartridge of very low velocity, the bullets so constructed as to give a clear flash and puff of smoke on normal impact. With four of these per gun the benefits of standing

gun drill and sub-caliber practice could be combined for the men, and those of blackboard firing and smoke bomb practice for the officers, greatly to the advantage and interest of all concerned.

It is to be hoped that such an addition to material will soon be issued to the organized militia. In the meantime it is neither difficult nor expensive to make a very satisfactory substitute for such sub-caliber tubes. The new .22-caliber "Spotlight" cartridge, manufactured by the Winchester Repeating Arms Company, give a very nearly ideal caliber and load if bursts on normal impact only are required. The remainder of the material parts necessary are all made by our Ordnance Department and may be purchased. They are simply the .22-caliber barrel used on the practice rifles issued to troops armed with the United States magazine rifle, the cartridge holder used with this rifle and the empty three inch cartridge case. A skilful battery mechanic can do the rest. He first turns an oak cylinder to the exact size of the three-inch chamber and extending somewhat beyond the chamber into the bore and binding strongly on the bands. He next fits this cylinder into the cartridge case, reams out the primer seat to the size of the base of the .22-caliber barrel, and bores through the oak from base to nose in the exact center, thus prolonging the center of the bore. He then splits the wood with a fine saw on the center of the hole from nose to base, makes the necessary slots and enlarges each half of the hole to the proper dimensions to take the .22-caliber barrel. He has then only to insert the barrel, screw the two oak halves together, seat and fasten them in the empty cartridge case and the sub-caliber tube is complete. Of course with the proper facilities and dies of the same pitch and size as those used in threading the .30-caliber barrel supplied in the sub-caliber cartridge issued, a good mechanic could make the .22-caliber barrels interchangeable with the .30-caliber barrels. Considerable mechanical difficulty would arise, however, and the use of the three inch empty case and a wooden container for the barrel is more simple.

Mechanic Bayer, of Battery E, 2nd Field Artillery, National Guard, New York, under my direction has made four of these tubes which have been very serviceable and satisfactory, so much so in fact that Colonel Wingate has adopted them for the regiment. The cost of these four tubes, including fifty .22-caliber



cartridge holders and four .22-caliber cleaning rods, but not including four three inch cartridge cases, and the value of labor was \$22.34. The cost of the .22-caliber ammunition is twenty-five cents per hundred.

The .22-caliber "Spotlight" bullet on striking a steel or iron target 1-16 inch thick (stone or surfaces of at least equal resistance are also serviceable) gives a bright flash clearly visible in an electrically lighted ring and also gives a puff of smoke in daylight. I have not determined at what range these results cease.

In purchasing the .22-caliber barrels a request should be made that the receivers be removed, for the barrels are finish-chambered after the receivers have been attached and are not usually supplied without receivers. The front sight fixed stud and the fixed base are also attached to the barrel. These, however, add little to the cost and keep the barrel from "creeping" in the sub-caliber cartridge.

The question of an extractor upon the rimless head of the cartridge holder gave trouble for some time, but in practice it was found that the space given by the cartridge ramp is enough for a man's fingers, or better for a small metal hook, and that in consequence an extractor is unnecessary.

The question of ruptured primers and broken firing pins is entirely eliminated by the metal .22-caliber cartridge holder as issued, for the firing pin does not come in contact with the primer. In consequence less trouble has been experienced with the .30-caliber tubes as issued. The .22-caliber cartridge of course gives very little residue after discharge and the difference in the soiling of the bore of the three inch gun after practice with the .22-caliber as compared with the .30-caliber cartridge is very considerable. The cost of the .22-caliber ammunition is roughly fourteen times less than the .30-caliber.

The target is the one expensive element of the equipment. It should be of 1-8 or 1-16 inch sheet iron or steel and as large as possible—say 40 yards by 5 yards. A brick or stone wall may be substituted but the results are not as satisfactory.

By means of the sub-caliber device thus outlined, this form of target practice becomes not only profitable for both officers and men of militia batteries, but also is an excellent means of increasing their interest in their work.

## EVOLUTION OF IDEAS IN THE METHOD OF PREPARING ARTILLERY FOR BATTLE.

BY COLONEL AUBRAT.

*Translated from the "Journal des Sciences Militaires," beginning January 1, 1914, by  
1st Lieut. N. Pendleton Rogers, Jr., Coast Artillery Corps.*

(CONTINUED FROM APRIL-JUNE NUMBER.)

### ACCOUNT OF THE EXERCISES HELD BY GENERAL LANGLOIS UPON THE COMPLETION OF THE TARGET PRACTICE.

The General listened while the major instructor gave out the problem and furnished information concerning the development of the exercise. As soon as he grasped the situation, the General left the other officers, who noticed that he then made a survey of the ground outside of the field of fire and then returned to the batteries.

As soon as the exercises were over and the major instructor had made his criticisms, the General called around him the officers of the Staff College. We at once attached ourselves to this group. The General told the officers to look over the ground, first in the direction of the village of La Cadoue, in a direction at right angles to the axis of the field of fire, and then to the rear. In front of them, the officers saw that the ground fell gradually to the village, a distance of about 2000 meters, and then again rose gradually. The ridge forming the horizon appeared to be about 3000 or 3500 meters away. Just below the crest of this ridge could be seen a highroad, bordered with rows of trees. At the edge of the field of fire, at a distance of about 500 meters, were noticed various kinds of cover, walls, hedges, woods, etc. Above and beyond the trees could be seen the steeple of Arnay. To the rear, the officers saw that the ground rose gradually up to the crest of the ridge forming the watershed between the valley of the Boivre and the ground drained by the stream passing La Cadoue.

After the officers had thoroughly examined the ground the General put the following question to them:

"Assume the following situation: An advance guard composed of a regiment of infantry and a battalion of artillery has come into contact with the enemy at this place. The artillery is in the valley

of the Boivre behind the ridge in our rear. The two lines of infantry are engaged. The enemy's line is along the edge of the village of La Cadoue. On our side the first battalion is already partially deployed. Our skirmishers have reached a point abreast of the edge of the woods where they appear to be held. Shells are bursting over the parts of the second battalion as soon as they clear the crest in rear. The flashes corresponding to these shells are seen on the horizon. The commander of the advance guard wishes to attack the enemy and drive him out of the village. He therefore orders the commander of the artillery to support the attack which will be made by the second battalion, reenforced if necessary by the third. The attack is to be made up the depression to the left of the woods. In order to avoid the ground covered by the fire of the hostile artillery, the second battalion will endeavor, by means of the depression on our right, to reach the woods and other cover from where it will start the attack."

"Lieutenant M., where should the artillery be placed?"

Lieutenant M., a little nonplussed, hesitated a moment before answering. Immediately all the other officers pointed out the cover 500 meters to the front and the ridge in rear and indicated to the General that they would make the following dispositions: In front, under cover, one (or two) batteries to act in conjunction with the second battalion and support the attack by firing on the hostile infantry; in rear, sheltered behind the ridge, the two (or one) remaining batteries to fire at the artillery seen on the horizon.

The General was delighted and said: "Very good, gentlemen."

During the field exercises, the General placed the artillerists in situations similar to those above indicated. They operated exactly as they would in actual service except that sometimes on account of the restrictions placed upon the field of fire they only simulated firing.

In closing the account of these exercises, we wish to say that we have no intention of questioning the efficiency of the officer who conducted it. He operated in strict accordance with the ideas held in 1900 by us and nearly all officers. In these exercises, he showed, as always, the qualities of decision, of a skillful tactician and of inspiration to others, which he possessed to the highest degree.

## INSTRUCTIONS FOR TARGET PRACTICE AND FIELD EXERCISES FURNISHED THE OFFICERS OF THE STAFF COLLEGE.

The accounts which we have just quoted show how interesting for the instructors of the practical course of fire, from the point of view of the orientation of ideas, was the visit made by the Staff College to Poitiers in 1900. Fourteen years have elapsed since this visit and yet mistakes similar to those pointed out by General Fayolle in his criticisms and scored by General Langlois in his remarks are still frequently made. It would seem to us to be well to discover why the majors made such mistakes, for the same reasons cause similar mistakes today.

In the first place it might be asked why the major, as soon as his battalion was in battery, did not open fire on the hostile skirmishers. He certainly could not be ignorant of the fact that this fire was necessary to assist the infantry to advance. Why did he not open fire? It was because the only way in which it could be done was to fire from the right of the field of fire to reach the skirmishers on the left and from the left, to reach those on the right and such firing was dangerous and was forbidden by the regulations for the field of fire. An important consideration then, *i. e.*, the narrowness of the field of fire, affected the major's method of operating. Another thing that had its effect was the manner in which the major had prepared the exercise. He had foreseen all firing which could take place during the phase. After having given up any idea of firing on the hostile infantry on account of the danger of such firing, he decided on firing at the artillery under the conditions that are known to the reader. He had the figures placed accordingly and imagined successive situations which were like the different chapters of the romance requiring such fire. In not using part of his artillery against the hostile infantry, his sin was one of omission rather than one of commission, by failing to assume that there were batteries firing upon the hostile infantry or by failing to place batteries to simulate such fire with blank cartridges. This is one example of the numerous mistakes constantly being made by the artillerists and which must be attributed to the smallness of the fields of fire which gets them into bad habits.

They begin by not firing on the infantry simply because the regulations for the field forbid it and then little by little entirely lose sight of the essential reason that artillery must fire on the infantry.

The same is true for many other kinds of fire, particularly for oblique fire forbidden on nearly all fields of fire.

Under such conditions, target practice instead of being similar to the firing which will take place in future battles, becomes merely a series of firing laid out in advance and whose order is more or less controlled by a problem covering certain particular situations requiring such firing.

Why were the situations and orders assumed by the major so indefinite as was pointed out by General Fayolle?

This was caused by the fact that the major was compelled to fulfill simultaneously the rôle of commander of the troops, of commander of the friendly artillery and of commander of the hostile artillery, and of umpire between the two sides. It was very difficult for the major to draw up correctly the orders which as commander of the troops he gave to himself as commander of the artillery. It was also difficult to imagine situations which were logical, especially with respect to the enemy.

The following is the manner in which the major established the various situations: He began by deciding on the maneuvers and firings which he desired his batteries to execute and then fixed the corresponding program for the enemy. This latter program was determined entirely with the object of causing the maneuvers and firings desired. The major did not act as if he was opposed by an actual enemy whose desire was contrary to his own, but as if he was opposed by an enemy obedient to his orders. An analogy will help us to see how illogical such a method is.

An officer who fulfills at one time the functions of the commander of the troops and of the artillery of both sides is in the same position as a player who wishes to amuse himself and taking a chess board places the pawns and queens and then studies the moves which he wishes to make with any particular piece, say the black queen. The pawns will sufficiently well represent the infantry and the queens the artillery. If the player contemplates a move with the black queen can he move the white queen and pawns in the same way that an opponent would? He evidently cannot.

If we lay so much stress on the inconveniences of having so many duties performed by one officer, as for instance a colonel filling the rôle of division commander, commander of the divisional artillery, and director of the exercises, while at the same time acting as commander

of the enemy, it is because to us these inconveniences appear very great. Not only does it put a stop to all progress but it also introduces the probability of the cultivation of false ideas.

When we play by ourselves at chess, at checkers, at cards, etc., we cannot make any progress and we risk adopting a method of play doomed in advance to be unsuccessful when we find ourselves opposed to a skilful opponent.

From 1900 to 1911.—We have just seen the method used in 1900 in the regiments and at the practical course of fire in target practice. This method was rapidly changed in the following years, first by the ideas set forth by General Langlois and Major Fayolle, later in consequence of the extensive modifications made in the use of artillery especially with respect to the choice of battery emplacements and the representation of the objectives, and finally in the last few years on account of the very thorough inspections made by General Percin at the course of fire and among the regiments.

The problem ceased to be a romance having practically no effect on the movements and firings. It defined a situation of actual war intended to serve as the initial stage of an imaginary battle. As soon as the phase began the director of the exercise proceeded so that as far as possible all the personnel would act as if the fight were real. He notified them at the proper times of the various situations. If these were well chosen, everyone was faced with the same problems that will have to be solved in future battles. The situations were decided upon in advance and in order that they might follow in logical sequence, the director drew them up after a careful study of the development of an imaginary fight. The dispositions made by the hostile artillery and the two infantries were very carefully considered. The problem was the succession of situations made up a real romance but it was a romance in which the various chapters were closely linked and were only given out as the exercise developed. This romance had a real effect on the choice of positions, on the movements necessary to install the batteries and on the firings.

The batteries were no longer placed on ridges. The battalion and battery commanders endeavored to make use of the most favorably situated cover. There was one method of attaining the positions and of emplacing the batteries which was preferable and the battalion and battery commanders had to determine which it was.

The execution of ranging and effective fire was subordinated to tactical considerations. Ranging fire was no longer necessarily followed by rafales delivered with the range to the target to destroy the same totally. The exact range to the target was seldom known. In addition, artillery was only slightly effective against sheltered infantry and the personnel of batteries equipped with shield and under cover. Being unable to deliver a destructive fire with torpedo shells, the battery commanders were often forced to take up a neutralizing fire which varied greatly, depending upon the needs of the situations.

These considerations show us the causes of the extensive modifications in the method of conducting target practice which resulted about 1903 in the adoption at the practical course of fire of the method which is still in general use today.

The director of the exercise is one of the major instructors and in a regiment either the colonel or lieutenant-colonel. Beforehand, with the assistance of infantry officers, he studies the operations of the opposing infantries in accordance with the problem he has selected. He decides upon the initial situation and those that follow. He gives his orders to the officer in charge of the park in order that the representation of the objectives will be in accord with the various situations assumed.

The practice develops perfectly naturally. It opens with a statement of the initial situation to all the personnel. Immediately the movements begin. The director, at such times as he decides upon, notifies the personnel of the succeeding situations. For this purpose he makes use of all the means at his disposal; verbal or written orders, appearance of objectives, flashes, simulated bursts of shells on striking, etc., in the field of fire.

The battalion commander and the personnel under him try to act in the same way that they would in an actual battle. In 1903, the characteristic feature of the method of instruction adopted by the instructors of the practical course of fire and by the regimental commanders, consisted of the logical development, *determined upon in advance*, of an engagement in which the operations of the imaginary troops belonging to the two opposing parties bore a definite relation to each other and caused the successive situations in which the battalion was placed.

This method of operating has given excellent results at the course

of fire and in the regiments whenever the director of the exercise has taken the necessary pains in the preparation of the problem. This preparation for target practice, even for a single battalion, however, is not as simple a task as might be imagined. Even if it is possible for a director to foresee and control everything; assumed movements of the two opposing infantries, imaginary fire of the hostile artillery, etc., when it is a question of controlling the maneuvering and firing of a single battalion, this is no longer possible when there are a number of battalions, in which case the complications are too great. In addition, as soon as the colonels desire to conduct regimental target practice, the methods used for a battalion are no longer applicable.

Regimental target practice is usually conducted as follows: The colonel is both director of the exercise and commander of the artillery. He draws up the problem and determines in advance the maneuvers and firings that the battalions will execute. The exercise therefore resolves itself into the simultaneous execution of two or three separate battalion target practices controlled by the situations of the combat, as deduced more or less accurately by the several battalions. If the colonel desires that no movement nor firing take place that is not logically the result of the battle that he has assumed, he must make a thorough study of the terrain and then prescribe the successive dispositions made by the imaginary troops, both friendly and hostile, at the various stages of the battle.

We have taken part in a number of practices of divisional artillery which were thus prepared for. There was not a single operation of the artillery, from the beginning to the end of the phase, which was not clearly justified. Everything was determined in advance down to the minutest detail.

The preparation for target practice requires on the part of the director the most serious thought. He must imagine an entire battle. For this purpose, he cannot do better than to consider in his mind's eye an action in which are opposed two sides which he commands alternatively and whose positions and dispositions he notes at different times. Such, we believe, is the best way of preparing a problem when everything must be determined in advance, and is most likely to result in simulating the conditions of actual war. Even though this method is the one that is recommended, it is far from being free from inconveniences. To demonstrate this, it is only



necessary to again resort to the comparison between the director who commands two sides and the player who, by himself, wishes to take the parts of two opponents.

What does such a player do?

He plays first for one side and then for the other. Whether the game be chess, checkers, cards or dominoes, in order that the plays should be similar to those that would be made in a game between two players, the single player must in some way change his personality each time that he changes sides. To put this in another way, each time that he plays for one side he must forget his intentions when he played for the other side, and vice versa.

Can a player thus make himself into two people?

It is certainly unquestionable that such a thing is very difficult of accomplishment.

A director of an exercise can no more easily make himself into two people than can a player and we therefore believe that the situations in a practice controlled by a single officer in the same way as a game played by a single player, are very likely to bear no resemblance to actualities.

The execution of a target practice where everything is determined in advance, in spite of the most careful preparation, is never absolutely free from errors.

The situations are not always plausible and often even they are likely to give false ideas. This can be avoided only by designating to command the enemy an officer entirely independent of the director.

It is certain that if this method of operating had been habitual with the artillery for the last few years, that there are many mistakes which for some time would not have been committed. We will now quote some examples.

The artillery would not have gotten in the habit of tranquilly ranging on standing skirmishers represented by wooden figures painted white, as we noticed as late as 1911, if an officer had always been designated to command the enemy. This officer would not have failed to intervene at the proper time and consider these skirmishers as alive, notifying the battery commander that they were lying down behind such and such a cover.

An artillery commander would never have received from an officer commanding the hostile forces such information as we heard given

by numerous directors, such as "Behind this ridge there are three concealed batteries, behind this other crest, where flashes are seen, there are two batteries," etc.

With respect to the execution of such a practice, even the most thorough preparation is nearly always counteracted by the inconveniences inherent in all maneuvers laid out in advance.

The principal concern of the director is to make the practice develop as prescribed. He is in the same position as an author directing the first presentation of a play, and target practice just as a play must be repeated and repeated, especially if it is to be subjected to a critical inspection.

It is really only a bluff when the artillery, giving the impression that it has had no preparation, goes through maneuvers that it has repeated time and time again.

With respect to the participants in the practice, their principal concern is not the determination of the best methods to be used in attacking the enemy and in resisting his attacks; that is of secondary importance. As in a play, each one has his rôle and his first concern is to remember it and to make his entrance into the action at the time desired by the player.

However that may be, even if a target practice where everything is laid down in advance is more or less instructive for the rank and file, it certainly is not so for the colonel. The latter can never learn how to command artillery unless he takes part in target practices entirely differently conducted. An exercise, whose development he has himself prescribed, since it is the result of a succession of problems chosen by himself, can only very imperfectly prepare him for his rôle of commander of an artillery of the field of battle.

The method of directing target practice in effect since the first years following the adoption of the 75mm guns should be modified since it is not applicable in firing several battalions together.

METHOD OF INSTRUCTION USED BY THE 17TH REGIMENT OF ARTILLERY.

1911.—During this year, at the instigation of Lieutenant Colonel Pierre, the 17th adopted an entirely new method of directing target practice.

Let us assume that a regiment of the divisional artillery is about to engage in target practice. The regiment is at war strength, including the following:

The colonel and lieutenant-colonel with their assistants:

The three battalion commanders with their scouting and communicating personnel. Each battalion is composed of three batteries.

What is necessary in order that this regiment, or rather this divisional artillery, may maneuver and fire in the same way that it would on the field of battle?

It must receive from the division commander the same orders that it would receive in time of war. In order that this may be the case, an officer is detailed to act as division commander.

The above are the officers and troops that are to take part in the exercises.

Let us now consider the additional officers needed in order that this divisional artillery may maneuver and fire under conditions as nearly similar to the actuality as is practicable in exercises during times of peace.

The colonel designates an officer to act as director.

The division is to come into contact with a hostile force and the colonel designates an officer to act as commander of this force.

The director of the exercise is assisted by a number of other officers, at least two being assigned to each battalion. One of these assistants represents the director and remains with the battalion commander while the other acts as safety officer.

This method of instruction, originated by Lieutenant-Colonel Pierre, was used in the 17th Regiment for several years in field exercises which included the use of the divisional artillery. This method may be considered as an adaptation of the method which we saw used on a larger scale, in 1910, in the instruction of the officers and noncommissioned officers of the 2nd Army Corps.

This method was used for the first time in 1912 for target practice and it gave very satisfactory results and went through with hardly a hitch. Such a result was certainly due to the great number of times that this method had been used in field exercises and also to the fact that Lieutenant-Colonel Pierre acted as director.

In order that our fellow officers may profit by the experience of the officers of the 17th, we wish to take up in detail their ideas at the present time on the preparation and execution of regimental target practice.

## PREPARATION.

The colonel assigns the duties of the many officers whose services can be secured during the target practice season (student officers from other branches of the service and officers of the reserve).

## EXAMPLE.

Division commander—lieutenant-colonel of infantry (student officer).

Advance guard commander—captain of infantry (student officer).

Artillery commander—the colonel.

The artillery which is to operate under the orders of the colonel is as nearly as possible at war strength.

Director of the exercise—the lieutenant-colonel.

Three officers are detailed as assistants to the director of the exercise and are charged with supplying information of the enemy. One is assigned to each battalion.

1st battalion—a captain (reserve).

2nd battalion—a lieutenant (line).

3rd battalion—a lieutenant (reserve).

The captain in charge of the park and his two assistants act as safety officers. One is attached to each battalion.

Commander of the enemy—commander of the reserve battalion.

The director of the exercise fixes the composition of the two forces and draws up the problems so that contact will take place at the place selected. He is responsible that information concerning either side is communicated only to the commander of that particular side.

## EXAMPLE.

One of the forces is a division of which the regiment forms the divisional artillery.

## PROBLEM.

The enemy is in position on \_\_\_\_\_

The division is to attack and drive the enemy back towards \_\_\_\_\_

The division is in line. It will connect on the right with \_\_\_\_\_ along the line \_\_\_\_\_ and on the left with \_\_\_\_\_ along the line \_\_\_\_\_

The heads of the infantry columns will clear at \_\_\_\_\_ o'clock the line \_\_\_\_\_

The portion of the enemy opposed to the division is composed of two regiments of infantry and two battalions of artillery. They are in line. The front is limited on the right by the line ——— and on the left by the line ———

The hostile artillery will be reenforced during the course of the assumed battle.

## PROBLEM.

The enemy is seen in the direction of ———

Their attack will take place on the morning of ———

This side will keep up resistance during the entire morning without counting on reenforcements which cannot arrive for more than twelve hours.

The successive lines of resistance are ———

The division commander and the commander of the hostile forces make out their orders and send them to the director of the exercise.

## EXAMPLE.

*Order of the Division Commander.*

Reconnaissance shows that the enemy is at ———

The division tomorrow will attack the enemy. It is in line and will connect on the right with ——— at ——— and on the left with ——— at ———

Route of march ———

The head of the advance guard (1st regiment of infantry and 1st battalion of artillery) will clear the line ——— at ——— o'clock.

The main body of the division (2nd regiment of infantry, 2nd and 3rd battalions of artillery, 3rd and 4th regiments of infantry) will clear the same line at ——— o'clock.

The division commander will be at the head of the main body.

*Order of the Commander of the Enemy.*

As in the case of the commander of the division, this order is made out so as to acquaint the director of the exercise with the distribution of the troops and the general position.

The orders of the two commanders allow the director of the exercise to determine what information he will furnish:

To the colonel so that the latter can decide upon:

(a) The time and place for assembling all the officers except those with the batteries.

(b) The time and place for the assembling of the 1st battalion of artillery and later of the 2nd and 3rd battalions.

To the division commander and advance guard commander on one side and to the commander of the enemy on the other side, so that contact will take place under favorable conditions.

To the captain in charge of the park, so that the targets will be placed in accordance with the dispositions made by the enemy.

To the officers charged with furnishing information of the enemy to the various artillery battalions, in order that they may have a sufficiently clear idea of the positions of the enemy and the probable development of the battle to be able to later place the battalion and battery commanders in logical situations.

#### EXECUTION.

All officers report to the place selected for the conference.

The director of the exercise takes the commander of the enemy to one side in order that the latter may explain in private the distribution of his troops on the ground and his intentions. Afterwards, the division commander communicates his last order. With respect to the artillery, for instance, he says that the first battalion, while still remaining under the control of the artillery commander, has been assigned the mission of supporting the advance of the advance guard. To assure the cooperation of the two arms, the artillery commander temporarily detaches his lieutenant-colonel (or the major acting as such) and orders him to report to the advance guard commander. Next, the advance guard commander communicates his last orders showing the dispositions of his troops, including the batteries of the 1st battalion attached to the advance guard.

Shortly after this, the director of the exercise announces that the two opposing lines of infantry have met. He then outlines the situation, endeavoring to make everyone see in his mind's eye what he would see actually if the fight were real. He points out the position of the firing line. He announces that shells are bursting in such and such a place on the infantry, but that there is nothing in the field of view to indicate the position of the artillery firing. He takes the commander of the enemy aside and outlines to him also the situation so that he will be able to take the necessary steps to resist the attack.

The commander of the advance guard may bring up the two battalions of the 1st regiment of artillery not yet engaged, explaining to the major acting as lieutenant-colonel the way in which the artillery is to support his operations.

The division commander and the colonel commanding the artillery make a general reconnaissance of the terrain. They are accompanied by the director of the exercise and his assistants together with the commander of the enemy. An officer furnishing information of the enemy and an assistant of the director of the park are left with the 1st battalion of the artillery.

During the reconnaissance of the division commander, the director of the exercise, as often as he considers necessary, furnishes such information as would be secured in actual war. When necessary he is assisted by the commanders of the enemy. At one place he points out the hostile firing line, at another, close to this line, he states that the whistling of the bullets can be heard, at another, that shells are seen bursting over such and such troops while they are crossing a certain open space, etc.

As soon as the reconnaissance is completed, the division commander issues his orders. The artillery commander notifies the commanders of the 2nd and 3rd battalions of the results of the reconnaissance and gives them their instructions. They proceed to place their commands in position. An officer furnishing information of the enemy and a safety officer at once report to the commanders of these battalions.

An aerial scout is detailed to reconnoiter the position of the hostile artillery and assist in the control of the fire.

The division commander rejoins his command.

At the proper time, the director of the exercise, after consultation with the commander of the enemy, draws up a second outline. The information contained in this outline is furnished simultaneously to the artillery battalion commanders and the advance guard commander by the officers charged with supplying information of the enemy. Later a third outline is furnished in the same way, and so on.

As the fight develops the director of the exercise continues to fill his rôle, which consists principally in drawing up outlines and in furnishing the information necessary to create the mental picture of an actual fight. The officers charged with supplying information of

the enemy act in the same way and in accordance with the instructions of the director.

As soon as the artillery goes into action, the artillery commander receives from the battalion commanders the information necessary for him to be able to control the fire. Data furnished should be supplemented by sketches, showing, for each battery, its position, objective and the limits of its zone of action.

We wish now to make a few remarks with reference to the rôle of the commander of the enemy as well as that of the director of the exercise and his assistants, the officers charged with supplying information of the enemy.

With reference to the rôles of the division commander, the artillery commander and officers filling similar positions (advance guard commander, artillery battalion commanders, etc.), we have only one remark to make. All they have to do is to operate as nearly as possible as they would in actual war. To this end, they should have the strength of character (easy or difficult according to their temperaments) necessary to keep them from looking the ground over in advance and endeavoring to find out ahead of time the intentions of the enemy; in order that they may fight an unknown enemy on unknown ground.

#### OFFICER COMMANDING THE ENEMY.

He should, before the exercise, go over the ground on which the troops are to operate in order to prevent the situation from being especially improbable (slight improbabilities are not of very great importance).

During the preliminary reconnaissance of the terrain, he will make a mental note of the principal lines of approach for the different arms and the principal positions that his artillery may occupy with the points that may be fired upon. He need not go into very much detail but he must be prepared to give a clear and concise statement of the conditions in general.

He will, in advance, prepare a brief schedule of the positions of his columns from time to time and of the probable successive positions of the troops. Several copies of this schedule will be made to serve as a guide for the officers supplying information of the enemy. It is not particularly important that this officer should be on the ground during the exercise, for if he is there, he will be separated



from the director of the exercise which will require communication between them to be by telephone or by orderly, which would considerably delay the progress of the exercise. During the exercise, therefore, he should be in the immediate vicinity of the director, though he acts independently of him in accordance with the information received from the latter.

#### DIRECTOR OF THE EXERCISE.

We have just seen what this officer's duties are during the preparation of the exercises (determination of the conditions of the problem, transmission of information after the receipt of the initial orders of the commanders of the two forces) and during the execution of the exercise (presentation of assumed situations as nearly as possible those of actual service, furnishing of additional information, strict observation of the time required for the completion of the movements, keeping secret the operations of the two forces, etc.).

The correctness of the assumed situations is of great importance, for if accuracy is secured in this particular, during exercises in time of peace, the artillery on the field of battle will not be apt to be thrown into confusion, for all movements and firings which they will then execute will be similar to the ones that they have been in the habit of executing.

How will artillery usually disclose its presence to us?

The first thing we will notice will be the sound of distant reports. We will immediately make a rapid survey of the horizon, but will be unable to discover any battery or even to see any flashes, though we may see dust and posts of observation. On the other hand we will both see and hear the shells bursting over our troops, and if these shells are bursting in our immediate vicinity we will be more than anxious to interfere by opening fire on the batteries firing these shells. To discover the positions of the greater part of the hostile artillery, whenever atmospheric conditions do not permit the use of aeroplanes, we will have to depend entirely upon the information furnished by the shells fired by these batteries.

If we lay so much stress upon this matter, it is only because we know how often directors of exercises, partly from habit and partly from the spirit of good-fellowship, turn out to the artillerymen, problems which do not in the least resemble those which will have to be

solved in wars of the future. Even during the present year (1913), in map problems, in the instruction of officers out of doors and in service target practice, we have seen artillerists furnished at the very beginning, more complete information than they could possibly hope to have even at the end of the phase, such as: "In such and such a place, flashes, three batteries; in such and such another place, no flashes but you know that there are four batteries there; etc."

OFFICERS FURNISHING INFORMATION OF THE ENEMY.

These officers act as assistants to the director and are at all times kept informed of the intentions and orders of the commanders of the two forces, so that, at the proper time, they may be able to inform the battalion and battery commanders concerned as to what they are supposed to see (movements of friendly or hostile troops, information from the officer in command, etc.). They present simultaneously to the officers pictures of assumed situations which will cause the latter to act at once, without waiting for orders from higher authority (School of decision). During a service target practice in 1912, after the simultaneous presentation of the same situation to three officers of successive rank in the tactical chain, i. e., the artillery commander, battalion commander and battery commander, we noticed that, at the same time, the artillery commander ordered the battalion commander to advance one of his batteries, the battalion commander, on his own initiative, started towards the battery that he wished to move, and the battery commander started the movement without waiting for orders.

The director of the exercise, during the course of the combat, must furnish the officers supplying information of the enemy, all data concerning the two forces that they require to complete the outline given them and to make as real as possible the troops operating in the zone of action of the unit to which they are attached.

The task of these officers is simple if the officer commanding the hostile forces furnishes in good time information as to the general situation which he intends to represent on his side. The details of minor operations are of comparatively slight importance, for both in maneuvers and in actual combat these escape the notice of the supreme commander, and are therefore during exercises regulated by the officers furnishing information of the enemy. If at any particular

time these officers are in doubt as to what they should do, from ignorance of the general situation, they should at once report to the director of the exercise and ascertain what is assumed to have taken place.\*

COMPARISON BETWEEN THE OLD METHOD OF INSTRUCTION AND THAT USED BY  
THE 17TH REGIMENT SINCE 1911.

The colonel who wishes to have target practice has a choice between two methods which are absolutely different. According as to which one he adopts, firing either is or is not determined in advance.

With the old method the firing was almost entirely mechanical. The colonel is at one and the same time the officer who commands and the director who regulates the "*mise en scène*." He employs at the same time both the military art and the theoretical art. His principal concern is not to attack the enemy, for there is no enemy, since he is not opposed by anyone with wishes that are the exact opposite of his own. His main idea is that the battalions and batteries shall operate as he has planned. One of the most serious results is that from constant repetition all the personnel under his command acts always in the same way and as they know perfectly well that they are operating under conditions which are very different from those met with in real war, there are many who, with a certain feeling of uneasiness, ask themselves: "How will I act when the unforeseen takes place in battle?"

With the method of Lieutenant-Colonel Pierre, the colonel rids himself of all ideas or bluffs. He deliberately places himself, as well as all the personnel under his command, in unknown situations and everyone operates under war conditions.

This method, as is called for by the regulations, "gives the initial obscurity of the situation as well as its instability when opposed to an active and resolute adversary," and causes the "unforeseen conditions which call for the use of every faculty." In addition, the reality of war is so closely simulated and everyone feels himself so well prepared for his duties, that they all feel most confident of success.

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\* All the remarks which we have just made with respect to the duties of the officers acting as director of the exercise, as commander of the enemy and furnishing information of the enemy, are extracts from an article by Lieutenant-Colonel Pierre.

## CHOICE OF THE METHOD TO BE USED IN MAKING INSPECTIONS.

The general officer making an inspection of an artillery regiment and attending the target practice held at that time, has the choice of either of the two methods. He may require the colonel to follow the method originated by Lieutenant-Colonel Pierre. Thus a division commander making an inspection of the divisional artillery may designate another officer to take command of the division, if he himself does not wish to command it. The colonel will then conduct target practice under the orders of his chief against an independent enemy in exactly the same way that he would in war.

How much better an inspection held under these conditions is than all those which we have seen.

The following is what would happen ordinarily when a general commanding a division notified the colonel commanding the divisional artillery that he will on such and such a day hold target practice for his regiment.

The first concern of the colonel is the selection of a terrain suitable for the proper conduct of the operations and having a point of easy access from where the general can follow the development of the exercise. As soon as such a place has been found, he proceeds to make the preparations for the practice. He decides on the positions to be occupied, the order of arrival of the battalions in position, the movements to be executed, the kinds of fire to be used, the placing of the targets, etc. He selects, for the officers known to be efficient in firing and maneuvering, duties which will cause them to be noticed and similarly he endeavors to keep the less skilful officers out of sight. He orders the drawing of large quantities of reserve ammunition and makes no attempt to husband the service ammunition which under such circumstances is always used in preference to target practice ammunition since it makes more noise and more smoke. After he has definitely decided upon the program for the exercise, that he intends the regiment to go through, he thinks out an imaginary battle in which are opposed a friendly force, of which the regiment forms the artillery, and a hostile force. The outline of this battle gives him the data necessary for the determination of the various situations of actual service which will be required to cause the desired movements and firings of the batteries.

To sum up, the colonel calls to his aid all his skill as a scene setter and all his knowledge of artillery in laying out the firing program

for the the various batteries and then thinks up a romance to justify what he intends doing.

It is certain that the execution, never mind how brilliant, of such an exercise, where everything is foreseen in advance, does not permit a correct estimation of the degree of preparedness for battle of the colonel and his regiment.

There is all the difference in the world between the exercises executed many times by the regiments and the maneuvers which they will have to go through in actual service. It is the same difference that there is between a parade and a war maneuver with full forces on both sides or between a bluff and the real thing.

Evidently the choice of which method to use is plain and unquestionable. However, as far as we know, not a single target practice has ever been held under the conditions we have previously mentioned. Such a method is the only one which allows a division commander to ascertain exactly what he can count on with his artillery. In addition, it is the method par excellence for increasing the confidence of the officers. They would no longer have any reason to say: "If war is declared tomorrow in the first battle we will for the first time execute actual service firing under the orders of the commanding general of our division."

Some officers may make the following objection: "Such firing is repeated again and again in map problems, in officers' instruction and in the fall maneuvers."

This is not our opinion, for only in service practice when the pieces are actually fired, can the artillery operate under conditions which allow the officers to determine accurately its degree of preparation for war and what may be expected of it on the field of battle.

Up to 1870 the artillery had only *target* practice as distinguished from *service* practice. This practice was conducted as if its only object was the instruction of the enlisted personnel to the exclusion of that of the officers.

Since 1870 practice has been conducted so as to instruct all the personnel of the batteries and to render the captains capable of conducting the firings.

From 1870 to 1898, that is for about 30 years, the methods in vogue remained about the same. The practical course of fire was equipped with only one battery so that all that could be held there was battery practice. Among the regiments there were held many

practices by battalion and many officers took part in maneuvers of larger bodies of artillery at the camp of Chalons, but in all these exercises the positions of the batteries and the targets were determined in advance and the colonels and majors superintend the firing rather than directed it. This is what causes us to say that, until 1898, the artillery held only battery practice.

In 1898 the 75mm matériel was supplied to the regiments. There was a general awakening and the artillery came out of its stupor. The practical course was now equipped with a battalion of three batteries of 75mm guns. There were held there field service exercises and service practices not only by the captains but also by the majors. The latter were unexpectedly placed by the instructors in actual situations of war and required to find the solution of the problem with which they were faced. The ball had been started rolling. Among the regiments, the colonels, like the instructors of the practical course, made the majors conduct service practice.

The French artillery, the only artillery equipped with rapid-fire guns was without doubt at this time the best in the world.

In 1906 district schools of fire were established and were used for the instruction of captains, while the original one was used for the instruction of majors. In 1908 the latter was equipped with two battalions and in 1910 with a regiment, so that after those dates battalion and regimental practices could be held.

In 1913 the artillery was furnished an increased number of both men and horses so that each captain was in command of a battery on a war footing and each major and colonel could operate with his command in the same condition that it would have on the field of battle in time of war.

In 19..(?) the artillery will hold regimental service target practice under the conditions we have previously indicated.

Since 1870 the artillery has gone through two periods of great stress. The first, immediately after the war, was an attempt to rival the German artillery, in which the captains, with their batteries well in hand were well trained in fire control. The second, after the adoption of the 75mm guns, was an attempt to become the foremost artillery in the world.

A third period is about to occur. The artillery, with an increased number of men and horses, is going to make a determined effort to acquire exceptional skill in maneuvering in order to regain the

superiority which it had over the German artillery in 1898 and which since that time has constantly decreased.

A common saying is that whoever forgets nothing in the past can foretell the future. Our reader is nearly in such a position. He has been shown what has been the evolution of ideas in the method of directing service practice and the past is so clear in his mind that he can look into the future and see how many of our ideas will be realized. As in our case, he must feel certain that in a very short time, all the colonels will be converted to the new ideas and will want to command their regiments in the same way on the practice ground and on the field of battle. They will want to maneuver and fire their batteries under the most unforeseen circumstances under the orders of their chiefs (the division commander and the artillery commander), or lacking these, under the orders of an officer designated by them to temporarily act for them.

As in our case also, the reader must be convinced that the colonels that stick to the old methods and continue to conduct practices in which everything is determined in advance will become less and less numerous. Later, when officers give their opinion on the method in which regimental target practice was still held in 1913, this opinion will be very nearly the opinion that we hold today with reference to the way in which the troops operated at the camp of Chalons during the years that preceded the War of 1870.

#### ORDER OF FIRING TO TAKE PLACE EACH YEAR.

The application of the principles which we have just advanced leads us to the conclusion that the target practice of a regiment should comprise the following kinds of firing: By piece, by battery, by battalion, and by regiment; to which should be added, by the division and artillery commanders, firing by regiments reenforced by battalions of the corps artillery.

Firing by piece should include firing of various kinds, of which the simplest used for ranging are: Ranging first for direction only without regard to height of burst and range; ranging only for height of burst without regard to direction and range. These should lead up to the more difficult ranging: Ranging in range under the most difficult conditions of observation. This should be followed by an effective fire under varied conditions.

Firing by battery is the true service practice in which the captains

fire successively and under all the conditions met with on the battlefield. During such firing the time element is not always considered, for whenever the instruction requires it, as for instance it is desired to discuss something that has occurred, the firing may be temporarily suspended.

Firing by battalion and by regiment may take place at the same time. A phase is devoted to firing by regiment and this is followed by firing by battalion and by battery. When firing by regiment, the higher officers, concerned principally with the fire direction, allow the battery commanders to fire without supervision, such firing as is directed. We can easily see how advantageous it is that the phase following the firing by regiment should be devoted to the execution by the various battalions of the movements and firings which are the solutions of the various situations in which the larger unit was placed.

The operations of the battalion commanders and the firing of the battery commanders are followed and later discussed by all the officers of the regiment.

It is not necessary to have each year a first series of phases devoted to preparatory firing, say in April, and then a second series devoted to service practice, say in July. The order of the firings should be established so as, above all, to provide for the instruction of the officers, slightly for the instruction of the non-commissioned officers and at the same time without neglecting the instruction of the men in ranks. This last is sure to be secured since the men operate the pieces.

The instruction of the officers cannot be completed in one year, in fact it is being perfected throughout their entire service, and for this reason the time of year has no bearing on the determination of the kind of practice to be used. The more the different phases are spread out over the year the better. The ideal condition would be one phase every ten or fifteen days. Firing by regiment takes place in November, hardly a month after the arrival of the class, if the regiment, at this time, can find a sufficiently large piece of ground that can be used, while firing by piece or by battery takes place in August, if, at this time, the regiment has only a small terrain available.

To sum up, it seems perfectly plain that the regiment that has its target practices at all seasons of the year, using the methods of



instruction that we have recommended, is a regiment that is ready for battle, for it is least likely to be surprised or bewildered. Everything that it would do under such conditions would be practically a repetition of what it had become accustomed to doing in the numerous exercises in time of peace. It would have secured "the continuous, methodical and careful preparation, which, no less than force of numbers, is necessary for success." (Extract from an address made at Bordeaux by M. Barthou, September 19, 1913.)

## RESUME.

How, since the adoption of rapid-fire guns, has the evolution of ideas in the method of preparing artillery for battle been brought about?

Such is the question that we have asked ourselves and, in order to answer it, we have tried to show how, by great perseverance, the instructors have been brought round to placing the officers and men in situations resembling more and more those of war and to adopting for the preparation of the artillery for battle, greatly improved methods of instruction.

We will give a brief outline of the methods used, from time to time, by indicating how the colonels performed their functions as instructors, in so far as concerns firing.

In 1870 the colonels paid very little attention to instruction in firing, the latter being limited to a firing on a range at artificial targets.

When war was declared the regiments were all broken up instead of being formed as combat units commanded by the colonels. Thus, Colonel de Vassart, who was in command of the 17th Regiment was called upon to take command of the reserve artillery of the 1st Corps, to which not a single one of his batteries belonged, the eight batteries of the 17th Regiment being formed in three battalions, attached, respectively, to the reserve artillery of the 2nd, 3rd and 4th Corps. Colonel de Vassart was killed at Reichshoffen on August 6, 1870.

"The one idea of most of the officers of the artillery in 1870 seemed to be that they must not allow their guns to be captured by the enemy. Many of them failed to appreciate that it was their duty to endeavor to make their batteries produce the greatest possible effect. They knew nothing about the desirability of pushing

forward, of combining their fire with that of the infantry, of combining with the latter, cooperating in its movements and supporting it both morally and actually; nor did they know anything about combining a number of batteries in the action against a single point. Abusing the mobility and ease of movement of the batteries, they were continually changing their pieces from place to place, believing that by so doing, they rendered the enemy's fire ineffective and compelled him to be constantly ranging. Most of the time, each captain acted entirely on his own account, firing at whatever objective he thought best, without any consultation or agreement with the commanders of the adjacent batteries."\*

The artillery commanders, before the war, had no practical knowledge of the questions of the distribution of objectives, of the division of missions or of fire control. Everything of this kind that took place on the battlefields of 1870 was originated by the officers concerned.

Reference is often made to the original operation conducted on August 31, 1870, by Colonel de Lajaille,† commanding the reserve artillery of the 3rd Corps, during the battle of Noisseville.

"The village of Noisseville had been taken by our troops who, however, were unable to make any progress against the village of Servigny, which was defended by 40 pieces of artillery, which the artillery of the 3rd Corps had been unable to put out of action, and whose fire held our infantry in check. Colonel de Lajaille had at his disposal two battalions of artillery, one composed of two mounted batteries of 12 guns and the other of two horse batteries of 4 guns (17th Regiment), the battalions being temporarily under shelter in a ravine near Mey. After making a reconnaissance of the ground, the Colonel ordered the 12 gun battalion to proceed by the Strasbourg road to a certain prominent position and deliver a heavy fire on the batteries at Servigny. As soon as this battalion had set out at a trot, the Colonel himself conducted the other battalion, by a partially screened route, to a position in rear of a small hedge, which was 1300 meters from Servigny and on the line joining Servigny and the position selected for the other battalion.

In accordance with the orders it had received, the 12 gun battalion,

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\* Marshal Canrobert, by Germain Bapst, Vol. VI, p. 400, Battle of Saint Privat.

† The Colonel later became General and President of the Artillery Board.

This example is taken from a letter of General P. Durand.

as soon as it was in battery, opened a heavy fire. As Colonel de Lajaille had expected, the batteries at Servigny all returned the fire. As soon as the firing was general on both sides, Colonel de Lajaille, who did not expect any success with the 12 gun battery, which was firing at a range of 3500 meters, ordered the other battalion to open fire. The attention of the German batteries was so much taken up with the Strasbourg road that the other battalion, with the loss of only one man, accidentally killed, began to destroy the guns at Servigny one by one and with such great success that the enemy limbered up as well as possible and retired. The 12 gun battery, it is true, lost about three-quarters of its men, but the German artillery was driven out and the 3rd Corps, shortly afterwards, entered Servigny."

General Drouot operated in very much the same way at the battle of Hanau. A large force of hostile artillery prevented our infantry from issuing from the woods and rendered an advance along that line impossible. Drouot, using the dirt roads, placed batteries on the right of the road through the wood, to fire on the hostile artillery and as soon as the attention of the latter was taken up by this fire, he placed other batteries on the left, which taking the hostile artillery obliquely, compelled its withdrawal and opened the way for the infantry.\*

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\* The two actual examples which we have just given are two solutions of the same problem in the use of artillery which might be stated as follows:

How shall a force of hostile artillery be made to open fire so as to distract its attention? How shall this moment of distraction be utilized for its destruction?

Let us consider the two preceding cases as the first two steps in an evolution of ideas. The successive stages will then be:

1st Stage.—1813. General Drouot places two batteries on the same line at a considerable distance apart, one of which is to be sacrificed in order to distract the attention of the hostile artillery, the other to destroy the latter by the delivery of an oblique fire. The short range of the guns of that time did not allow one battery to fire over the other.

2nd Stage.—1870. Colonel de Lajaille places a battalion of two batteries of horse artillery under the line of fire of a battalion of two mounted batteries. His guns lacking accuracy at long ranges, he sacrifices the latter batteries to occupy the German artillery while the former batteries proceed to destroy it.

3rd Stage.—1913. The solution of the artillerists is the reverse of that of Colonel de Lajaille. They place batteries to the front, on the low ground, within a short distance of the hostile artillery, so that the latter can fire upon them only by advancing and consequently unmasking, some of his batteries, which run the risk of being destroyed by the concealed artillery farther to the rear.

4th Stage.—In the future, the artillery will be assisted by aerial scouts, and the preceding solution will be used more willingly than it is nowadays. The

In the organization adopted soon after the war, each brigade of artillery was composed of two regiments. Upon mobilization, one regiment was attached to the divisional artillery of two divisions and the other regiment to the corps artillery. Thus one-half of the colonels went into a campaign with only a portion of their command.

For nearly thirty years, from 1870 to 1898, instruction in firing was limited to the school of the battery. Such firing was usually conducted as follows:

The captain director of the park marked by flags the positions which the batteries were to occupy in order to fire at the various figures. The captains placed their pieces at the indicated points and ranged, that is, determined the range to the target. Little by little, the colonels began to act as instructors. They saw that the proper number of rounds was fired and that the methods prescribed were scrupulously adhered to. After a few years, battalion practices were held and later certain regiments took part in maneuvers of large bodies of artillery at the camp of Chalons. During battalion practice, the role of the colonel was only slightly different from what it was in battery practice, for battalion practice, for many years, was nothing more than the simultaneous execution of several battery practices, the fire control being limited to the distribution of the objectives. The colonels who took part in the maneuvers of the larger bodies of artillery were the only ones who actually commanded artillery composed of several battalions.

In 1898 the 75mm matériel was issued to the regiments and the method of firing changed. The mechanism of firing changed but as long as the artillery was placed on the ridges and the objectives remained the same, from the point of view of the use of artillery, nothing was altered and service practice was held under the same conditions as it had been previously.

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reason why artillerists, today, so often hesitate to use it, that is the deliberate sacrifice of certain units, will have lost a great deal of its importance as soon as the batteries concealed far to the rear can be destroyed due to the assistance of the aerial scouts.

5th Stage.—During a battle, fights will take place between the aerial scouts, and one side will win and the other will lose so that one force of artillery will have scouts and the other will not. The artillery which has scouts that can fly at will, in order to destroy the hostile artillery, will not have to cause the latter to unmask itself and open fire. The side which secures the victory in the air is assured of success in the artillery duel while an artillery that is forced to operate without the assistance of aerial scouts is doomed in advance to defeat.

After 1900, in consequence of the lecture delivered by General Langlois, previously quoted, the method of executing service practice was greatly improved. The battalion constituted a combat unit and for fire control it was under the orders of one man. Target practice no longer consisted of the simultaneous execution of three battery practices. The battalion commander received a mission and to carry out this mission, he selected the positions and determined the kind of fire which he considered best suited the situation. The colonels took part as directors of the exercises in order that the battalion and battery commanders might be placed in the situations of war which the colonels intended.

In the last organization of the artillery (1909), each brigade of artillery was composed of three regiments. Upon mobilization, one regiment was attached to the corps artillery, the others being attached to the divisional artilleries. Each colonel now goes into a campaign with his regiment which is seldom broken up and which constitutes a combat unit, its fire being under the control of the colonel.

"It is necessary to get used to the idea that artillery fights, not by separate battalions, but by entire regiments, as in the other branches, either as a whole regiment attached to the divisional artillery as a whole or half regiment attached to the corps artillery, and the colonels and lieutenant-colonels should be prepared to exercise command under these circumstances." (General Fayolle, "Concentration of Fire and Concentration of Power.")

During the maneuvers of the officers and non-commissioned officers of the 2nd Corps, in 1913, we were present at a phase which gave a brilliant demonstration of the value of what we have just mentioned, sufficient to change the ideas of those officers who up to that time believed in the division of artillery.

The situation was as follows:

The 3rd Division was ordered to pursue the enemy who had been routed in the preceding engagement to the south of Saint-Quentin. The division passed through the town in a westerly direction and advanced towards Lesdins, 6 kilometers north of Saint-Quentin. Lesdins is the meeting point of three valleys, through each of which runs a canal, forming a kind of "Y."

The division was supported on the east by the 4th Division and on the west by the 1st Corps. It marched in two columns, each

column consisting of a brigade and the attached artillery, the two forces being separated by the Somme and the parallel canal, that is by the leg of the "Y."

The first attack of the 3rd Division caused the hostile infantry to fall back into the bottoms of the valleys forming the two arms of the "Y." Being under fire from the hostile infantry under cover in the valleys and from the artillery concealed in rear of the ridge between the two arms of the "Y," the troops of the 3rd Division found it impossible to advance further, without the support of the artillery. The artillery with the column on the right could see absolutely nothing of the hostile infantry whose fire was holding up that column. It could, however, take up position in prolongation of the left arm of the "Y," from where it could see and attack obliquely, the portion of the hostile forces opposed to the column on the left. The artillery with the latter column was in exactly the same situation. It could not see a thing of the hostile infantry opposed to it but it could support the attack of the column on the right by taking up position in prolongation of the right arm of the "Y."

This goes to show that all artillery, either divisional or corps, instead of being divided among two separate columns, should remain under the orders of a single man, namely, the commander of the divisional artillery. This officer is the only one who should decide upon the division of missions among the battalions. A minute's thought will show how unfortunate the consequences might be of so dividing the artillery that the two parts were under the orders of the commanders of the two columns.

Nowadays the colonel has charge of the instruction in firing of his batteries, battalions and regiment. He should also study his duties as commander of an artillery force, particularly with reference to preparing himself to control properly the fire of his battalions. Regimental target practice consists in the successive movements and firings that an artillery would usually require in an actual battle. It no longer consists in the simultaneous execution of a number of battalion practices, as might be almost expected, on account of the manner in which the colonels are often forced to conduct the practice for the regiment due to the lack of large enough practice grounds.

## THE PRACTICE GROUNDS FOR THE ARTILLERY ARE TOO SMALL.

Many practice grounds are so small that a battalion and, "*a fortiori*," a regiment, cannot easily deploy and the regiments are forced to hold target practice under the worst possible conditions. It is impossible to overestimate how much the lack of sufficiently large grounds has affected the instruction of the artillery and retarded, among the officers, the evolution of ideas.

Since 1870, instead of a large expanse constituting a real practice ground, the artillery has been compelled to use for this purpose, ranges with artificial targets, later, trough shaped practice grounds and finally camps of instruction on a small scale. Even today it is seldom that a regiment has available a piece of ground large enough to be used for the target practice of divisional artillery, such practices nearly always suffering from lack of time and space.

On the trough shaped practice grounds, being unable to hold service practice, all the artillery could do was to range on the artificial targets represented by figures, all idea of fire control and direction being abandoned. How was it possible to do otherwise when the ground used was such that the regulations required the batteries to fire parallel to each other? The use of such practice grounds often gave the officers absurd ideas. The following is an example of this very thing and even though it is unimportant of itself, it has its importance since it shows the danger of bad habits contracted in time of peace.

We remember our surprise, during a practice at Poitiers, when an artillery captain, a very intelligent man, too, came up to inform us, as a very extraordinary thing, that two batteries were crossing their fire. This officer, on the field of battle, would probably have hesitated to let the fire of two batteries cross. On account of always having seen the batteries of one battalion fire parallel to each other, this method, in his mind, had become a veritable dogma.

The grounds available are too small since they do not allow the proper execution of the service practice of a divisional artillery and with reference to fire control they get us into bad habits similar to the following:

On account of their lack of size, we are afraid to cross the fire of two batteries, even though this is the general thing when firing on varied ground.

On account of their lack of length, it is impossible to make use of the entire range of the guns.

On account of the limited length of time that these grounds are at the disposal of the regiments, firing must be done hastily.

We are firmly convinced that it would be better to allow the batteries, each year, 400 rounds of ammunition instead of 500, but in return to allow them the time and the ground which they now feel the need of. With this reduction in the allowance of ammunition there would be the following savings:

For each battery—100 shells at a little over a mean of 15 francs, from 1500 to 2000 francs;

For each regiment—about 20,000 francs.

For each brigade—about 60,000 francs.

With this amount of money it would seem that the artillery could secure, for the necessary length of time, all the ground that it needs, the lack of which hinders greatly its instruction.

At the present time, the artillery regiments cannot get any great benefit from target practice for the colonels can not either deploy their batteries nor have them fire in the directions called for by the terrain and the circumstances nor make use of the extreme range of the guns. In addition, all the battalions of the regiment must act together in order that the colonel may maneuver and fire with the same number of batteries that he will command in battle.

"The main object of all instruction is to accustom the troops to service conditions. Such instruction should be of such a nature and of such duration that under all circumstances, and especially in battle, everyone will be thoroughly acquainted with the proper method of operating." (Extract from an address by General Joffre during the discussion of the three-year bill.)

#### CONCLUSION.

In 1898 the French artillery was without doubt the best in the world. It was the only artillery equipped with rapid-fire guns. The supply of ammunition for target practice was ample and the officers were constantly endeavoring to improve the firing. Little by little the French artillery began to lose the superiority which it had attained over foreign artillery, as soon as the latter began to adopt rapid-fire guns.

In 1913 the artillery was furnished an increased number of both



men and horses. In all exercises, each captain was in command of a battery on a war footing and each major and colonel could operate with his command in the same condition that it would have on the field of battle in time of war. Due to this fact, they acquired exceptional skill in maneuvering and regained part of the superiority which they had lost, particularly over the German artillery, in which the captains, having only a limited number of horses, could not use all six pieces of their batteries.

Today, what is necessary to keep the artillery in the front rank of the artilleries of the world?

We must abandon the practice grounds which have become too small, since their continued use ruins the instruction.

We must use large grounds and also aerial scouts.

Both the above are necessary: The first, in order that firing may be under conditions similar to those of actual war and may employ the extreme range of the guns; the second, to assist in taking up a bold offensive which alone gives victory.

Finally, it is desirable that the officers who will command the artillery when it goes into action and are charged with its instruction to prepare it for battle should cause it to maneuver and fire under conditions as nearly as possible similar to the conditions of actual war.

[CONCLUDED.]

# INDEX

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## FIELD ARTILLERY DIRECTORY.

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*2d Regiment (Mountain).*—Col. E. A. Millar: Manila.  
*3d Regiment (Light).*—Col. G. W. Van Deusen: H. Q. and 1st Bn, Fort Sam Houston; 2d Bn, Fort Myer.  
*4th Regiment (Mountain).*—Col. Lucien G. Berry: H. Q. and 1st Bn, Vera Cruz, Mexico; 2d Bn, Texas City.  
*5th Regiment (Light).*—Col. Granger Adams: Fort Sill; Bty D, Fort Snelling.  
*6th Regiment (Horse).*—Col. E. St. J. Greble: H. Q. and Btys A and B, El Paso, Tex.; Bty C, Fort Bliss; Bty D, Brownsville, Tex.; Bty E, Laredo, Tex.; Bty F, Eagle Pass, Tex.

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- Missouri*.—Btry A, St. Louis: 1st Lieut. Walter J. Warner, 2d Lieut. Edwin R. Niehaus; Btry B, Kansas City: 1st Lieut. Roy T. Olney, 1st Lieut. Arthur J. Elliott, 2d Lieut. Harry W. Ruttinger, 2d Lieut. Harman H. Kube.
- Texas*.—Btry A, Dallas: Capt. F. A. Logan, 1st Lieut. A. C. Allen, 1st Lieut. Sanford A. Stewart, Jr., 2d Lieut. Fred M. Logan.
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*Oregon.*—Btry A, Portland: Capt. Hiram U. Welch, 1st Lieut. Frank I. Randall, 1st Lieut. George B. Otterstedt, 2d Lieut. Bert V. Clayton, 2d Lieut. Charles L. Johnson.

*Unassigned.*

*New Hampshire.*—Btry A, Manchester: Capt. Edwin L. Towle, 1st Lieut. Frank J. Abbott, 1st Lieut. Henry A. Worthen, 2d Lieut. Lucius E. Hill, 2d Lieut. Geo. W. Upton.

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Arranged by percentages in each regiment in the regular service and in each inspection district in the organized militia.

3rd U. S. Artillery .....	81 per cent.
4th U. S. Artillery.....	81 per cent.
1st U. S. Artillery.....	78 per cent.
2d U. S. Artillery.....	78 per cent.
5th U. S. Artillery.....	70 per cent.
6th U. S. Artillery.....	67 per cent.
1st Militia District .....	63 per cent.
8th Militia District.....	50 per cent.
5th Militia District.....	40 per cent.
6th Militia District.....	23 per cent.
2d Militia District.....	21 per cent.
3rd Militia District .....	21 per cent.
7th Militia District.....	20 per cent.
4th Militia District.....	8 per cent.
9th Militia District.....	5 per cent.

## BOOK REVIEWS.

Elements of Field Artillery. By Major Harry G. Bishop, 5th Field Artillery. 1 vol., 8vo. Published by the George Banta Publishing Company, Menasha, Wisconsin. Price, \$1.50.

There has long been a demand in our service for a book of ready reference on the general subject of field artillery compiled in such a manner as to be readily accessible and easily understood by officers of other branches of the service. Major Bishop has filled this need in a most admirable manner. Avoiding the air of combined mystery and superiority with which so many artillery officers in the past have confused and antagonized infantry and cavalry officers, the author has presented in a simple and concrete manner a subject matter which is of vital importance to every officer who ever expects to command a force partly composed of field artillery or a force of any arm subjected to hostile artillery fire. For this reason it is not too much to say that this book should form the part of the library of every officer of the mobile army.

There is no theoretical discussion, no fog of mathematics. The chapter on the Preparation and Conduct of Fire is necessarily slightly technical; but the technique is so clearly defined that no one could fail to understand it or be interested in it; and every other chapter of the book is taken up entirely either with well-selected extracts from the drill regulations or other standard works or else with a plain statement of essential facts or of tactical principles as applied to field artillery.

The book contains nothing not authorized by drill regulations or the most approved practice; and for this reason is especially valuable, for the reason that officers of other branches, not previously familiar with the subject, can with confidence utilize it as an authority.

One of the most useful chapters is that dealing with umpiring field artillery and the methods of checking up the laying of guns. A lack of knowledge of these points has often placed umpires in embarrassing situations.

The book is also one which every officer of the organized militia should own, as it gives a most excellent and comprehensive impression of the true relation of field artillery to the other arms and of the interdependence of all arms which is so often lacking in the militia where officers are naturally almost entirely bound up in working for the welfare of one organization and in great danger of not seeing the relation of their own arm of the service to other arms.

Major Bishop lays no claim to originality; but one cannot read his book without feeling that the field artillery and the entire mobile army owe him a debt of gratitude for having presented so well a subject which has previously been almost neglected.

Army Orders, 1914. By Captain Jas. A. Moss, 29th Infantry. Sales Agents: The George Banta Publishing Company, Menasha, Wisconsin, and The Post Exchange, Fort William McKinley, P. I. 8vo. Price, \$3.00.

This latest aid to the line officer in trying to meet the exacting requirement of army paper work will be appreciated by line and staff officers alike.



After going over all the orders published since 1894 the author has discarded everything that is not of present interest and everything that has since been incorporated in other authorized government publications like Army Regulations and Drill Regulations. The result is a compact volume containing everything that an officer requires in the way of general orders except his file of orders issued since April 4, 1914. It is the intention of the author and publishers to issue a new edition annually, so that an officer may at all times keep well informed in regard to general orders by consulting but one book.

Although the necessity for some such work has long been felt it rested with the ability and the industry of Captain Moss to furnish it to the service.

It is hard to see how an organization commander or post staff officer can get along without this handy and useful publication, as it will save hours and hours of labor now wasted in going over old files of orders for some lost order; but one cannot help being struck by the fact that it was the duty of the War Department to furnish the service with some such book, rather than to leave it to the ingenuity of one officer.

#### BALCK'S TACTICS, VOL. II.

A translation into English, by 1st Lieutenant Walter Krueger, Third Regiment of Infantry, United States Army, of the Fourth Revised and Enlarged Edition of Volume II, of "Tactics" by Balck, Colonel, German Army, has just come from the Press of the U. S. Cavalry Association.

The original work, as is well known, is published in 6 volumes: I. Infantry. II. Cavalry and Field Artillery. III. War Organization; Reports; Orders; The Service on the March. IV. Railroads; Sea Transports; Outposts; Shelter; Reconnaissance; Subsistence. V. The Science of Tactics; Tactics in General; The Battle; Retreat and Pursuit. VI. The Science of Tactics; Night Combats; Wood and Village Combats; Combat for Defiles and River Lines; Mountain Warfare; Minor Warfare; The Service of the Line of Communications.

(In previous editions Vols. II and III were entitled "Applied Tactics.")

The part of Vol. II. relating to *Cavalry*, is presented in six sections: I. General. II. The Formations. III. The Combat Operations of Cavalry. IV. Cavalry versus Cavalry. V. Cavalry versus Infantry. VI. Cavalry versus Artillery.

The part relating to the Artillery is presented in nine sections: I. Armament, Mobility, and Organization. II. The Formations. III. Employment of Artillery in Action. IV. The Attack. V. The Defense. VI. The Retreat. VII. The Employment of Artillery according to various Regulations. VIII. Mountain Artillery. IX. Horse Artillery.

Regarding the present day roll of Cavalry, the author states in the Preface to Vol. II: "In proportion as the cavalry in the operations in the Balkans, in South Africa and in Manchuria, was unable to reap successes with the 'arme blanche,' it is the more necessary that the science of war, as such, should point out that cavalry need by no means abandon shock action; that in spite of all the mechanical improvements in fire arms, saber and lance have not yet ceased to play their rôle. As highly as I value the importance of

fire arms, I am nevertheless firmly convinced that the days of the charge are not yet passed." To this principle considerable prominence is given in the book.

Referring to the Field Artillery he makes the following remarks: "The employment of heavy artillery has, of course, received thorough treatment in these pages. The events of the Russo-Japanese War give but a faint idea of the power of the modern rapid fire gun although the latter's shrapnel was so effective as to force the artillery on both sides into covered positions and to very materially protract the combats. \* \* \* The lessons of the Russo-Japanese War, however, are applicable only to guns without shields. \* \* \* Gun shields will impart an entirely new character to the artillery combat of the future. \* \* \* New Weapons, New Tactics; Tactics can not wait for the events of the next great war, but looking ahead, must endeavor to divine these changes. Nevertheless we will not be spared surprises. These will be the greater the less we have studied, in time of peace, the characteristic properties of modern weapons at their true value."

Especially interesting and instructive are the sections on Heavy Artillery, the importance of which arm is fully recognized by the author.

The same treatment and arrangement of the subject matter is retained in Vol. II as in Vol. I. of the 4th and of previous editions. The treatment represents the principle that tactical lessons must be deduced from human nature, from the effect of weapons, and from experience in war, proper regard being had for national characteristics and historical transmission. *Tactics is psychology*. The arrangement is based on a comparison with other armies, and is amplified by numerous examples from military history.

The volume contains a very detailed table of contents and a most complete index, the historical examples cited in the text being separately indexed. These features enhance its value to the military student.

The paper, typography, illustrations and binding are very good.

The translation of Vol. I appeared in the Spring of 1911. Due to the importance of the subject, its masterly treatment by the author and the excellence of the translation, it soon became extensively and most favorably known by the military profession here and abroad.

The equally excellent translation of Vol. II, eagerly looked forward to by all arms, but especially by the cavalry and field artillery, now makes its appearance at a most opportune time in view of the gigantic armed conflict raging in Europe.

Much credit is due the able translator for this most excellent volume.

CHARLES MILLER, Major, 7th Infantry.