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JANUARY-FEBRUARY

**THE
FIELD ARTILLERY
JOURNAL**

EDITED BY

ARTHUR F. CASSELS

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

**THE UNITED STATES FIELD ARTILLERY ASSOCIATION
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CLUBBING ARRANGEMENTS WITHDRAWN

Because of the increased cost of manufacture it has become necessary for the U. S. Cavalry Association and the U. S. Infantry Association to withdraw from the clubbing arrangement with the U. S. Field Artillery Association; therefore, the offer of the U. S. Field Artillery Association to obtain for its members subscriptions to the Cavalry Journal at \$1 per annum and to the Infantry Journal at \$2 per annum must be withdrawn. The Secretary of the U. S. Field Artillery Association will be glad to place subscriptions to the other magazines for members, but can do so only at the regular subscription rates of those magazines. The Field Artillery Journal can be furnished hereafter to members of other Associations only at the regular subscription price of \$3 per annum.

HENRY SHRAPNEL

Lieutenant-Colonel in the Royal Regiment of Artillery
Inventor of the "SHRAPNEL" shell



DIED—LIEUTENANT-GENERAL—13 MARCH, 1842

From an Oil-painting in the Royal Artillery Institution, Woolwich
(Painted by F. Arrowsmith, in 1817)

THE FIELD ARTILLERY JOURNAL

VOL. X

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NO. 1

Infantry-Artillery

BY LIEUT. COLONEL PAUL B. MALONE, INFANTRY

[EDITOR'S NOTE.—*The following article was prepared at the request of the JOURNAL with a view to giving to our Field Artillery officers the ideas of a distinguished Infantry officer based upon experience in the World War.*

The author's service in the recent war was of such a varied nature as to give him unusual opportunity to observe the needs of his own arm in coöperation with Field Artillery.

Colonel Malone was Chief of the Training Section, G.H.Q., A.E.F., from August 8, 1917, to February 13, 1918; commanded the 23rd U. S. Infantry, 2nd Division, Sommedieue Sector—Château-Thierry, Aisne Defensive, and Aisne-Marne Offensive; as Brigadier-General he commanded the 10th Infantry Brigade, 5th Division, in the St. Mihiel Offensive—Meuse-Argonne Offensive and up to the date of the Armistice.]

The war has brought the Infantry and the Field Artillery into such close coöperation that, broadly speaking, the two arms have merged into a single fighting unit, compelling the mutual acceptance of certain methods of combat, in order that the team may function on the battlefield with the maximum efficiency.

All other arms being auxiliary to the Infantry, a statement of the rôle of the Infantry will determine the corresponding rôle of the other arms in coöperation therewith.

Let us, then, consider these rôles from the standpoint of our latest experience in the World War. Briefly, we passed

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through the successive stages of stabilized warfare, the attack of strongly entrenched positions, the break-through and the initial phases of warfare in the open.

In the first phase Infantry occupied the ground already conquered, and its mission was to hold it against attack to the extent indicated by the High Command. The mission of all other arms was to support the Infantry in the execution of the rôle assigned it.

The methods of holding the ground during the war passed through successive phases, beginning with reliance on a dense infantry firing line charged with holding to the last extremity, and closely supported by troops of the first and second lines.

The useless loss of life resulting from this dense distribution brought about a deep extension in depth, finally developing, for each position, the system of elastic defense in three successive zones—the zone of outposts, the zone of principal resistance, and the zone of reserves. The zone of outposts was lightly occupied, and, during a general attack, was usually evacuated according to fixed methods, while on the evacuated area the defensive artillery concentrated its fire with a view to breaking up the attack by the time it reached the zone of principal resistance, which was held to the last extremity. The troops in the zone of the reserves counter-attacked according to plan.

The rôle of the Artillery was drawn in strict accordance with the Infantry plan. It contemplated a light defensive barrage in front of the zone of outposts, a dense concentration of all the artillery fire in this zone as it was progressively evacuated, reaching the maximum intensity of concentration in front of the zone of principal resistance, where it was hoped the attack would be shattered. This was stabilized warfare in its highest development.

Based upon the infantry plan of operations, the artillery plan was drawn in every detail by the Artillery Commander to produce the desired result. During the whole period in sector the artillery was fully and exclusively under the command of artillery officers up to and including the Artillery Brigade Commander,

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who reported directly to the Division Commander. Infantry Commanders exercised no direct control over the Artillery Commanders who supported them in their sectors, but, as contemplated in the plan of defense, the closest liaison existed between them at all times. The correct execution of this plan contemplated that the headquarters of the Artillery Commander supporting a sub-sector be located at or near the headquarters of the corresponding Infantry Commander; that an artillery liaison officer be located at the headquarters of the Infantry Commander; that another liaison officer be located at the headquarters of the infantry unit in the front-line position, with artillery agents of communication in the foremost infantry echelons. Paralleling the system of infantry communication from front to rear was an independent system of artillery communication, sometimes lacking because sufficient wire could not be provided for the purpose. While infantry information ordinarily came over infantry lines, and artillery information over artillery lines, yet either or both lines might be used for any kind of information in case of emergency. Such artillery liaison officers became, in effect, staff officers of the infantry commanders, to whom they reported, and framed into artillery terminology the requests of the infantry for artillery action, but they did not give orders. They were responsible for a complete knowledge of the infantry dispositions and for keeping their artillery commanders completely informed by maps, sketches, and reports as to every change in the dispositions of infantry troops, and for the transmission of any other information necessary for complete cooperation. Infantry commanders could ask for and secure accurate fire on any point accurately described in their fronts.

There can be no doubt that these arrangements were satisfactory; that during the period of stabilized warfare no question as to overlapping or conflict of command could occur; that the infantry was completely served by the supporting artillery when the latter carried out its duties as contemplated in the plan of defense, and responded promptly to the calls of the infantry for

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appropriate artillery action. Let us, then, consider the next phase, the attack of organized positions and the break-through.

The St. Mihiel, Aisne-Marne, and Meuse-Argonne offensives serve as examples of what the relation of artillery and infantry must be on the actual field of battle during such periods. In each the attack was prosecuted according to well-matured plans. Artillery was generally, though not always, assigned as supporting units for the corresponding attacking units of infantry, and the plan of attack anticipated, in so far as possible, all possible contingencies until the attacking troops had advanced approximately to the limit of the barrage, and artillery units began to advance and take up new positions. The victorious infantry was disorganized by a long advance and the loss of a large percentage of its personnel, especially its leaders. Liaison by all means, except by runners, was lost. The artillery was struggling to push forward by man- and horse-power across a terrain churned by shell fire and covered by barbed-wire entanglements, frequently several hundred metres deep. Complete dislocation of command was generally the rule, and this at the very crisis of the action, yet in order to secure the full fruits of victory the attack must be resumed. The infantry must resume the advance, or, better still, never allow it to stop. The advance must be continued either by the infantry in the assaulting echelons, or else the supporting echelons must pass through. At this moment leadership for the first time suffers a very serious test. Up to this moment everything has proceeded, if successful, according to plans well developed in advance. Commanders were required merely to play their specified rôle in the general program, but now there can be no definite program other than the broad general orders that apply ordinarily to troops in open warfare. The infantry has a definite direction of advance, and an objective generally beyond human power to attain, while the artillery units "support" the corresponding infantry units in attaining the objective.

Does it not become clear that we have upon the field a team which may be designated the infantry-artillery team, whose mission,

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instead of being separate, distinct, and well-defined, now blends into a common mission, in the successful execution of which a multiplicity of situations will develop in rapid succession, which can be handled only by the initiative of the leader on the actual field of battle? Again, is it not equally clear that upon this field of battle responsibility for decisions must rest upon the leader of the dominant arm, and therefore upon the Infantry Commander?

To these two questions, in my opinion, and in harmony with my experience, the answer must be in the affirmative. If so, there can be but one logical procedure when this stage is reached. The supporting artillery of any infantry unit falls under the orders of the Infantry Commander whom he has been designated to support, and continues in this capacity until the mission assigned the infantry-artillery team has been accomplished, and a new set of conditions permit the orderly and methodical readjustment of the responsibilities of all concerned.

Pending such readjustment there can be no doubt in my mind as to the duty of the infantry commanders with respect to their supporting artillery—they must positively command it, unembarrassed by the assumption that they must appeal to the Division Commander or to the commander of the artillery brigade for the fire which the fleeting opportunities of the moment demand should be delivered unhesitatingly.

It is, I think, futile to assume that the artillery brigade commander will be able to come forward at this time and personally command his widely dispersed units. By no means of communication yet devised will he be able to receive information of the situation in time to issue orders which can be executed along the whole division front while the division is still advancing. In the usual case he will be the recipient of tardy information that action has been taken and results attained by his subordinates in harmony with the "requests" which in future should be considered "orders" of the Infantry Commanders.

The term "order" is used deliberately. In all or nearly all of our offensives the artillery commanders who supported us

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sought information as to our artillery needs and were generally not only willing but anxious to conform to our wishes, but the hypothesis that the action of the artillery commander was in response to a request, not an order, is, I believe, totally wrong in principle.

One great consideration must dominate all others—the infantry must roll onward to the limit of power of the attacking troops to press the attack, in harmony, of course, with the mission assigned the whole command. It would seem manifest, then, that the infantry officer on the field of battle, on whom responsibility inevitably rests for success or failure, must, of necessity, command all of the units which contribute to success or failure on his front.

It is he who must decide to press onward against points of weakness, and then, by flanking operations, assist his comrades in overcoming strong resistance which they are unable alone to break. The means to accomplish this result must be under his control. The brigade artillery officer, during this period, located necessarily at division headquarters, will be able to control only through the use of the 155's not placed in support of infantry units, and by proper distribution of fire, when the whole division has been brought to a halt by strong resistance.

The recognition of these principles will produce a true infantry-artillery team, and a further principle necessary for the fullest development of the efficiency of the team will follow as a corollary; the infantry officer must know how to command the team. This leads to a brief discussion of the infantry needs and obligations during the period in question.

Having smashed through the enemy's position, and having captured the mass of his divisional artillery, the infantry finds the hostile machine guns the greatest remaining resistance to be overcome. The assaulting echelons will frequently find themselves under an annihilating machine-gun fire at close range, and will be compelled to halt and seek cover while echelons on the flanks gain ground and envelop the points of resistance. Accustomed to sending up signals for a barrage in stabilized

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warfare and getting an immediate response in accurately placed fire by the supporting artillery, the infantry is prone to think that artillery fire may be called for in the same way, and that the same prompt response with the same degree of accuracy should be expected. No such results are possible. The difficulty of keeping the artillery informed as to the location of the assaulting waves is very great.

The time necessary to transmit information cannot be disregarded. If the attack be allowed to halt until the artillery can suppress the machine guns, the attack will fail completely, and the fruits of victory will be lost. Infantry must conquer this resistance by its own fire and its own power of manoeuvre. The zone in which artillery can safely place its fire is well in advance of the assaulting waves. With present methods of communication this zone is not less than 1000 metres in front of the echelons in motion, though under favorable circumstances it will frequently be less, and as communication improves it will decrease correspondingly. The infantry, then, during this period of attack must unhesitatingly accept as its mission the conquest of all points within 1000 metres of its own assaulting waves by its own fire and its own efforts, seizing, nevertheless, upon every opportunity to use artillery fire within this zone whenever it can be done successfully. In this connection it should be remembered that it is frequently as difficult to stop artillery fire upon a point as it is to start it; many golden opportunities were lost during the war because artillery fire in our close front prevented the capture of the escaping enemy, who would otherwise have been inundated by our further advance.

Infantry armament must be fashioned in harmony with the mission above assigned, and infantry tactics must meet the test. From this it follows that the infantry must have as one of its habitual weapons a gun capable of direct fire of sufficient intensity to knock out tanks and machine guns behind cover, and curved fire with a shell practically equal in explosive effect to the H. E. shell of the 75's, this shell for use against machine

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guns in clusters of trees or woods where their exact location is uncertain. This weapon will be known as the Infantry Howitzer. It should not be confused with the accompanying gun, which is an artillery gun, manned by artillery personnel, and commanded by an artillery commander, but operating under the direct orders of the infantry commander of the assaulting battalion. The withdrawal of the accompanying gun from the artillery command is an undesirable expedient as it reduces the strength of the artillery as such, and often does not materially assist the infantry. There will still be occasions when circumstances justify its use, and the motorization of the 75's will vastly increase the possibilities of the weapon on such occasions. The Infantry Howitzer will therefore cover with direct and curved fire the entire zone 1000 metres deep in front of the assaulting waves of infantry, and as much deeper as practicable, so as to relieve the artillery from the mission of firing, during this period of attack, in the foregoing zone, and will also materially reduce the number of occasions on which the assignment of the accompanying gun will be necessary.

It follows that the Infantry Howitzer must become a powerful weapon, possessed of great mobility, and carrying large quantities of heavy ammunition. All solutions founded on the hypothesis that it will be carried forward by man-power or horse-power will probably prove unsatisfactory. The animals will be killed. The number of men necessary to carry forward adequate supplies of ammunition will be out of proportion to the value of the unit. Results, I believe, can be hoped for only in a caterpillar of great mobility, carrying both gun and ammunition, and capable of traversing any terrain passable by infantry. This Infantry Howitzer will thus combine the functions of the one-pounder and the Stokes mortar, and add tremendously to the mobility of both. The special interest of the artillery in this weapon centres about the fact that its proper development will permit the assignment to the artillery of a mission in the breakthrough which it can accomplish successfully in coöperation with the Infantry Howitzer, thus relieving the artillery of a

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task usually impossible of satisfactory execution. The artillery will merely deepen the zone of fire of the Infantry Howitzer and, when possible to do so, will reinforce the fire of the Infantry Howitzer in the zone usually covered by the latter.

The fire power of all infantry weapons must be developed and coördinated and extreme mobility maintained in infantry manoeuvre, preserving at the same time the necessary echelonment in depth to reduce casualties.

The means of communication employed in the war must be vastly improved to meet the needs of modern warfare. Radio telephony between all echelons in attack, and between air units and land units, promises most satisfactory results, while the development of signals by rockets to keep the artillery constantly advised of the location of assaulting waves will add materially to the teamwork of the infantry and artillery, so necessary to success. In any attack which penetrates to great depth the team will be pulled asunder unless the artillery can develop much greater mobility than was developed during the war. In the great offensives both the Allied and the enemy infantry ran away from their supporting artillery. The enemy had practically no artillery during the early days of June, when the 2nd Division, also without its artillery, encountered the Hun on the Château-Thierry-Paris road. A remedy can be found only by developing in the artillery mobility equal to that of the infantry over any terrain across which the infantry can attack. The artillery of the future must be able to tear through barbed-wire entanglements and advance regardless of roads in close support of the infantry at the fastest pace the latter can attain in organized attack. Again the caterpillar provides a possible solution of the mobility problem which in all probability will be satisfactorily solved in the near future. Thus, it would seem that the horse is rapidly disappearing from the actual field of battle, and that even the combat and field trains may in the near future be completely motorized.

Great changes will thus occur in the methods of open warfare, which would seem to still further increase the importance

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of a closer relation between the infantry and artillery in the perfection of the fighting team.

Summarizing, then, it would seem:

(a) That in stabilized warfare no great changes are needed in the relation between infantry and field artillery as they developed in France.

(b) That during the break-through, and until conditions permit the resumption of normal relations, infantry commanders must be recognized as the actual commanders of their supporting artillery, and must know how to command such artillery.

(c) That such knowledge can be secured only by close association, the actual transfer of infantry officers to artillery units, and artillery officers to infantry units for definite periods of service, and that no infantry officer should be allowed to reach the grade of colonel, and no officer should be allowed to reach the grade of general of the line, without demonstrating that he can successfully command the infantry-artillery team. The single list will tend to accomplish this result. Combined with standardized tests results would be insured.

(d) That the mobility of the artillery is now far below attainable standards, and must be developed in the near future so as to closely support assaulting infantry at the fastest pace the latter can attain in organized attack over any terrain passable by infantry. Studies and experiments are in progress to this end.

(e) That communication takes its place among the matters of first importance in combat, and that nearly all means of communication employed during the war must be regarded as defective, capable of great and immediate improvement, and to the problem of improving them the best thought of the Army should address itself. The Signal Corps has already made material advances along these lines since the Armistice.

(f) That infantry tactics is "the art of taking and holding ground; the tactics of any other arm, the art of supporting infantry"; the extent to which any other arm contributes to the

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success of the infantry is the measure of its relative importance. Among the supporting arms artillery occupies the first place.

These conclusions are based principally upon combat experience as commander of an infantry regiment and an infantry brigade.

Many other conclusions might be drawn from this brief and partial presentation of the subject, but, so far as the infantry and artillery are concerned, suffice it to say that the war has welded them into a unity which time and service heresies should not be allowed to destroy, and that both infantry and artillery officers should prosecute a never-ending campaign to insure that the leaders who command them in action shall be required to give satisfactory evidence that they can successfully command the infantry-artillery team.

The Invention and Development of the Shrapnel Shell*

BY A. MARSHALL, F.I.C.

(Chemical Inspector, Indian Ordnance Department).

SHRAPNEL shell differs from other shell in that it is filled with bullets and contains a bursting charge which is only just sufficient to open it and allow the bullets to continue to travel along paths not diverging very much from the trajectory of the shell before bursting. Its effective use, therefore, requires the provision of a reliable time fuze. Although the claim was at one time disputed in favor of various French and German artillerists, there is no doubt that it was entirely the invention of Lieutenant Henry Shrapnel in 1784.† The claim was fully established in a paper contributed in 1863 to the Proceedings of the Royal Artillery Institution by Captain Vivian Dering Majendie, R.A., at that time Captain Instructor in the Royal Laboratory and afterwards Sir V. D. Majendie, the first whole-time Inspector of Explosives.

Henry Shrapnel was born in 1761 at Midway Manor House, the old family residence not far from Winkfield in Wiltshire. He was the youngest of several sons, but as his brothers died without issue he became the head of the family. Otherwise, it is improbable that he would have had the means to establish his invention. He entered the army in 1779 as a Second-Lieutenant in the Royal Artillery, and after serving in Newfoundland and other places abroad returned to England in 1784 and began to investigate and experiment at his own expense on the various problems connected with hollow spherical projectiles filled with bullets and bursting charges, and with their discharge from the heavy and light ordnance of the time. In 1785 the principal features of the invention had been worked out, but its value was

* Reprint from Journal of the Royal Artillery, January, 1920.

† See frontispiece of this issue.—Ed.

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not recognized by the authorities, and he was sent to Gibraltar for four years and then to the West Indies. He afterwards, in 1793, served with the Duke of York in Flanders and was wounded at the unsuccessful siege of Dunkirk. During the retreat Shrapnel's originality came into play, for he suggested that the wheels of the gun-carriages should be locked and the guns skidded over the sands instead of being wheeled. This was done with conspicuous success.

For more than twenty years Shrapnel continued to devote all his spare time and a large part of his private fortune to perfecting his invention and bringing it to the notice of the authorities. In 1803 extensive trials were carried out at Government expense under Major Shrapnel's directions and there is a copy of a letter extant from the Carron Company a year later requesting payment of some thousands of pounds for spherical case shot sent by them to Dublin, Leith and other places and for experiments carried out by Major Shrapnel at Carron. In the next year the shell was definitely adopted by the Board of Ordnance, and Shrapnel was appointed Inspector of Artillery at Woolwich and promoted to Lieutenant-Colonel. Shortly afterwards it was used with success in the attack on Surinam on the coast of South America, and at the battles of Rolica and Vimiera in Portugal. The troubles in connection with the fuzes had been overcome to a great extent, and the shell was used largely during the Peninsular War. The Duke of Wellington wrote to Sir John Sinclair in 1808 testifying to the great benefit which the army had derived from Shrapnel's case shot in the encounters with the enemy. He considered it most undesirable that the invention should be made public, but as the inventor would thus be deprived of the fame and honor which he might otherwise have enjoyed, he should be rewarded amply for his ingenuity and science.

It would not seem that any adequate reward was ever paid, however, for in the extracts of the Ordnance Select Committee under the date 2nd June, 1852, there is the following entry: "Report of the Committee on Mr. Shrapnel's letter of the 17th

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May, 1852, requesting on behalf of the family of the late General Shrapnel of the Royal Artillery, the honour of the Board issuing an order that the *spherical case shot* be called *shrapnel shells* instead of spherical case by some and shrapnel shells by others, from the circumstance that other nations have long since done this honour of invariably attaching his name to this weapon, and because the family have not the means to afford the expense of erecting a monument awarded to the graves of other distinguished officers, but which such a distinction would be the means of representing.

"The Committee see no objection to this application of Mr. Shrapnel, and solicit your Lordship's authority for his request being granted." The original name, which had been used by Shrapnel himself was thereafter dropped and the shell has since been called invariably by the name of the inventor.

The nature of the original shrapnel shell is shown in Fig. 1, which is a reproduction of a drawing and directions supplied by Colonel Shrapnel to the Carron Company for casting twelve-pounder shells. It will be seen that he laid down definite dimensions and limits. Similar instructions were provided for three- and six-pounder shells. The interior was filled with a mixture of bullets and powder and a time fuze was inserted into the fuze hole. The bullets were driven in tightly and then a few were removed near the fuze hole to make room for the bursting charge, which was not separated in any way from the bullets.

About the middle of the last century the occurrence of numerous prematures and blinds led to modifications of the shell. The blinds were due to faulty fuzes and diminished in number when these were improved, but the principal cause of the prematures was found to be the ignition of the bursting charge by the impact or friction of the bullets. On the Continent the balls were consequently fixed by means of sulphur, pitch, plater-of-Paris or other material. Captain Boxer, R.A., Superintendent of the Royal Laboratories, considered, however, that it was advisable also to separate the charge from the bullets. First, in 1849, the bursting charge was enclosed in a

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shown in Fig. 2. In order to prevent the shell operating at the place where the diaphragm meets it, it was made extra strong there and grooves were cast in the interior surface of the shell to facilitate the opening. The bullets were embedded in resin (rosin) which was found to be better than the other materials that had been used on the Continent, as these did not pulverize sufficiently. Trials with these diaphragm shrapnel were eminently satisfactory in 1852 and 1853, as they were found to be more accurate as well as superior in other respects. During the Crimean War (1854–6) large quantities were made, but as the design had not been worked out fully and inspection was evidently weak, many of these were

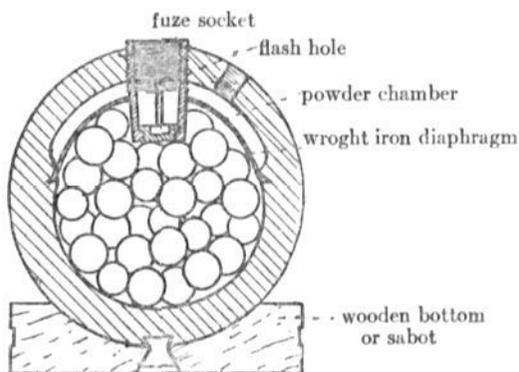


FIG. 2.—BOXER'S DIAPHRAGM SHRAPNEL.

afterwards found to be faulty. Further experiments led to the provisional approval of a design in December, 1858, and the manufacture of the old-pattern shrapnel ceased. In 1863 the Ordnance Select Committee called for reports from the various artillery stations at home and abroad. The great majority of these were very favorable, but the O.C. Devonport was apparently an extreme conservative, for he said: "The invention appears to be an instance where individual ingenuity has been suffered to exert itself in complication, costly, and cumbrous to Artillery service." The Committee did not succeed in getting any report at all from India. Diaphragm shrapnel was definitely approved in September, 1864, but by that time rifled ordnance was coming

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into use and spherical projectiles of all sorts were consequently becoming obsolete.

In 1858 rifled cannon were introduced on the recommendation of a special committee, and in the following year the segment shell was adopted on the proposal of Sir W. Armstrong for use

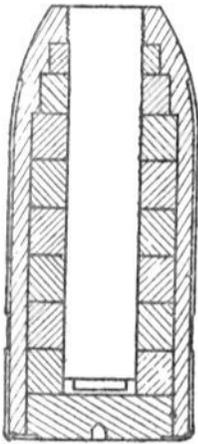


FIG. 3.
BOXER'S R.M.L. SHRAPNEL

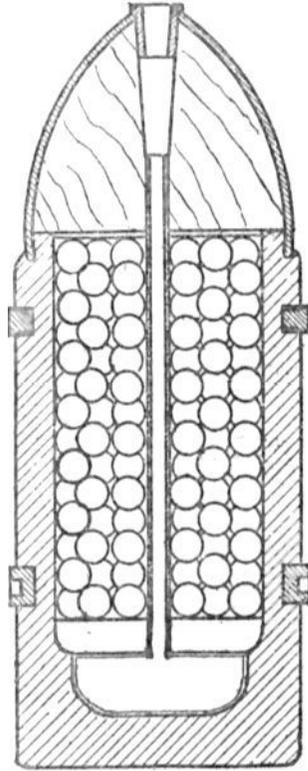


FIG. 4.
ARMSTRONG'S R.B.L. SEGMENT SHELL.

in these guns against personnel. The construction of this shell is shown in Fig. 3. It consisted of a thin cast-iron jacket inside which were rows of cast-iron segments so arranged as to assist in withstanding the pressure from the outside. Lead was allowed to flow between them to help hold them in position, and the base, through which the segments were inserted, was also retained by lead. The outside was coated also with the same

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metal, which was made to adhere more thoroughly by first treating the iron with zine. This lead coating was applied to all the breech-loading projectiles of that period to enable them to take the rifling; there was a cannellure a little way up the shell into which could flow the lead displaced from further forward. The bursting charge of these shells was considerably greater than that of the shrapnel. It was fired by means of a rapid percussion fuze, but there was often a time fuze in addition.

Lieutenant-Colonel Boxer, in 1864, brought forward designs for a shrapnel shell for use in rifled ordnance, and this, which embodied all the essential features of the modern shrapnel, proved very satisfactory. After a time it entirely displaced the segment shell which indeed is compromise between shrapnel and common shell not possessing the full advantages of either. The shell illustrated is provided with studs for use with muzzle-loading rifled guns. The small powder chamber is in the base, the powder itself being contained in a tin cup. Resting on the lip of the powder chamber is a loose wrought-iron diaphragm with a hole in the centre into which passes a wrought-iron tube to convey the flash from the fuze to the bursting charge. Above the diaphragm are the bullets embedded in rosin. The ogival head is only lightly fixed to the body of the shell and is filled in with a block of wood.

It was no doubt due to his thorough study of spherical shrapnel that enabled Boxer to lay down once for all the essential features of the ogival shrapnel for rifled ordnance. Subsequent improvements have been confined to minor details, and the greater accuracy of the modern time fuze has greatly increased the effectiveness. During the present century the Germans have endeavored to introduce a high-explosive shrapnel (Einheitgeschoss), which had a charge of T.N.T. either in the head or amongst the bullets instead of rosin, the object being to have a single shell which could be used either as H.E. or sharpnel, but the great expense and the complication, especially of the fuze, caused them to drop it during the war. The shrapnel shell, therefore, remains an entirely British invention.

Preparation and Conduct of Fire

BY LIEUTENANT COLONEL O. L. SPAULDING, FIELD ARTILLERY

[EDITOR'S NOTE.—*In an editorial in the November-December, 1919, issue of the JOURNAL we said: "The subject of 'Map Firing,' so called, will be discussed more in detail in our next issue."*

The following article has been prepared with this in view.]

BEFORE entering upon a discussion of this subject, it will be well to reach an understanding as to point of view.

We entered the recent war with a fairly well settled and very correct theory of warfare. But it was only fairly well settled; it had become a part of the mental habit of some, but not of all, our officers. Hence it was not able to stand against serious shocks.

These shocks it received, both from within and without. First, the defensive strength of the doctrine was weakened by the enormous expansion of our armies, far beyond their elastic limit. Next, we came suddenly into contact with a doctrine of war distinctly different from ours, striking us from two different angles, and each attack supported by all the prestige of long experience in war on a large scale.

Both the French and British had gone to war with a doctrine very much like ours. Both had been compelled by circumstances to accept modifications, the processes being somewhat different but the results not dissimilar.

Operations had come to a standstill on the western front, in the fall of 1914, and both sides had had to resort to the expedient of digging in and holding on. This in itself was nothing new or abnormal; but the difficulties multiplied. There was not strength enough anywhere to break the deadlock—on the part of the Allies—because Great Britain could not put forth her full strength for a long time—on the part of the Germans, because they were fighting on two fronts.

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All had to make up their minds to a long halt. The idea then grew, among the Allies at least, that a new form of warfare had come into being; the Germans, perhaps, did not go so far, by reason of the existence of their eastern front, which retained its mobility for a part of the time. The new theory is well exemplified, from the British point of view, in Lord French's book, "1914"; from the French by Col. Azan's books, "The War of Positions" and "The Warfare of To-day," both written expressly for American use.

The British now had to undertake the colossal task of making an entirely new army and using it while it was in the making. In large measure, the new army was trained at the front. It was forced to learn something, for self-preservation; it learned the things of the most direct practical utility; it had no time to study theory, but naturally assumed that the things it was learning were the whole art of war. Meanwhile, the French had to hold while the British organized; they did not have to make a new army, but they had to expand greatly under heavy stress, so that the results were very much the same.

This heresy was probably never fully accepted among the best-trained officers of either army. But even among them it gained great strength, and it entirely controlled those representatives of both armies with whom we came most directly in contact. It is true, a reaction set in late in the war, as Marshal Haig's final dispatch shows, but of course in this movement the Americans did not follow, but led.

This powerful force partially overcame the weakened resistance of our doctrine. General Pershing never yielded; but the very existence of the controversy led even many of the Americans who kept the faith to accept, tacitly, the basic assumption that position warfare was something essentially different from "open warfare"—to use, under protest, the term coined to express this difference.

But the present discussion will be based upon the contention that the difference does not exist. It has been said that Boston is not a city, but a state of mind; so position warfare is not a

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separate department of the art of war—it is a state of mind. It is that state of mind described in one of General Pershing's early training orders, quoted by him in his report of September 1, 1919:

"Trench warfare naturally gives prominence to the defensive as opposed to the offensive. To guard against this, the basis of instruction should be essentially offensive both in spirit and practice. The defensive is accepted only to prepare for future offensive."

So much for generalities; now to apply them to artillery firing.

Certain methods were observed by Americans visiting Europe early in the war, which varied from our familiar ones. Looking at them with the preconceived idea that we were dealing with a new manner of warfare, many officers assumed that these methods also must be something new; and they failed to examine the methods to see the underlying principles. A little thought, however, brings out the truth that the alterations are by infinitesimal increments and not by jumps; the development of the art is a smooth curve, and we have to look at the whole of it, past as well as present, to deduce its equation. On this assumption, let us examine a little into the theory and practice of preparation and conduct of fire.

Preparation of fire consists of determining such firing data that the first shot shall fall near the target. In making this preparation two opposing considerations must be balanced—accuracy and speed. The officer must decide, on the merits of the particular case, which shall govern.

An officer must never allow himself to fall into the habit of using one method exclusively. He must be familiar with all, must understand the special merits of each, and must be prepared to decide quickly which one best suits the requirements of his problem. When a battery has prepared its fire by rapid and approximate methods, it is desirable, if it remains in position for any length of time, to proceed to more accurate and deliberate methods, substituting the results for the original approximate

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ones as soon as they are ready. The data are generally calculated for a reference point, and the battery established in observation; in the exceptional case, where data are prepared for a particular target only, the same procedure is, of course, applicable.

The determination of a deflection involves the solution of triangles. The solution may be analytic or graphic, accurate or approximate.

Of analytic solutions, the classic form is the " p minus t " calculation, with its special modification, the "parallel method." This should be the first form taught to new officers, and no officer should ever allow himself to lose facility in it, since it finds constant application in many calculations of great utility. It is ordinarily used only for quick approximations, since where minuteness and not speed is the prime consideration there are other methods which answer better.

It is often assumed that these methods apply only where a distant aiming point is used. This is an error; the parallel method works very well for compass laying. It may be applied in several ways; a simple one is described below.

From some point not too distant from the guns determine by a " p minus t " calculation a line parallel to the desired line of fire and passing through the observation station. Take the compass bearing of the auxiliary point thus determined and transmit it to the guns. Let the executive, with a compass calibrated to the one used in taking the bearing, drop back behind the gun far enough to get a fairly long sight, and move until the gunsight has the proper bearing from him. Let the gunner, with his sight set at 3200 (or at the equivalent reading if the full circle graduation is not being used), lay on the executive's eye as he sights over the compass, and then read his deflection from any convenient aiming point, natural or artificial.

The graphic solution consists in plotting the points in question on a map or sheet of paper, constructing the angles desired and measuring them with a protractor. The guns may then

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be laid upon the selected reference point by any convenient method and a deflection read from an aiming point.

The guiding points should be determined and plotted with considerable accuracy. The direction is usually given as a compass bearing. The guns may be laid on this bearing by some plan similar to the one described above; but it is quite common to do it by means of a line of known azimuth, drawn on the map and staked out on the ground near the guns. An angle measuring instrument may be set up at a convenient point on this line, with its zero line parallel to the desired line of fire, and the gun laid parallel by reciprocal laying.

These operations require some slight skill in topographic work but are all extremely simple; one's own common sense is the only guide really necessary. We have manufactured all kinds of difficulties for ourselves by unnecessary introduction of technicalities. Details of map-making are very interesting and very important to some; the technic of surveying is important also. These things should be taught, the elements to all and more than the elements to specialists. But it is a serious mistake to take an officer and tell him you are about to teach him how to lay a gun; then start with the technic of handling a plane table. He at once gets the idea that laying a gun is a mystery; when he has mastered the mystery more or less, he considers that he has taken the first degree in a new and fascinating lodge and takes care that any new man that he instructs is impressed with the difficulty of it.

If, on the other hand, a new man is taught to lay his gun by simple means, without much in the way of instruments, he never acquires the mistaken notion that gun-laying is a mystery. Also, if he is taught surveying as surveying, he takes that also as a matter of course. If, then, at a convenient point in his training, the suggestion is made to him that his surveying will help him over some knotty problem in gun-laying, he will take to the new idea like a duck to water, and will never know that he has encountered a new idea at all.

Where first-rate large scale maps are available, the graphic

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processes may be very extensively used and might even become the standard. It is well known that this is not the case in the United States; but in order to get an idea of the true situation, inquiries have been made of the Chief of Engineers. It appears from these that the only maps now in hand on a systematic plan are those at 1/62,500. Fairly good progress is being made with this, and if appropriations continue as hoped, the work may be completed by 1932. This is too small a scale for firing, however, and the Chief of Engineers refuses even to estimate when larger ones could be looked for. And even if we had the best of maps of our own country, we could hardly afford to concentrate exclusively on a system of fire which might fail us in a foreign theatre of operations.

As an auxiliary system it is different. The map itself is then a luxury, not a necessity; the graphic solutions may be made almost as well with a blank paper and a plane table. When an officer has reached the stage of instruction just referred to, where a map or diagram is welcomed as a convenience, not looked upon either as a necessity or a nuisance, he ought to be called upon to use it constantly, not as a substitute for his other methods, but as a supplement and a check. When the graphic method can be applied under favorable conditions as to equipment and time, it is the best and surest method.

Deflection is the element of the firing data that requires the most discussion; little need be said of the others here. Range, of course, may be either estimated, measured with a range finder, or taken from the map, as may be most convenient. It can never be too accurately determined, subject always to the time limitations of the particular problem.

All artillery fire is subject to certain perturbing influences, some of which can be foreseen. When great accuracy in preparation of fire is necessary, these must be allowed for; even when not absolutely necessary, it is always desirable to do this, if time and facilities permit. The best possible data should be procured as to the behavior of the gun and ammunition, and as to the weather conditions, and the corrections calculated as often

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as may be necessary. The methods to be used are found in the range tables for the gun used. In this matter, too, we have a tendency to make difficulties by convincing the new man that there is something difficult and complicated about these corrections. In practice they are easy enough, and one comes to make them almost mechanically; if they are given only their natural emphasis in the course of instruction, new officers will never find any trouble with them.

In order that artillery fire may be directed intelligently, it is necessary to have some means of rapidly and certainly designating targets. Generally the officer who is to conduct the fire is at a distance from the fire director, and any ordinary description fails on account of parallax. The best method is by the squared map. This, however, presupposes that maps and topographical material are at hand, and that the necessary time for topographical locations is available. It would be unsafe to base our entire system upon these assumptions. Some means must be found which requires no special equipment and which can be worked rapidly. Battalions may then be brought into action with speed and with reasonable accuracy; the topographical operations may then be taken up; and, if the results are found to be better than those obtained by the quicker methods, they may be substituted.

The map methods are so simple and obvious that anyone with a little topographical knowledge and experience needs little guide. Systems of target designation without maps, however, while common enough, are generally not to be found in print; most of them have been evolved in the field as required and remain an oral tradition in the particular command. One simple and satisfactory one was described in the *FIELD ARTILLERY JOURNAL* for July-September, 1917.

When but few guns are concentrated, stations can be found from which all the fire can be observed. This is the ideal situation; *unobserved fire, no matter how careful the preparation of fire has been and how good the registration upon an auxiliary point, can never equal observed fire.* But when many guns are

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crowded into an area, and when other troops are active in it, much fire, even in the daytime, must be done without observation. But there has sometimes been a tendency to accept the unobserved fire when observation is difficult only, not impossible; this is a thing to be carefully guarded against.

All observed fire is for adjustment. All fire, except such as is directed upon a registration mark or other auxiliary point, is for effect. Circumstances determine in each particular case which is the governing consideration.

Only one method of adjustment is recognized—determining an over and a short range and progressively narrowing these limits. Adjustment may be either rough or close, but in any case it constitutes one continuous process. Dividing it into several separate stages may perhaps be convenient at times, but is generally to be deprecated as tending to unnecessary multiplication of terms and to undue technicality.

In the earlier stages of adjustment, errors of range-finding predominate over those of the guns. Hence, an initial change may be made boldly on a single observation, but any critical point must be verified by additional ones. The finer the adjustment, the more shots required to justify a change. In the later stages individual gun errors predominate. Hence, at some point in a close adjustment, it will become necessary to make individual corrections for each gun, even though they have been adjusted to shoot together as closely as possible; this adjustment, of course, is presupposed in all regulations or discussions on the subject.

The earlier, larger range changes are more or less arbitrary, their size being based chiefly upon experience. Later, the changes are based upon the accuracy of the gun; this begins when the bracket includes approximately one complete dispersion scale; the French regulations call this critical bracket *the* bracket for a particular gun and range. In our service it has become somewhat common to introduce the word *fork*, which is the literal translation of *fourchette* and is the usual English term for *bracket*. This seems an unnecessary refinement of

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technicality; even the French, in whose methods we found the distinction, feel no need for a separate technical term. There is also a tendency to over-refinement in the details of close adjustment; the desideratum is a range showing approximately equal numbers of shorts and overs, and this may be found by simple rules as quickly as by elaborate ones.

Officers conducting fire should always consider the circumstances of the particular problem and decide, on the merits of the case, to what extent adjustment should be carried. Every case is a special case; no one case, *per se*, is a precedent for any other.

There is only one system of artillery tactics recognized for our service—not several. The terms "position warfare" and "open warfare" should be avoided whenever possible; when used, it should be with the distinct understanding that they refer to different phases of the same thing, not to separate and antagonistic conceptions.

Where a distinction between the two conceptions becomes unavoidable, for the purpose of clearness and convenience of discussion, it is highly essential that "open" be taken as standard, and "position" as a special modification. *The adoption of the "position" point of view is fatal.*

The first and best chance to win, for artillery or any other mobile arm, is by speed, flexibility and accuracy of maneuver. Therefore, simple plans, involving maneuver, should always be tried first. If exterior conditions immobilize us temporarily, we must try to compensate for the loss of our best weapon, mobility, by the higher development of other possibilities. But the resulting stabilization phase must be recognized as temporary and as a necessary evil; all energies must be bent to shaking off its shackles and regaining our liberty of maneuver.

The same principles should guide us in the matter of technic. There is no such thing as a French and an American system of ranging; there is one system, expounded in different terms and from different points of view by the French and Americans. There are not several systems of preparing firing data; there is

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only one system into which methods of work with and without maps and instruments all fit simultaneously and harmoniously. The first idea of every officer and man should be to get results; if he has time and equipment, he should get these results carefully and accurately; but he must never wait idly while a slow and accurate process is being completed, if he can improvise something that will serve in the meantime. One must never permit himself to become the slave of his tools, so as to feel lost if he does not have them. He must take it as a matter of course to be without them, and must count it all clear gain if he gets them.

The artilleryman has a profession that requires and repays close study; one does not acquire a knowledge of it casually. But it is not a mystery. Let us not, then, use mysterious language for the purpose of concealing thought—or, worse yet, concealing a lack of it. No technical term and no foreign word should ever be used if plain, non-technical English can be made to answer the purpose.

There is danger that in the study of special things we forget their application and interrelation; that we fail to see the forest for the trees. We must guard against this; and also against the tendency, often noted, of looking at the name and not the thing, and making difficulties where none exist by trying to distinguish between things that are identical.

The Horse and the War

[EDITOR'S NOTE.—*Through the courtesy of Mr. Wayne Dinsmore, Secretary, Percheron Society of America, Union Stock Yards, Chicago, Ill., the JOURNAL is granted the privilege of reprinting extracts from "The Horse and the War," by Captain Sidney Galtrey, British Army, published at the offices of "Country Life," 20 Tavistock Street, Covent Garden, W. C. 2, and by George Newnes, Ltd., 8-11 Southampton Street, Strand, W. C. 2, London, England.*

The British are conceded to be past masters in the art of handling and training the horse, and the following extracts from what appears to us to be the best discussion of the subject yet published, will, we believe, be of interest to our readers.]

FROM THE COMMANDER-IN-CHIEF OF THE BRITISH FORCES IN
FRANCE

THE power of an army as a striking weapon depends on its mobility. Mobility is largely dependent on the suitability and fitness of animals for army work.

I hope that this account of our army horses and mules will bring home to the peoples of the British Empire and the United States the wisdom of breeding animals for the two military virtues of *hardiness* and *activity*, and I would add that the best animals for army purposes are also the most valuable for agriculture, commerce and sport.

(s) D.HAIG, F.M.
19th Sept., 1918.

G.H.Q.
France

WAR-HORSES
BY G. M. JEUDWINE

We combed you out from happy silences On
thymey downs;
From stream-veined meadowlands alight with crowns

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Of buttercups, where, for you, shapely trees
Made spacious canopies.

Now (day and night) unsheltered, in the mud
You droop and ache;
While ruthless hands, for human purpose' sake,
Fashion the complex tools which spill your blood
And ours in rising flood.

No deputation (yet) your wage controls,
Ungauged, unpaid
Your overtime. The war blast leaves no blade
Of green for you—poor ghosts of happy foals!—
Munching your minished doles
In ravages by human frenzy made.

CHAPTER I

INTRODUCTORY

It is certain that the people of this country, of our Empire, and of the countries of our Allies know little or nothing of what this book professes to tell—of the horse and mule that help to move the gun, the transport wagon loaded with food, ammunition or stores, and in hundreds of ways keep armies moving and make them formidable in offence and sure in defence. Surely the volume needs no better justification than this ignorance of the people. They could not well be otherwise, for I have failed to notice that our war-horses have had their agents of propaganda. The people only learn when failures are exposed and things are revealed. Our war-horses and mules have been bought, literally, by the million, and the taxpayer has contributed, and will contribute, to the many millions they have cost the State. Information and publicity bureaus have caused even the Silent Navy to break its silence so that the people should know of its existence and history-making doings. Land and air forces have wisely been exploited by experts and laymen appointed for the purpose, and one cannot doubt that every one

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is better for the little knowledge thereby imparted. But the silent, plodding uncomplaining horse or mule, each bearing the brand of national ownership, have never yet failed, and so they have never been heard of outside the armies. May I hope this volume will bring them some little credit, some little gratitude for the debt, ever mounting higher and higher, we may never pay, simply because we may never realize how great it is.

I wonder if people understand that in order to keep pace with the requirements of our armies we have had to buy horses and mules running well into seven figures. I wonder! Can you, for instance, imagine that whereas the Army possessed about 25,000 horses on August 4, 1914, we must now own at least a million? And in the interval of four years that million and many more—for, of course, we must allow for the heavy wastage from death and disease which has gone on in all the theatres of war from day to day—have had to be bought in all parts of the world and brought by our ships to Europe and the East. We have bought colossal numbers in North America, and others in South America, Australia and New Zealand, India, Spain, Portugal, South Africa, while camels, oxen and donkeys have been purchased for us in those theatres to which they were peculiarly suited. We may assume that the four or five hundred thousand bought up to date in the United Kingdom and the seven or eight hundred thousand bought and shipped from North America have been employed in this country and France in the same way as horses from Australasia would naturally be most conveniently used in Egypt, India and Mesopotamia.

You may ask if it is not a fact that motor haulage has largely displaced horses. Obviously, after the figures I have given above, it has not done so. To a limited extent it has unquestionably done so or there would be no reason for the existence of the bewildering growth of the Army Service Corps Motor Transport Companies, the immense "parks" of motor lorries in France and those other countries where the Allies are fighting, and, again, the tractors which are now part of all heavy

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siege artillery units. But what of the horses? Again let me emphasize the significance of the figures which, by the way, are necessarily vague, for reasons that must be well understood, without being too vague to convey no real meaning. I, at any rate, have often heard the remark: "But surely horses have ceased to be in modern warfare. One never, or very rarely, hears of cavalry. And isn't all the rest done by motors?" The belief is typical of the folk left behind. Hence, there may be at least one virtue in the appearance of this volume, if it should succeed in shattering the absurd notion by which our brave war-horse is denied the credit that he is so fairly entitled to.

What is the artillery that preponderates in modern warfare? The field gun, of course, which is the weapon of the Royal Field Artillery and Royal Horse Artillery. Each must have its own team of conditioned horses, and so when you count up the guns in a battery, the batteries in a brigade, the brigades in a division, the division in a corps, and the corps in our armies on all the fronts you arrive at a first calculation of the vital necessity of horses and mules in many tens of thousands, the wastage among which has to be watched with the greatest care in order that the establishments prescribed may be rigidly maintained. For easy mobility and flexibility in rapid movement are vital and essential in the makings of successful warfare.

Then with the artillery of every division there must be a Divisional Ammunition Column, which means several hundred more animals, and again there is the Divisional Train Transport, chiefly horsed by weighty draught horses, while you must also bear in mind that every battalion of infantry has its own transport of at least half a hundred animals. Think also of the tremendous variety of other units (especially those connected with machine guns and Royal Engineers), which go to make an army in being, each having horses or mules, or both, allotted to it. One has in mind Labour and Road Construction Companies, Railway Companies, Forestry Companies, units on Lines of Communication and the Medical Service.

What of the Cavalry? There is an idea that it has ceased

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to exist since those early days when it did invaluable work in the retreat from Mons. Undoubtedly it seemed to pass into the limbo of things forgotten and out-of-date during the years of trench warfare, and no doubt both first- and second-line cavalry were put to more active uses than merely watching and waiting for the word to dash into the break in the barrier that never really came. I am writing, of course, of the era of trench warfare.

Was it not Mr. H. G. Wells, that genius of imagination, who wrote during the era referred to that the day of cavalry had gone forever? It would be paying his genius and reputation a poor compliment to say that many people, both in and out of khaki, were not influenced by his pronouncement. Yet Jerusalem would never have been entered but for General Allenby's Cavalry; the crusade into the heart of Palestine was distinguished by the fine exploits of Yeomen of Warwickshire, Worcestershire, Buckinghamshire and Berkshire; but for Indian cavalry, Allenby's brilliant coup by which two Turkish armies were smashed would not have been possible; while the success and gallantry of the Dorsetshire Yeomanry at Matruh in the Senussi fill a sparkling page in Near Eastern military operations. The advance to Bagdad and beyond along the shores of the Tigris was not made possible by guns and infantry alone. So, too, in France, when comparatively open warfare displaced the stalemate of trench warfare, we had cavalry coming into its own again. With an enemy in retreat cavalry must be present to direct, aid and hurry the victorious sweep onwards. In my opinion, the day must come in the closing stages of the war when cavalry will play its own great part. It will operate at the end as it did at the beginning, but with this difference, that cavalry when used in advance in conjunction with modern methods and engines of war must be more vitally important and essential than when used in defence.

If, therefore, I have made it clear that horses and mules are necessarily taking a big share in the burden of this gigantic war, it will surely be appropriate that I should sketch briefly

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the methods adopted by our army authorities in dealing with the arriving crowds from across the Atlantic preparatory to their going fit and well on active service to France and elsewhere. In this connection it will interest the reader to draw some comparison between requirements in the South African War and the vast demands on the world's horse population since August, 1914. For instance, I find the average strength in horses and mules in South Africa was approximately 150,000. I shall not be far off the mark if I say that the strength in 1916 of animals engaged with the British Armies is close on a million. There is a startling difference between the 70,000 horses which were bought in the United Kingdom during the South African War, that is, from October, 1899, to June, 1902, and 450,000 which the United Kingdom had furnished for the Army between August, 1914, and the middle of 1918.

CHAPTER II

THE RAW MATERIAL

We shall win the war. Of course. It may be sooner or later; but though, as the Prime Minister once suggested, the road may be rough and stony, the vista of peace be still obscured by thick mists, and the climb to victory tortuous and anxious, we shall win. And when that greatest day in history comes, and praise and honors and medals are being lavished among the armies of the victorious nations, will a thought be spared, one wonders, for the horse and the mule in their tens and hundreds of thousands that have contributed to the victory? Assuredly the vast and wonderful burden they have borne will touch the horse and animal lover. He will realize how indispensable they have been to victory, how vital to the Allies' successful prosecution of the war. But the general public in the land of the preeminent thoroughbred may never quite realize, because they have never understood, the importance of the horse for war purposes. When they begin to realize how the horse and the mule have been as essential in their way to defeating the

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Huns as "shells, shells, and more shells," they will begin to understand something of the debt they owe.

They will understand why in years gone by the horse-breeding societies of the United Kingdom begged the State to aid the breeding of horses for the Army. So, too, it will be accepted as evidence of Britain's unreadiness for the World War, if such evidence be necessary, that the country's resources for horsing the Expeditionary Forces, apart from the original Expeditionary Force of "contemptibles," were hopelessly and ridiculously inadequate. How, therefore, was the tremendous deficiency made good? Whence did the millions of horses and mules come. And what has been the manner of their coming and going to and from the United Kingdom? My object is to convey some idea to the reader of how the problem of the nation's horse supply for the armies was solved; to tell something of the conquest by the imported horse and mule from North America; and why it is that of all the breeds and cross-breeds of horses in the world the one from the United States and Canada has proved paramount and incomparably the best.

What we should have done had not North America's vast contribution to the world's war-horse supply been a real factor, goodness knows. It is an uncomfortable reflection which, fortunately, need not be dwelt on. What we do know is that the amazing resources were known to exist—they were known in the South African War—and that in the early days of this war they were tapped by British Remount Commissions with astonishing speed and prodigality. There could never have been any half-hearted buying, or the flow to Europe would have been interrupted with disastrous consequences. And this, too, quite apart from the fact that France has bought as extensively in America as we have, in addition to Italy's purchases! After all, apart from the great part played by motor transport—think of France's taxicab army that issued from Paris and virtually decided the battle of the Marne!—the horse and the mule were essential for the guns, the transport, the ammunition columns, and all arms of mounted troops. The horse supply in all the

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theatres of war had to correspond *ad libitum* with the bewildering growth in numbers of men and guns.

Let me invite the reader to meet the horse and the mule as they arrive at a port in the United Kingdom and endeavor to give some idea of their personalities, their characteristics and, as impartially as may be, examine their merits and demerits. For, surely, it cannot fail to be of absorbing interest to know something of a more or less intimate nature about the horse that has made a great reputation in this war, that has saved the situation where the horsing of the armies is concerned, that, in short, has most convincingly "made good." Some day it will be revealed exactly how many horses were bought by agents of the Remount Service in the United Kingdom, and astonishing figures will be forthcoming, when the proper time arrives, to show the great numbers imported. Then it will be realized how immensely we have been dependent on the imports, and what a debt is owing to them, and at the same time to what a desperate pass we should have come had those imports not been available.

Let it be understood that in discussing the war-horse of today the individual in question is the animal officially classed as the "Light Draught." He is the outstanding success of the war. The other conspicuous success is the mule, but he is not a horse. He is just a mule—a law and character unto himself—and, therefore, calling for separate treatment, and to be judged only from his own unique and peculiar standpoint. We in the United Kingdom have produced our breeds and classes for war purposes. The Shire horse by size, weight and physique naturally filled the rôle of heavy draught. The thoroughbred, the three-quarter and half-bred thoroughbred just as naturally have played the part of the charger, and no horse ever bred in America can beat the British riding-horse with thoroughbred blood in his veins. The pony bred in these islands has been a valuable asset, and hereafter many a man will bear tribute to his charger which has been a pony and classed for service purposes as an officer's cob. The Hackney horse has been utilized,

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but this breed produced but a "handful," as it were, of the hundreds of thousands bought for our armies.

The point to bear in mind is that, though America has sent us chargers, troop horses and cobs, that country must always be gratefully remembered for the light draught. He is the horse which has come in numbers quite out of proportion to other classes. He is the horse most typical of the millions of imports. Hardiness, placidity of temper, strength and power, virility of constitution, with what is called "good heart," versatility and extraordinary activity for his size and weight—these are characteristics that have impressed themselves for all time on all who have had to do with him. The riding-horse from America is, on the whole, deceptive. He is usually high in the withers, suggesting that the shoulders are sloping and that he must carry the saddle in the right place. The truth is that the shoulder is straight more often than not, and the scapula narrow with a consequent loss of freedom in action which the riding man perfectly well understands. There are, of course, exceptions, and, perhaps, what is lost in positive correctness of action is compensated for by that measure of comfort to be derived from the "lope" or "tittupping" gait of the Yankee saddle-horse.

But, whatever the class of horse, the fact remains that when they arrive in this country they come to us raw and rough to a degree—unkempt, ragged and mere caricatures of horses. We may pass over the time they spend in the large reception and "Seasoning" Depots in America—that period during which they are brought together for inspection and purchase by the accredited buyers of the Remount Service, with their subsequent rail journey to a port of embarkation on the east coast of the United States—and introduce ourselves to them as they are first met on the transport which has brought them to the English port of disembarkation. As the war has gone on the arrangements on shipboard have improved with experience; and we may be sure that everything possible has been done to make the voyage as bearable as possible for the animals, so that loss should be avoided if humanly possible. Such minimum loss has

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been made possible, we may take it, through the employment of painstaking, conscientious and intelligent individuals in charge, judicious feeding to suit the unnatural conditions, and the observance of sanitary and hygienic conditions.

The results in such cases have been splendid. Take a recent example which came within the personal experience of the writer. A ship arrived from a port in the United States, having occupied about twenty days on the voyage. She had sailed with 1270 animals, including nearly 1000 mules, and some very bad weather had been experienced. Only one animal was lost on the voyage, through a sudden seizure which could not be combated. Let us, for example's sake, take note of these 1269 animals, for they are typical of the war-horse in the rough state, before the horse-masters of the Remount Service have "ironed" them out for their work in France.

She is a big ship, and her length, except for the interval occupied by her engines and boilers, is used to accommodate the live cargo. The great thing is that she has come safely through danger zones and that she is at last alongside the berth at her destination with the welcome aliens ready for immediate disembarkation. There is no time lost. "You can begin to unload now," says the naval officer to the Remount Officer, and the latter's men are on board and leading off the first horses and mules in less time than it takes to write this. The ship has been about twenty days on the journey, and bad weather has been experienced, necessitating the closing down of hatches. Moreover, the cleaning out has had to be carried out under difficulties which have grown more formidable as the voyage has lengthened. Below decks the atmosphere is heavy and unhealthy, and the fumes of the disinfectants mingle with ammonia gases. The horses are obviously used to what they have helped to create, and their keenness and alertness show they have suffered no more than temporary inconvenience. They seem to know that something unusual is going to happen. There is no motion on the ship; the engines have ceased to throb, and the movements of the animals in their narrow stalls or pens seem

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more insistent. They know as well as we know that they are going to emerge from their imprisonment into the sweet, fresh air and the blinding light of day. The horses know. The mules are distrustful, because it is their one thought and principle in life to be suspicious and apprehensive. They fear more trouble.

So, out of the unsalubrious, gas-laden air and the forbidding gloom of the decks below stairs the first of the horses come quietly and with marked docility down the sloping "brows," or gangways, on to a foreign soil. They blink in the sunshine, shake their heads and neglected manes, and quietly submit to the first requirements of their new military existence. Some are sullen and soberly matter-of-fact, seemingly devoid of all excitement and emotions of any kind; some are nervous and distraught, wild-eyed, and betraying fear as if they cannot understand the violent upheavals that have occurred in their usually uneventful existences. These latter snort like the ancient war-horses were supposed to snort and breathe fire on the threshold of battle. The war-horse of the twentieth century, if he be not placid and unmoved, is at least mildly demonstrative when first "joining up" in England. Perhaps he is too "used up," too weary of the sea, to protest too much; and perhaps, also, what we took to be a snort of annoyance and a dilated eye of apprehension were really nothing more than normal excitement that one unpleasant phase was over and that something unknown was being entered upon.

But the calm and placid newcomer is in an overwhelming majority. He carries himself bravely in spite of a soiled and unkempt appearance that suggests anything but the idea of bravery and the chivalry of battle. Shall we who saw and handled him then ever forget the impressions made by his coming? He came in several sizes and weights—the narrow, lightishboned rider; the heavy "light draught," which is not as heavy and imposing as the heavy agricultural horses of the United Kingdom; and the light draught with bone, size and activity for the Field Artillery and quick-moving horse transport. This latter is the war-horse that has made history, and probably there

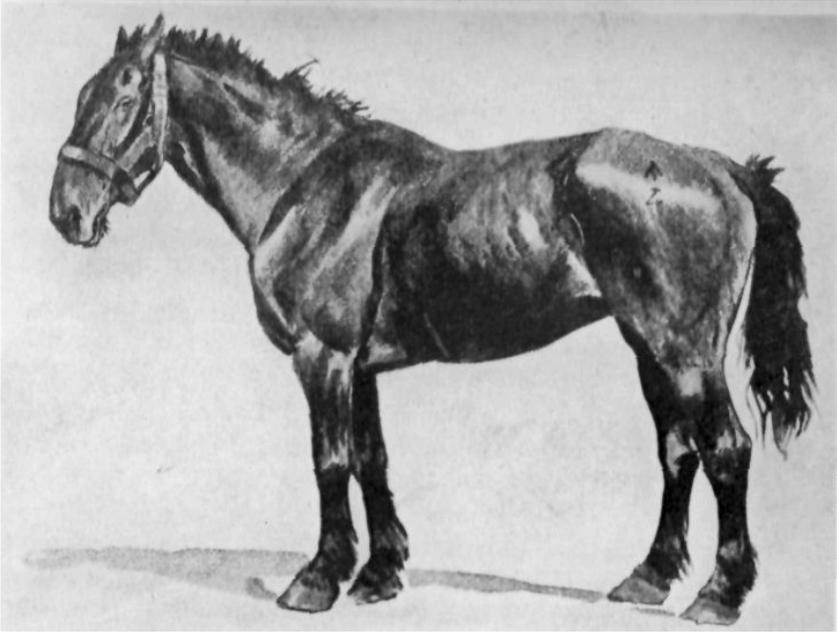
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were twenty of him to one of any other kind. He would not have impressed you then as he moved softly and quietly off the "brow." You would, perhaps, have laughed at anything less beautiful and inspiring, and you might have wondered at the boldness and seeming incompetence of our buyers on the other side. He was shoeless, long-haired, tousled-maned, ragged-hipped, and he almost dragged his tail on the ground, so long and full and caked with dirt was it. His neck had gone light and mean, his backbone stuck up like a knifeboard, and his ribs were pushing through his neglected hide.

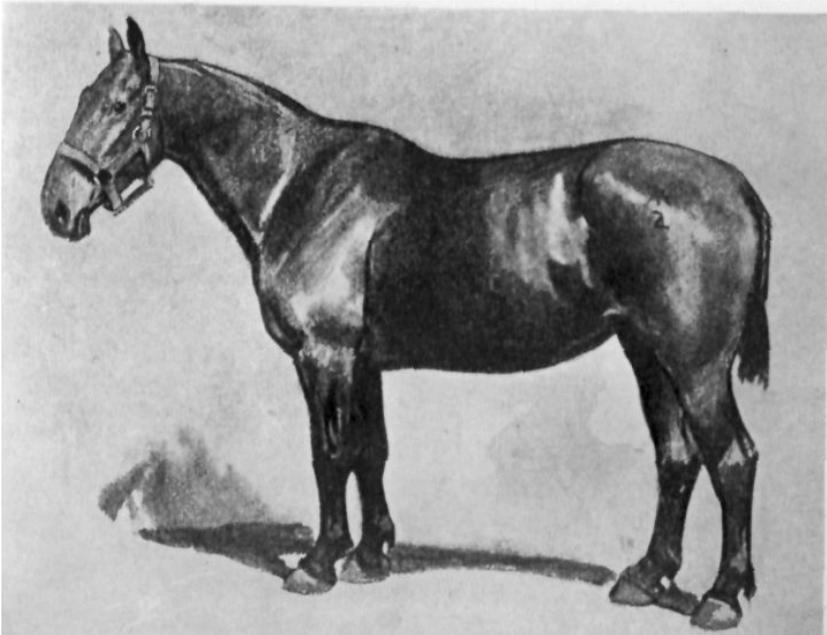
Such was our war-horse in the rough, a true and faithful representation of the raw material rendered thus unpresentable by the flesh-weariness of irksome and exacting existence on board ship. Yet, through it all, as he stamped and fretted to be free, and as he stepped on shore, he flung out a challenge to his new masters. He was willing to be born again. Blacks and greys there were in abundance. They were obviously the prevailing colors, and there were also, of course, bays and chestnuts; but the color scheme afforded a contrast to that to which we in this country are used. Blacks and grays are by no means the dominant colors here. Then, after noting the colors, you would remember that the Percheron stallions of France are chiefly black and grey, and that the war-horse from the United States and Canada is first and foremost the progeny of the Percheron horses that were imported from France through all the years.

Certain characteristics belonged to them all. Take the black horse that has just stepped jauntily off the "brow" and which has neighed with a lustiness and inquisitiveness betokening health and a vitality quite opposed to his ungentlemanly appearance. He is sixteen hands, and the first and last impression is of his thickness and sturdiness of physique.

This idea of thickness seems to belong to him in every respect. His head is plain and thick across the jowl; his neck is short, cresty and thick, and it passes abruptly into straight shoulders. Then his middle-piece is thick and capacious, and,



The Field Gun Horse from America on his arrival—"shoeless, long-haired, tousled-maned, ragged-hipped."



The same Field Gun Horse ready for France—"the well-fed, clean and healthy horse."

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though the croup is short, he is thick across the quarters because the loins are wide and inclined to be ragged. He stands on sound, clean legs, showing very little hair about the heels, but the legs are not orthodox as we would have them. The hocks are slightly away from him and he shows a tendency to be back at the knee; while the feet are big, flat and saucer-like in shape; too big, one would think, for the rest of the animal. Still, those all-important legs have splendid bone.

Yes, this black horse we are looking at is undoubtedly a stranger—a "Yank," as we have learned to designate him; but he is the great utility horse of the war, useful rather than ornamental. Through him and all of them the stamp of the Percheron in the breeding stands out clear and distinguished. It is there in the power of the quarters, the shortness and crestiness of the neck, the clean, sound legs, the hard constitution and good temper and the willingness to work.

CHAPTER III

BUYING BRITISH REMOUNTS IN AMERICA

BY BRIGADIER-GENERAL T. R. F. BATES

As quite two-thirds of the horses and practically all the mules used in the British Army in France and the other theatres of war come from the American continent, it will, perhaps, be of interest to trace the history of the Army horse and mule from its source on the other side of the Atlantic till it reaches the Remount Depots in the United Kingdom.

It is interesting to know that the first batch of American and Canadian horses arrived in England in October, 1914. In the early stages of the activities of the British Remount Commission in Canada and U.S.A. practically the whole continent was covered in the search for suitable animals. Later experience proved that it was more profitable from every point of view to centre all activities in the middle western states, which are par excellence the draught-horse producing area of the continent.

The proposition in front of the Commission was to produce

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a steady flow of horses and mules to England at a rate varying between 25,000 and 10,000 a month. This proposition may roughly be divided under three headings: (1) the actual purchase; (2) care after purchase, including railway transit; (3) embarkation.

Before describing the actual method of purchase, it will be well to make a brief analysis of the fortunes of the animal before he comes before the official purchaser. It has been found time and again that in purchasing such large numbers of animals as are in this case involved it is imperative to buy only from well-known and reliable horse dealers. Such dealers have their show-yards in large towns where the live-stock business is a big concern. The chief centres used by us are in Chicago, St. Paul (Minnesota), Sioux City and Des Moines in Iowa, St. Louis, Kansas City and also, in the earlier stages, Toronto and Montreal in Canada. In each of these centres one, or, perhaps, in some cases, two or three firms of reliable dealers engage to show to our purchaser so many horses a week.

Now the big dealer buys most of the horses he shows, both buying himself and sending out agents among the farmers, among whom he has a regular clientele. The dealer who cannot afford to put down a lot of ready money for purchase outright allows smaller dealers and also farmers to show horses under his, the dealer's ægis, the small man having to pay the dealer so much on every horse bought by the Government inspector. Such horses are known as subject horses. This latter method, though in many ways undesirable, cannot be entirely eliminated. When it has been arranged with a dealer to show horses to one of our purchasers he is given a description of the class of animal required—height, weight, etc. After a few days' experience with the purchaser the dealer gets to know the type of horse that will be taken, and tells his buyers accordingly; and very soon, if he is a good dealer, the "rejects" should be few and far between.

Dealers do not find it worth while to keep horses a day longer than necessary before they show them to the purchaser. I have often known horses taken off the train by the dealer in

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the morning and shown for purchase in the afternoon. In this way purchasers are confronted with the task of selecting suitable horses from animals in every sort of condition—some overfat and soft, others hard and fit, while many are in very poor condition. This brings us to the actual method of purchase—our purchasers have all, or nearly all, been selected from men who have had lifelong experience in buying and handling horses. Each buying centre has its allotted one or more purchasers, each purchaser buying from one or more dealers, and each having his own veterinary officer. The procedure is always substantially the same, differing only in matters of detail.

At a suitable place in the dealer's yard there is a "show alley" where the purchaser stands. Each horse is walked up to him. Unless immediately rejected, it is then walked away and trotted, and if passed by the purchaser as desirable as regards conformation, it is handed on to the veterinary officer to be examined for soundness—including being galloped (cavalry horses ridden, draught horses driven) for wind. If passed by the veterinary officer, it is put in a pen alongside—under the eye of both purchaser and veterinary officer—until the pen contains seven or ten horses, when the lot are branded with a broad arrow, purchaser's brand, etc. Manes of draught horses are hogged, tails trimmed, shoes, if any, removed; after which the animals are put in the pens reserved for purchased animals. No animal is considered actually bought until it is branded; and, in the case of heavy horses, the formality of weighing is insisted on before branding.

It may be interesting here to touch on the much-debated question as to the number of horses one man can buy in a day before he loses his "eye." Few men agree on this point, and no doubt some men can buy more than others; but after seeing many thousands of horses and mules purchased the writer is strongly of opinion that, as regards horses at any rate, there are few men who can buy more than 100 a day without laying themselves open to a strong probability of their "form" deteriorating.

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Having now got to the period when the animal has become the property of the British Government, we come next to that stage of his existence which includes safe transportation to the Atlantic seaport, and all the machinery of organization which this entails. Before entering on such a descriptive itinerary it will be as well to discuss briefly two main principles, either of which it has been possible to adopt.

An even perfunctory knowledge of the map of North America will enable any one to realize the enormous expanse of country which has to be traversed between the purchase area in the middle western States and the embarkation area on the Atlantic seaboard. One of the most serious factors which has to be contended with in the horse business in North America—a factor which I venture to think is anything but widely understood in this country—is shipping fever, which, speaking untechnically, is a sort of influenza constantly resulting in pneumonia or similar pulmonary diseases. It is a deplorable, but indisputable, fact that over 70 per cent, of horses moved over rail contract this shipping fever—some directly and others a considerable period after detraining. So far, though researches are continually being made, only qualified success with preventive serum has been achieved. We have two possible principles to adopt: Should we keep the horses in the country a sufficient time to let them get over their shipping fever before embarkation; or should we embark them with the least possible delay—the latter alternative meaning the contraction of the disease on board ship and after arrival in the United Kingdom? The former alternative has been adopted, and, in the writer's opinion, there is no doubt whatever that it is the soundest plan. It will be seen easily that the adoption of the principle of keeping the animals in America till they are "salted" entails the upkeep of considerable organization, besides that of purchase on the other side of the Atlantic.

It has been found that the minimum period of detention from time of purchase till date of embarkation is seven weeks, and, though circumstances cannot always be such as to allow

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of this being adhered to, this procedure is adopted as closely as possible. A glance at the map will show that the area in operation is most simply divided into two zones—the purchasing zone and the embarkation zone. In each of these zones there is a system of remount depots—situated as far as possible in places with suitable railway facilities.

It may be mentioned here that the chief sources of infection of shipping fever are dealers' yards, stockyards and railway cars, all of which, owing to their continual floative population, become so infected as to be almost hopeless of satisfactory sanitation. Consequently, horses, once they are purchased, are kept as brief a time as possible in any of the three. There is a law in the States which forbids any horses being kept on a train without off-loading, watering and feeding for longer than thirty-six hours. As most of the journeys from the purchasing zone are of several days' duration, it has been found necessary to form subsidiary remount depots at suitable points on selected railways, such depots being used as off-loading and feeding stations. All these depots—purchasing area, embarkation area and off-loading stations—require and possess their necessary staffs of executive and veterinary officers and subordinate employes.

Now let us come to the movement of the animal itself. We left him just purchased walking out of the dealer's yard branded with the broad arrow, etc., and the property of the British Government. At some purchase points there are depots in the vicinity, and the horses are walked over and come under the supervision of the depot officer on the very day of purchase. At others the depot may, through force of circumstances, be located a short train journey away. In the latter case the purchasing officer has to make local arrangements until he has collected a sufficeint number to fill a train, which varies from 300 to 600. In either case the animals get a rest for a week to ten days or perhaps a fortnight before starting on their real journey towards the embarkation area. During that time they are malleined in accordance with the glanders test. Those which

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show any symptoms of sickness are segregated, and from day to day the fittest are cut out and put into pens in which only those fit to travel, colloquially known as "shippers," are kept.

Every depot has its veterinary hospital and staff, into which serious cases are put. Now let us imagine we are starting off with a trainload of "shippers" from a depot in the purchasing area. First, we note that every horse on our train has had its temperature taken as a final precaution, and any found exceeding 101 degrees are rejected and retained till another occasion. We are going on a journey of about thirty-six hours. If in winter, probably in a temperature of 25 degrees below zero; if in summer, it may be 110 degrees in the shade. We are now entirely in the hands of the railway authorities, but our departure and probable time of arrival, with the numbers and classification of the animals on the train, have been wired on to the commanding officer of the off-loading depot, where we are looking forward to having the horses taken off, rested, watered and fed.

Let us arrive! We are met by various members of the offloading depot, probably including the C.O. and his veterinary officer. Off-loading is a quick process, and probably in half an hour every horse is out of the train. They are put into pens alongside the railway, when the sick and seeding-looking ones are again segregated from the fit, and hospital cases are taken off to the veterinary hospital. This, I venture to think, gives a general idea of how transportation is organized and carried out.

The next stage or stages are worked on exactly the same plan; always remembering that every horse is examined and every horse has his temperature taken before starting on any railway journey. Theoretically this should mean that only fit horses arrive in the depots in the embarkation area. Practically it means that, though it is impossible, or appears impossible, not to receive some sick horses in the embarkation depots, at any rate every possible precaution has been taken to make the number of sick as small as possible. No effort is spared to try and

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keep the embarkation depots free from being clogged with numbers of sick animals. In the embarkation depots the animals get a final rest of several weeks, which, with a system of extensive runs, makes a sort of finishing process before going on board ship.

Embarkation itself requires little or no description to remark that the final selection for fitness of animals from the embarkation depots for sending on board ship is made with even greater care than former inspections. In this connection it must be mentioned that the adequateness of the arrangements on board ship, for which the embarkation officer—also a remount official—is responsible, is a priceless factor in the matter of the condition of the animals on their arrival in the United Kingdom.

So far little or no mention has been made of the different types of horses which are purchased for the Army, nor has the mule been more than barely mentioned. Either of these subjects is worthy of more space than can be devoted to it in this chapter, but a brief description of both would appear to be desirable. Broadly speaking, three types of classifications of horses have been purchased and exported from the United States and Canada—cavalry, light artillery, heavy artillery. Experts have known for some time, and our purchasing activities have proved beyond contention, that the cavalry horse as we know him in England does not exist in North America in any numbers which are appreciable for modern war requirements. What have been bought as cavalry are the best that can be procured, but that is all. The cavalry horse is not a commercial factor in America, and that, in a nutshell, is the reason of the scarcity of the type.

The light artillery horse is the commercial equine article of the country, and has proved himself good through and through. It is a remarkable fact that after the export of hundreds of thousands of this class of horse the high standard is still being maintained. The requirements for the light artillery horse are: Height 15 hands 2 inches to 16 hands; weight, about 1200

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pounds; short on the leg; short in the back; strong in the neck and quarters, and as much quality as procurable. The best of these horses are bought from the states of Iowa and Illinois. The strains of Shire, Clyde, Belgian, Normandy and Percheron are the predominant types, and it is a matter of contention which is the best. One can only give one's opinion that, from what one has seen, a predominating Percheron strain appears to give by far the best results.

Heavy artillery horse production in any quantities in America has been a recent innovation, and it has been, and is, a very difficult matter to procure an appreciable number of such horses which possess the requisite weight. Two classifications have been purchased so far: those of a minimum weight of 1400 pounds and those of a minimum weight of 1500 pounds. It must be remembered that American and Canadian breeders hate hair on the leg, and consequently the so-called heavy horse of North America with practically clean legs never looks the weight of his cousin in this country. Complaint has been made that the American heavy horse is too light; but when the writer left America in March, 1918, there were coming in many heavy horses which would compare well with our heavy cart-horses. In this class, again, Iowa and Illinois are predominant, though many good heavy horses have been bought in Canada. The same strains are predominant, and, though the Percheron maintains his high place, the Shire blood runs him very close.

At long last we come to the mule, which, though he occupies this tardy position, is probably the most serviceable and satisfactory animal used in the war. Indeed, the writer, who has had experience of both horses and mules with a battery in two theatres of the war, would unhesitatingly say that if he had the remounting arrangements for any future war, mules would supplant horses to the greatest possible extent. Though for purchasing purposes mules in America have been divided at different times into several classifications, as a general principle mules may be regarded as being divided into three main categories—heavy mules for heavy artillery purposes in

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Eastern war theatres, light draft mules which have practically taken the place of horses in wheeled transport other than artillery and pack mules for pack transport. The heavy mules run to a height of 16 hands 2 inches or even 16 hands 3 inches, and weigh about 1300 pounds. The light draught mules are between 15 hands and 13 hands 3 inches, and weigh about 1100 pounds, while the pack mules are under 15 hands down to 14 hands 1 inch. All these types of mules are found in the middle western states of Missouri and Kansas, and the southern states of Tennessee, Texas, Alabama and Georgia, though one does not get the larger type much out of Missouri and Kansas.

In the earlier stages of the war cotton, for which industry the mule is entirely used, was down to six cents a pound and mules were easy to get and procurable at reasonable prices. Now cotton is up to twenty-seven cents a pound, sugar and other agricultural industries are at a premium, and owing to these causes, coupled with the fact that the capital number of mules available was never an inexhaustible quantity, the supply of mules is daily becoming more difficult.

In conclusion, it is only fair to describe a few of the sterling qualities of this often vilified and still more often caricatured animal. The mule is practically immune from many of the diseases inherent in the horse—notably he suffers less than half as much from shipping fever. He, as a general rule, has sounder legs than the horse. He can certainly stand more hardships. He eats less and is less particular about his food, though more particular about his water. He thrives on work. Great as has been the success of the American gun-horse, still greater, though perhaps less appreciated, have been the war qualities of the American mule. Long may he thrive!

(To be continued.)

An Artillery Study Made in the A. E. F.

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INTRODUCTION

1. THE war brought a great development in the use of artillery. In the number of guns, absolute and relative; in the number of different calibres; in the proportions of heavy and very heavy guns; in the number of types of ammunition, and in the expenditure of ammunition, we have reached figures unheard of before the war.

As presenting a picture of the development reached, the following tables have been prepared. They are prepared from the best data immediately available, but are not complete in all respects; they do not show all the various calibres employed, nor do they give any idea as to the variety of ammunition. But they are sufficiently exact to give a good idea of the number of guns used in supporting our troops in the various important engagements. The four critical dates in the operations of American troops have been selected in preparing these tables, because the figures for these dates are the most accessible, namely, July 29, the crossing of the Ourcq by the 1st Corps (moving warfare); September 12, the attack on the St. Mihiel salient (attack on fully prepared positions); September 26, first

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day of Argonne offensive (fully prepared positions); November 1, the 1st Army in the Argonne (moving warfare).

2. In computing the following statistics, the infantry strength in rifles and automatic rifles of an American combat division is considered to be 13,000 (paper strength, 13,686); that of a French combat division to be 3500 (paper strength, 3756).

OURCQ RIVER—29 JULY, 1918

Exclusive of trench mortars.

Corps	Rifles	Guns			Guns per 1000 rifles		
		Division	Corps	Aggregate	Division	Corps	Aggregate
1st U.S.	13000	144	88(1)	232(2)	11.07	6.77	17.84

NOTES.—(1) Includes only those guns in position this date. There were actually 144 corps guns assigned to the 1st Corps on this date, but the older and less mobile types had not reached position at this time.

(2) Includes only divisional and corps artillery. A considerable number of heavy guns pertaining to the 6th French Army were in operation in the army sector, but their numbers are not now available.

ST. MIHIEL—12 SEPTEMBER, 1918

Including about 200 trench mortars among divisional guns. These trench mortars did not take part in their attack

Corps	Rifles	Guns				Guns per 1000 rifles			
		Division	Corps	Army	Aggregate	Division	Corps	Army	Aggregate
1st U.S.	52000	680	282	.....	.....	13.07	5.42	.....	.....
4th U.S.	39000	588	225	.....	.....	15.07	5.77	.....	.....
5th U.S.	23000	372	168	.....	.....	16.17	7.30	.....	.....
Total...	114000	1640	675	221(1)	2536	14.38	5.92	1.94	22.24

NOTE.—(1) Including a small number of army guns which supported the holding attack of the 2d Colonial Corps.

MEUSE-ARGONNE—26 SEPTEMBER, 1918

Exclusive of trench mortars.

Corps	Rifles	Guns				Guns per 1000 rifles			
		Division	Corps	Army	Aggregate	Division	Corps	Army	Aggregate
1st U.S.	39000	420	126	103	649	10.77	3.23	2.64	16.64
5th U.S.	39000	504	131	130	765	12.92	3.36	3.33	19.61
3d U.S.	39000	524	106	150	780	13.43	2.72	3.84	19.99
Total...	117000	1448	363	383	2194	12.37	3.10	8.27	18.75

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MEUSE-ARGONNE—1 NOVEMBER, 1918

Including trench mortars.

Corps	Rifles	Guns				Guns per 1000 rifles			
		Division	Corps	Army	Aggregate	Division	Corps	Army	Aggregate
1st U.S.	39000	480	80	.....	.....	12.31	2.05	.....	.....
5th U.S.	26000	392	120	.....	.....	15.07	4.61	.....	.....
3d U.S.	26000	360	80	.....	.....	13.84	3.07	.....	.....
Total...	91000	1232	280	210(1)	1722	13.53	3.07	2.31	18.92

NOTE.—(1) Approximate.

FIRST DAY AMMUNITION EXPENDITURES

Calibre	September 12		September 26		November 1	
	Total	Days of fire	Total	Days of fire	Total	Days of fire
75.....	402,100	1.30	322,400	1.02	300,000	.....
105.....	22,000	1.36	49,000	1.16	.....	.....
155 How	57,000	1.02	57,000	0.75	60,000	.....
155 G.P.F...	9,150	0.61	31,500	1.50	20,000	.....

3. At the commencement of the war in 1914 both sides advanced with the artillery then available. For 1000 rifles the British were supposed to have 6.8 guns, the French 4.6, and the Germans about 6.4. The unexpected elements were the German and Austrian heavy guns and the vast expenditure of ammunition.

After the German offensive failed on the Marne, the battle on the western front stabilized. On the eastern front comparative stabilization also resulted after the Tannenburg battles. From that time on neither side was able to get through the opposing lines without blasting the way through. The first example of this was when the Germans massed on the Russian left in Galicia in 1915 with infantry and guns, and, driving their way through there, forced a retirement of the whole Russian line. The Russians were short of guns and short of ammunition, and could not meet the German concentrations.

In all the German offensives of the spring and summer of 1918 they massed great quantities of guns and ammunition for a drive at a selected point. Where they acted more or less by surprise, as in their earlier attempts, they got through; and,

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having abandoned the idea of limited objectives, they kept going until their own energy was exhausted; there was very little to oppose them once they had broken through. By July 15, however, the Allies had caught the new idea. They correctly located the place of attack, and, by violent and persistent fire on the troops concentrating for the attack, they broke it up and took the heart out of it, so that only in isolated places did minor penetration occur. Our own troops had previously, in May at Cantigny, shown the possibilities of artillery fire in breaking up a threatened offensive.

Similarly, in our own attacks, the infantry was covered by the intense fire of great masses of artillery, and thus assisted through the enemy's prepared positions. The infantry then progressed until stopped by hostile resistance, when it waited for the guns to come up and repeat the operation. Obviously, as the enemy's prepared positions became less and less formidable, the amount of artillery required to support these successive attacks could be reduced, assuming, of course, that our advantage in man-power continued.

The proportion of artillery to rifles is then a variable function, and depends upon the nature of the campaign, the mission assigned and the difficulties to be overcome.

LESSONS OF THE WAR

4. *Coöperation.*—We have been shown repeatedly during this war how indispensable it is to have close coöperation between the combat arms. To the lack of coöperation many tragic incidents are to be ascribed.

Coöperation is assured only where it has become a habit. It becomes a habit only when the arms are continually associated together in practice, and when personal acquaintance and mutual confidence have been established. It is impossible for a complex machine to work unless its parts are adjusted and oiled and duly controlled.

The infantry and artillery which are to work together in combat must train together and must live together to the greatest

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extent possible. Similarly the cavalry and horse artillery and the aeronautics and artillery must be very closely associated, For this reason our troops should be grouped in training areas, so that personal acquaintance may be established, so that combined action may be frequently practiced, and so that superior officers may learn how to handle the combined arms. Each arm acquires separately the elements of its technic; but the adaptation of technic to battle conditions can be assured only by means of tactical exercises of the combined arms.*

During combat, groups of artillery are designated to work habitually with certain groups of infantry. Thus, in a division, one of the regiments of 75's works habitually with one infantry brigade, and the other regiment of 75's with the other brigade. The artillery regimental commander is in close association with the infantry brigade commander personally or by liaison officer, and these two officers should think and work together in carrying out common missions. Similarly a group of corps artillery is associated with each division, the group commander having his command post close to the divisional artillery commander, so that support when needed may be quickly asked for and quickly given.

5. This close association of infantry and artillery commands does not involve, however, *parcelling out the artillery among the minor infantry* commands, and making of the division a number of small separate combined commands. This would mean losing the ability to concentrate and to adapt the power of the artillery to meet the larger phases of the action. The commander must preserve the ability to use his artillery in this larger way, and to influence its action when he sees fit through the intermediary of his divisional artillery commander. Hence the command of associated artillery does not pass to subordinate infantry commanders except in the case of special groups assigned to carry out certain definite missions.

6. This brings us to the problem of accompanying artillery. Much difficulty was experienced in recent campaigns in getting

* See Infantry-Artillery. This issue.—Ed.

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a successful solution of this problem, due in part to the inherent difficulties of keeping up with the infantry a gun which cannot be dragged by men, and in part to the inexperience of all concerned, and the lack of practice in coöperative action. Artillery must render this close support to foot troops. Sections, platoons or batteries must be assigned to infantry commands to move to positions where they can surely know the infantry's immediate needs and meet them. The psychological assistance thus rendered is often as great as the material assistance. One solution of this problem from the artillery point of view lies in the provision of a tank, mounting or dragging a 3-inch gun, and transporting the ammunition and perhaps the personnel to forward positions. If the divisional artillery is tractorized or given caterpillar mounts, as now seems possible, a certain proportion of its guns could be given armored protection similar to that of the tank. Experiments should be carried out to develop means of transportation of this kind; but in the meantime our present types of artillery must be trained to do the work. Against a broken or inferior enemy the problem is not very difficult; and even against a well-prepared and stubborn enemy ways and means may be found if both the infantry and the artillery have practiced together.

7. *Fire Action.*—An aggressive and intensive employment of fire is demanded of the artillery. This applies not only during crises of attack or defense, but during the whole time the opposing troops are in contact.

It is necessary to study continually the enemy's dispositions, not only in the front lines but also the rear. His troops are arranged in depth. The proportion in the front echelons depends largely upon whether his intentions are offensive or defensive. In rear are his reserves, his supply dumps, his headquarters, his routes of communication, reinforcement and supply, his system for transmitting orders and information. No part of this vital machinery must be allowed to work uninterruptedly. His front-line troops must be made to feel that they are in the most dangerous position of all; but if his reserves are continually

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under fire they get no rest or relief from the strain; if headquarters are shelled the staff does not work to advantage; if the supply system is constantly interfered with on the roads and at the dumps his front-line troops suffer; if the transmission of orders and information is stopped, confusion results. The object must be, in short, to harry the enemy front and rear so as to destroy his morale, lower his vitality, and weaken his will to fight.

In offensive action, while a portion of the guns are used to harass the enemy's service of the rear and prevent reinforcement and communication, the great mass of the guns is used to smother his front-line troops and neutralize his artillery. The fire is directed especially upon his strong points, on machine-gun nests, and all critical points selected by the infantry. As the infantry progress, the fire is lifted to critical localities in rear, according to prearranged signal, or, if the infantry so prefer, by time schedule, thus preventing reinforcement and interfering with retreat. Artillery liaison officers must move with the infantry commanders and keep the guns informed of the infantry needs. The guns move forward by echelon as the attack progresses.

In defensive action the artillery must break up the attack *before it starts* by intense fire on the enemy's concentration areas in front, his reserve positions in rear, and the routes of approach from rear to front. This fire commences as soon as the enemy's intention to attack is guessed, is kept up intermittently, and becomes violent as soon as evidence is gained that his troops are being massed in front. Barrage lines should be established in front of our outposts and in front of our lines of resistance, and fire opened on these lines when the proper infantry commanders so demand.

A large expenditure of ammunition and a large wastage of guns is to be anticipated from this mode of action, but experience in this war has shown that the ammunition and guns must be furnished so as to make such a mode of action possible.

The foregoing applies especially to attacks of penetration

against a stubborn enemy where a more or less carefully worked out plan of action can be prepared. In enveloping attacks, in advance and rear-guard actions, in rencontre engagements, the successful employment of the guns depends largely on the quick initiative and dash of artillery commanders, on their skill in getting the guns rapidly to good positions and bringing fire to bear on the important targets of the moment. This war has offered us little opportunity for work of this nature, but another war, at least in its earlier phases, may be full of such opportunities, and our artillery must be prepared to take advantage of them.*

8. *Counter-battery*.—The enemy guns must be kept dominated so as to protect our infantry. Counter-battery is the especial function of corps artillery, but it is often necessary for divisional artillery to assist. Divisional artillery is almost wholly employed in supporting or protecting its own infantry during periods of attack or defense. But these periods are intermittent. The action of the enemy's guns is apt to be continuous, and none of ours must be idle.

The corps artillery commander organizes the counter-battery system, allotting to divisional artillery commanders the counter-battery work to be done in restricted areas immediately in front of their own line, but employing the corps artillery for the greater proportion of the work. In order that the corps artillery commander may properly supervise the employment of all the artillery of the corps, he has an executive known as the Heavy Artillery Commander, who is in immediate charge of the corps artillery guns. At the command post of this latter officer is the *forward artillery information centre*, which is the nerve centre for collecting all artillery information from the front and rear, and for transmitting quickly this information to all concerned. It is connected with the flash ranging sections, forward observation stations, balloons, corps artillery groups, divisional artillery commanders, aeroplane service and with the headquarters of the corps artillery commander. All information from

* See article on "Preparation and Conduct of Fire."—Ed.

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the front is rapidly gathered, tested and disseminated from this station; and, similarly, from the corps artillery commander's headquarters comes all information gathered from other sources as to the enemy's dispositions and intentions. Thus the heavy artillery commander is kept constantly informed of the activity of the enemy guns, and can quickly bring concentrations of fire to bear upon those which are active. He likewise employs certain guns on harassing and interdiction fire, in accordance with instructions received from the corps artillery commander, in whose office the enemy's dispositions, movements and intentions are continually studied, and systematic plans made for effectively damaging the enemy and interfering with his activities.

The organization for conducting counter-battery thus comprises: the corps artillery commander, with his headquarters staff for operations and intelligence; the heavy artillery commander; the information centre; the forward observation stations, and an effective communication system. The machinery operates continuously in moving warfare, its degree of effectiveness depending upon the means of communication available. In very rapid continuous movements, communication may be limited to radio and motorcycle; when movement is checked telephones are installed. The essential things are to have a system for locating the enemy's guns, and an organization for making prompt and orderly use of this information in bringing fire to bear.

9. *War of Movement.*—Our training, both in tactics and in technic, must be based on the war of movement, since this type of warfare alone is productive of decisive results.

A skillful technic is indispensable, and is acquired only by much study and practical experience in conduct of fire; but ability to operate successfully in moving warfare is to be gained only if officers and men frequently carry on their practice under conditions simulating those of moving warfare.

Regimental and battalion commanders must have large experience in employing their commands on a varied terrain to meet tactical situations; and battery commanders must know

how to adjust fire under all sorts of difficulties. In actual warfare a large proportion of the fire of artillery may have to be conducted at nighttime, while in daytime, fog, snow and rain are apt to be the normal conditions.

Adjustment, or at least registration of fire, is the greatest problem. When the artillery passed from stabilization to movement in this war, one of its greatest lacks was a fully organized system of observation and quick communication adapted to the new conditions. The positions of the enemy guns and of his infantry were not known, as had been the case in trench warfare, and the machinery for getting this information, for quickly transmitting it, and for promptly securing adjusted fire were not adequate. A highly trained technical staff is needed. As the infantry moves forward, artillery regimental commanders, or their technical staff, must locate and assign observation stations and registration areas to the battalions; and battalion commanders must see that communication is quickly established, and that adjustment is secured at the first opportunity, whether on the actual target or upon registration points. Communication by radio must be employed to a large extent. Aeroplane assistance is most essential, and its value will be very greatly enhanced with the successful development of radio telephony. Flash- and sound-ranging sections must form a part of the artillery command, and must be skilled not only in locating the enemy's guns and his infantry dispositions, but also in adjusting fire in the ordinary way, and by means of high bursts.

10. *Long Range*.—The great proportion of artillery work takes place in the immediate support and protection of the infantry at ranges up to about 6500 yards. But long-range work is important. As described in preceding paragraphs, the enemy may be very seriously damaged by fire directed against his reserves in rear of the front line, and against his whole system of command, communication and supply. This system may be said to extend back for at least 18,000 yards from his front-line positions, while the centre of gravity, so to speak, of the system is probably within 11,000 yards of the front line.

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It is accordingly important that all of our guns, including our divisional guns, shall have ranges up to approximately 11,000 yards; and that in our corps artillery should be included a certain proportion of guns capable of attaining a range of at least 18,000 yards.

During the campaigns just concluded, guns having ranges very much greater than those just described were employed to fire on great concentration camps, aviation fields, or railroad junctions in rear of the opposing lines, as well as upon centres of military manufacture and supply. Undoubtedly fire of this kind is of value, as it may interfere seriously with the movement of troops and the ordinary operation of the service of the rear; while it may greatly impede manufacture and supply, due to the tendency of employees to seek cover during bombardment and thus delay work. A small proportion of these very long-range weapons is hence deemed essential.

11. *Motorization.*—Motorization of all types of military vehicles is progressing at a very rapid rate. What would have been deemed impracticable a few years ago in this line is now an everyday affair, and evidently the limit of motorization by no means has been reached. It has been possible, due to motorization, to employ many types of heavy artillery and to supply them with ammunition. In fact, all of our existing types of artillery now in use in Europe are motorized, except the 75 mm.*

The tractors supplied for our heavy guns have been of two types—the wheel type and the caterpillar type. The wheel type proved very useful on the European terrain, where roads are plentiful, and where gun positions were usually on the sides of the roads. The wheel type, however, has been replaced by the caterpillar in order to give greater mobility across country. The caterpillar tractors did excellent work for us in the latter months of the campaign. The horse had about reached his limit, and many units were consequently immobilized. Fortunately, the caterpillar tractors pertaining to heavy artillery regiments became available in certain areas, and could be used, not only for

* The question of motorizing the "75" is now being considered.—Ed.

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the work of their own regiments, but also for moving guns of all descriptions for long distances into position in the front lines, and for bringing up ammunition and supplies. These tractors were employed almost continuously on these duties in bad weather, night and day, and stood the test very well.

In May, 1919, the two 75 mm. regiments of the 3rd Division stationed in Germany were tractorized and, after less than four weeks' training, were submitted to an eight-day test, involving continuous maneuvering across country and marching on roads. A total distance of about 150 miles were covered, and the last day's march was about 39 miles. A horse-drawn brigade could not have been expected to go through the test, as laid out, without undergoing excessive loss in animals and great fatigue and hardship to the men. The tractors finished the test with only a reasonable number of casualties. It would have been desirable to halt for a day's overhauling, so as to prevent deterioration, but the tractors were evidently ready to go on if conditions had so required. As for the men, the very notable thing was the total lack of straggling, and the fact that they arrived at the end of each day's journey fresh and ready for work.

Of course, this test did not involve the difficulties of winter warfare, but it showed that, under conditions existing, the tractor could do practically all that the horse could have done and more.

If we could state that all our future campaigns would be in a country like Europe or the well-inhabited parts of the United States, we would probably soon be able to agree to give up the horse in favor of the motor for 75's as well as for the heavy artillery, it being evident that, by modifications and developments, now well within reach, the motor equipment now available can be adapted to meet the conditions of warfare in a country having good roads. The adaptability of the motor to countries like Mexico is, however, not yet fully established. In order to carry on development, and to satisfy ourselves as to the limitations on motorization, it is recommended that one 75 mm.

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regiment in each brigade of divisional artillery be motorized and that the other remain horse-drawn for the present.

12. It may be foreseen that the replacement of the horse by the motor will produce very important changes in artillery matériel and artillery methods. Thus, our guns may be mounted on caterpillar mounts, and the carriage designed so as to give an all-around as well as high-angle fire. The caisson originally designed as a horse-drawn device for carrying ammunition, may be replaced by trailers carrying a useful load relatively much greater than that of the caisson. Furthermore, motorization will permit us to store reserve batteries complete, ready for use at a very short notice, thus eliminating the necessity of collecting and training horses after war is declared.

13. *Aviation and Anti-Aircraft Artillery.*—Undoubtedly aviation will affect to a greater and greater extent the tactics of future warfare. Offensively, aviators may make use not only of bombs and machine guns, but also of cannon or torpedoes. For defense against aeroplanes, the artillery on the ground will have greater and greater responsibilities. In the zone of the armies the troops on the line, or at rest in reserve, as well as their supply depots and command posts, must all be protected; while in the rear zones, manufacturing establishments and towns must be protected.

If, due to caterpillar mounts, our ordinary field-pieces secure the ability to execute high-angle as well as all-around fire, they will assist in the struggle against the aeroplane; but special types of guns, having high velocity and hence low time of flight, must be provided.

In the tactical units, anti-aircraft guns should form a part of the regular artillery commands, being assigned to armies and to corps as needed. For the defense of the areas in rear, such as important cities, important manufacturing centres, etc., special groups of anti-aircraft artillery must be employed, which must work in close coöperation with our aviation service. There is no good reason for making anti-aircraft artillery a separate arm by itself. It should be a branch of artillery, specially organized

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to fulfill its special mission, but managed through the established artillery commanders.

14. *Gas*.—The use of toxic gases played a larger and larger part in this war so long as stabilized conditions were maintained. A very large proportion of our daily casualties were due to gas. During moving warfare gas played a less prominent but a still very important part. On the defensive it could still be used without limit, but on the offensive strict limitations had to be enforced.

A weapon so formidable as this having once been brought into play, it is hardly possible that it will not appear again in future warfare. Our military plans should accordingly be made on the basis that it is a most important factor to be taken into account.

Toward the close of the war the ordinary guns of the artillery were the principal agents for propelling and scattering toxic gases. Special gas projectors were discarded after we had passed from stabilized to moving warfare. In order, however, that we may not be caught at a disadvantage, research should be directed toward evolving perfected means of employing, as well as of guarding against, this very formidable weapon of modern warfare. The possibility of employing very large capacity bombs, dropped from aeroplanes, is to be specially studied.

(To be continued.)

Some Historical Precedents of Modern Artillery Methods

BY JENNINGS C. WISE, LATE LIEUT. COLONEL, INFANTRY, N. A.

THERE was never a truer aphorism than that there is nothing new in war.

In an article contributed to the *Infantry Journal* by the writer, entitled "The Battle of Elah," it was attempted to show that the principle of fire in combination with movement was employed by David in his struggle with Goliath. In that contest the principle of the projectile was taken to have been applied by means of the sling which wrought havoc to the dense, conventional masses of the assailants among whom the destruction was completed at the psychological moment with the "*arme blanche*" by the mobile forces of David in counter-attack. The incident, when analyzed, discloses an example of perfect generalship on the part of David, which embodied an innovation in tactical methods. One interested in following out the analogy should study carefully the biblical narrative.

A study of the more recent pages of military history discloses many other interesting precedents. There is the instance of the submarine in which James I navigated the Thames, and there is always the interesting and as yet unsolved mystery of the proposed "Dundonald Destroyer," which aroused so much excitement during the siege of Sebastopol in the Crimean War. Personally, I contend that the "Dundonald Destroyer" was no more or less than asphyxiating gas to be generated in all probability by the burning of huge piles of sulphur in combination with charcoal on the windward side of the beleaguered city. To my mind it is not at all improbable that the industrious German General Staff exhumed the "inhuman proposal" of Dundonald from the archives of the humane British War Office, and sought to spring it at Ypres as a surprise with the identical effect which its originator claimed for it.

Ludendorf asserts that gas was not first employed in the

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Great War at Ypres, but that fair notice of its more extensive use was given by its employment on the Eastern Front. However that may be, asphyxiating gas, well known to the ancients, was first proposed in the form of "Stink Shells" by Brigadier-General William Nelson Pendleton, Chief of Artillery, Army of Northern Virginia, in May, 1864.

Pendleton proposed to produce a projectile from the bursting of which within the enemy's works a suffocating effect would be obtained, and was actually engaged with the Chief of Ordnance in developing a gas shell of the desired nature when overruled by the humane military authorities of the Confederacy. It was at this same time that he urged the production for issue to the infantry of hand grenades.¹

Oddly enough, the old Artilleryman had for many years prior to the war between the States been a minister of the Gospel, and it was he who so often, when a battery commander prefaced his command of fire with the invocation, "May God have mercy on their souls!"

During the Seven Days' Fighting on the Peninsula of Virginia in June, 1862, General Lee made effective use of long-range guns mounted on armored railway cars which were shifted back and forth over the tracks of the York River Railroad along the Chickahominy. The principle underlying the employment of these mobile heavy guns was identical with that which dictated the methods of the Germans and Turks in the defense of the Dardanelles in 1915, and of the Belgians and French in the defense of Liege and Antwerp the preceding year. The term "Long Tom" was applied by the Confederates to their huge imported Whitworth rifles, with which they searched deeply into the hostile terrain. These most effective guns were constantly employed for counter-battery work. We find repeated instances of their use to silence the Federal guns.

The contemporaneous records of the Sieges of Torres Vedras, Delhi, Sebastopol, Paris, Plevna, Vicksburg and Petersburg disclose precedents for almost every method latterly

¹ See my Long Arm of Lee, p. 826, and Rebellion Records, Series I, Vol. XXXVI, Part III, p. 888.

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deemed innovations in trench warfare. The conditions at Petersburg in 1864-5 were surprisingly similar to those which prevailed in the trench warfare of France from 1914 to 1918.

Not only were incendiary shells employed for illuminating purposes, but star shells were used.²

It is of three precedents of interest to Artillerymen, of which I wish to write. The first is a well-defined instance of indirect fire employed for harassing and defensive purposes.

At Cold Harbor, during the first week of June, 1864, Breckinridge's Division and the Third Corps of the Army of Northern Virginia, less Heth's Division and Poague's Battalion of Artillery had taken position on the right of Lee's line about Gaines' farm, where his flank rested on the Chickahominy River. Pegram's Battalion, to which Dement's and Chew's Maryland batteries had been attached from the defensive forces in Richmond, occupied an excellent position on Turkey Ridge, with McIntosh's, Richardson's and Lane's battalions in order on its left. In the rear of his batteries, McIntosh posted a 24-pounder howitzer and adjusted it for high-angle fire over the ridge in its front. This first piece was so successfully employed with indirect fire against the hostile working parties opposite the artillery position that the method devised by McIntosh of avoiding the accurate fire of the enemy sharpshooters was soon more extensively employed. It was subsequently resorted to at Petersburg, where it was also necessary to screen the guns and detachments.

The second precedent is that of the defensive barrage. At Petersburg, where, as we have seen, indirect fire was employed, the practice was developed of registering and laying the defensive guns upon "No Man's Land." These guns frequently opened with great and sudden violence upon unseen targets. A clearer case of defensive barrage can hardly be imagined. We find no parallel for this instance in the other sieges referred to.

The third precedent to which I wish to refer is to be found in an instance of topographical preparation of fire which was utilized for interdiction on a defile in rear of the hostile line.

² See Long Arm of Lee, p. 398.

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Sedgwick had suffered severely on May 3, 1863. In two days he had lost over 5000 men and his position on the south side of the Rappahannock was commanded by the Confederate guns on the Taylor House Hill west of Fredericksburg. Perceiving that Sedgwick would probably attempt a withdrawal to the north bank of the river during the night, Brigadier-General Edward Porter Alexander, Chief of Artillery, First Corps, A.N.V., carefully reconnoitred the terrain and established a series of points of direction for night firing by his guns upon the fords by which a crossing would have to be made. The firing was done by Jordan's battery, which occupied a position on the bluff to the left of the River Road opposite Banks' Ford.

At 1 o'clock A.M. Sedgwick received orders from Hooker's Chief of Staff to "withdraw under cover," and between that hour and 5 o'clock A.M. effected the crossing, but not without loss from Alexander's guns. In addition to Jordan's battery, four pieces of Carter's and Fraser's batteries of Hardaway's Battalion were placed in action by Hardaway, who established deflection points for them and delivered indirect fire during the night at the rate of one round per minute upon the approaches to the ford on the north bank of the river.³

From the foregoing facts, all of which appear in the contemporaneous reports of those concerned, it is clearly seen that indirect fire methods were employed by the Confederate Artillery as practical expedients long before they were formulated in a definite system of fire. The fact is, however, these methods did not attract the attention their advantages warranted, and it remained to Langlois to give to the Artillery indirect fire in its modern stage of perfection. Nevertheless, there is much to be learned from a study of Artillery methods and operations in the war between the States, which have been sorely neglected by the modern student who is ever prone to lose sight of fundamental principles in centring attention upon the more recent methods of their application.

³ Long Arm of Lee, pp. 539-540.

Address of Dr. C. R. Mann

CHAIRMAN OF THE ADVISORY BOARD, WAR PLANS DIVISION, GENERAL STAFF.

DELIVERED AT THE CONFERENCE OF EDUCATION AND RECREATION

OFFICERS CALLED BY THE SECRETARY OF WAR AT CAMP

ZACHARY TAYLOR, KENTUCKY, DECEMBER

9TH, 10TH, AND 11TH, 1919

A GREAT deal has been said this morning about the part that this recreational-educational program is playing in the military training of the army. You are doubtless all impressed with the facts of the war experience, and therefore you must all recognize that educational and vocational training are essential in making a good soldier. When you analyze it carefully, you find that a good soldier is also a good citizen; or *vice versa*, a good citizen is also a good soldier. Hence the development of this educational program from the point of view of obtaining military efficiency is very closely parallel to or tied up with the general educational problem of this country in developing good citizens.

The essential features of this military program have already been outlined to you. I would like briefly to contrast the situation in the army with the situation in civil life, for the purpose of pointing out the opportunity which the army has at the present time of making a very definite, positive and large contribution to the solution of the educational problem for the nation at large. The benefits of this program are not limited to the army by any manner of means. It is a problem and an activity which has a very definite and important bearing on the future development of civilian education in this country.

For the purpose of comparison, I am going to mention a few of the leading facts concerning the development of public schools and civilian education, to show you what the various elements have been that go to make up free educational systems

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at the present time. We can then understand the contrast between the army schools and the civil institutions.

In 1636 the Massachusetts Bay Colony, "fearing to leave an illiterate ministry to the churches when our present ministers shall lie in the dust," established at Cambridge the university now known as Harvard University. This institution at once assumed the position it has ever since so honorably maintained of leadership in American education. We must not forget, however, that it was founded and its early curricula and customs were designed to save the colonies from the curse of an illiterate ministry.

After having thus provided for the higher education of the clergy, the Massachusetts Bay Colony in 1642 passed its first school law. This law said that since it was of interest to the Commonwealth that every one should be trained in some trade or gainful occupation that was of benefit to themselves and to the Commonwealth, therefore the selectmen of the town should see to it that every child within the town was given an opportunity to become an apprentice and learn a useful trade. The selectmen were authorized to expend public money to furnish the equipment for the children and to pay the teachers. This was the first public school law of this country. You notice that its object was to make the children of the town, or Commonwealth, productive citizens—to teach them to earn a living.

Five years later this law was succeeded by another one, which begins: "It being one chief project of that deluder Satan" to catch men unawares by keeping them in ignorance of the Bible, by keeping them illiterate; therefore, it is a duty to every town to establish a school, and keep a teacher who can teach children to read and write. The teacher should also be able to prepare youth so far as to be fitted to enter the university. One of the first acts of the Continental Congress (1787) was a school law which provided that one section in every new township should be set aside forever for the support of schools. The reason for this act is thus given in the statute: "Religion,

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morality and knowledge being essential to free government, education shall forever be encouraged."

These four early laws provided four different aims for education. These were: (1) to train the clergy; (2) to train children to earn a living; (3) to teach reading and writing so as to be able to read the Bible and so avoid the clutches of that "old deluder Satan"; and (4) to foster religion, morality and knowledge as the foundation of free government.

Unfortunately, the law of 1642, which justified the expenditure of public money for education on the ground that it trained men to make a living, fell into disuse, because the apprentice laws were then in vogue, and it was not regarded as part of the school system to train men to earn a living. Hence, reading, writing and general education to prepare for college came to be regarded as the chief functions of the school. This tradition has come down to us, although the real justification, as history shows further back, for the expenditure of public money for free education lies in the fact that the schools make the citizen, or the child, a productive citizen, able to earn his own living, and therefore not a charge on the community and the poorhouse in his old age.

During the War of 1812, when commerce was crippled, it became evident that this country would have to develop its industries and become a productive country. We were then largely relying on England for manufactured articles. It at once became necessary to make this country self-supporting as far as manufacturing industries went. Hence, the demand for teaching people to do useful things so as to be productive citizens has developed with increasing strength ever since. In 1825 The Franklin Institute of Philadelphia was established, and in 1829 The Mechanics Institute in Ohio was founded for the same purpose. Many schools of that kind were later established for the purpose of training men to become productive workers. This development finally culminated in 1862, during the Civil War, in what is known as the Morrill Act.

The Morrill Act guaranteed certain public lands to the

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states for the purpose of establishing schools to train the workers of the country to become useful citizens. About the same time technical schools began to flourish, and since then the higher development of the public-school system for teaching humanities and the training of engineers in the higher technical branches have been progressing side by side.

At present these various aims in education are expressed in a variety of schools. There are law schools, divinity schools, medical schools, physical training schools, manual training schools and many others. Each emphasizes one or more of the special phases or aims of education, but few and rare are the schools that aim at the complete education of the man. In the curricula methods of all of these schools the emphasis is invariably placed on teaching subjects. The teaching of men is seldom a conscious objection for the work.

The point I wish to emphasize in mentioning these few facts of our educational history is that there has been no coherent attack on the educational problem on a national scale. As things have developed, one group of men has come along with certain hobbies that they push and work until one particular phase of education is developed with a certain degree of success. Then another group of men come along and develop another idea, so that another phase of education is developed in an abnormal way. The results of this uncoördinated development were evident when the country began to mobilize an army. The first thing discovered was that over 30 per cent. of the men were illiterate. Then from 30 to 32 per cent. of the drafted men were found to be physically unfit. Again, there was by no manner of means a sufficient number of technicians and mechanics for the army. It seemed an almost hopeless case when it came to manning the army with skilled men. What happened? The army was compelled in its trouble to gather teachers, civilian and military, and skilled mechanics who had technical knowledge in some particular branch of education and to create schools and an emergency system of education.

In like manner, during the war, an emergency system of

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recreation and welfare work was developed in the army by the national welfare societies, under the direction of the Commission on Training Camp Activities. This work demonstrated the power of recreation and social life in the building of fine men and good soldiers.

These two emergency systems contained within the military training every element of a complete educational system. The three can be welded into a coherent and symmetrical system of national training. This is what the War Department is doing.

You recall from the reports you have heard this morning that the control of the activities in the army is now coordinated in a single place, the War Plans Division. There are three training branches: the Training and Instruction Branch, which has charge of military training and all things pertaining thereto; the Education and Recreation, the functions of which were described this morning; and the R.O.T.C. branch, which has to do with the military training in civilian institutions. This is the first time in the history of this country that there has been a single organization charged with the duty of dealing with the whole problem of education on a national scale.

There are 83 different agencies in Washington, each of which is responsible for some particular phase of education or vocational training, or the establishment of playgrounds, and what not. There are 83 of them; but the army organization is the only organization which is trying to combine in a coherent system the essential elements of a sound, upstanding man who is not illiterate, to give him a chance to develop his own abilities to the best possible extent, to make him able to earn his living, to develop in him a sense of service, with the ability to fight if necessary, and to turn him back to the nation a well-rounded, reliable citizen.

This being the case, any development of any experiments the army makes have a fundamental significance to the development of education in this country. May I suggest, then, two or three directions in which the army has particular chances for making real contributions in the way of national educational

ADDRESS OF DR. C. R. MANN

development. A few years ago I was asked by the National Engineering Societies to make a study of engineering schools. I began by visiting a number of engineers who were employing a large number of graduates of these schools, endeavoring to find out what they thought of the product, and what suggestions they had to make as to things that might be done in engineering schools in order to strengthen the output. I was very much impressed by the fact that when I asked these men who had experience in engineering work which schools turn out the best product there was a surprising unanimity of opinion that they got the most satisfactory men from West Point. This puzzled me for a long time. Finally I went up to West Point and investigated. I found that, according to my judgment, the method of instruction in the academic subjects was far less efficient than in many colleges; that is, they don't teach mathematics and history and other academic subjects as well in West Point as they do in many of the civilian colleges. But there is something about West Point that develops something in the man which made these engineers say that they preferred the West Point man to the ordinary college graduate. Further study of the paradox finally led to a definition of what the engineers considered essential in a man to make him a success. Their first requirement—the first element of success in the young man is character; the second is judgment; the third is ability to understand and know men; the fourth is ability to administer, and get things done; the fifth is knowledge of his subject; and the sixth is practical technic or ability to do things with his hands.

It is now clear why engineers prefer the West Point man, or the West Point system. It is because military training and military discipline are important factors in developing these personal qualities that count most with a man when he enters the struggle of civil life. Therefore, I have been an ardent advocate, as you know, for the introduction of military training in civilian schools for the purpose of strengthening the schools along that line. Conversely, I am an ardent advocate

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of academic training in military camps for the purpose of turning out a better soldier. Thus the army has a very definite contribution to make to the public schools, and the public schools have a very definite contribution to make to the army. The plan that has been developed in the War Plans Division contemplates, as you notice, the coordinating of all the activities and training that are necessary to develop a fine soldier or a fine civilian. He will have his physical training, and his school training, and his military training, and also his general education, to make him an intelligent citizen, and teach him what is going on in the world, and how to deal with it. He will have a chance to learn to earn his living, to be skilful with his hands. He will have an opportunity for religious and moral instruction. He will have athletics and entertainment that he enjoys, and so on. In fact, it is an undertaking on a large scale to develop an educational system which is well rounded, well balanced, and which gives coherent training in a systematic and thoroughly sound manner.

This is a very ambitious thing to undertake. It is a thing that has been done on a small scale, now and then, in one school or one institution. The army is attempting, with its usual "punch" to do that with the whole army—several hundred thousand men in two or three hundred posts. The army will do it.

It is a very inspiring thing for a civilian who has slept a great many years in a faculty to work in the army where men know how to get things done promptly. This is the largest single educational enterprise that was ever undertaken on a democratic basis. There have been equally large educational enterprises undertaken—in Germany for instance, but on an autocratic basis. That is not what the army is doing. The army is working on a democratic basis; we are looking to you all to make a contribution. There are enormous possibilities for good in it. If the army does nothing more than to turn back to the nation every year seventy-five or a hundred thousand men who have been developed according to the program that

ADDRESS OF DR. C. R. MANN

is laid down, it will make a large contribution to the national defense, not only against an armed foe, but also against subtle attacks of the I.W.W. and Bolsheviki and other propaganda of that sort.

If you turn out, say, seventy-five or a hundred thousand men who have been through this training you will do a great service to the country. The service will be greater if Congress adopts a universal training law. The only constitutional grounds upon which Congress can enforce a universal training law which is compulsory, are those of national defense. Therefore, any universal training law that is constitutional must naturally make the army the centre of the training activity. Therefore, this experiment of developing for three hundred thousand men an educational system which will satisfy the demands of the public for sound training of productive citizens is preliminary to developing a system of universal training. If Congress should pass a universal training law to-morrow and ask the army to administer it, there would be a large chance of failure, because the army has had no experience in that line. But let the army work on it this year, and next year, and the army would make it efficient. If Congress, then, passes such a law, the army would make a great success of it. Therefore, the significance of this is very large with respect to universal training. The work you are doing is not only a question of military efficiency—it is a question of national education. It is a question of how to handle the young men of this country so that we will have an upstanding young manhood, a source of strength against every kind of peril. If you see this vision you must realize that it is well worth putting all the energy and all the enthusiasm you have in this work. If you make as good a job of this as you did of the late war, you add one more achievement of the army for national service in addition to the many fine victories the army has already won.

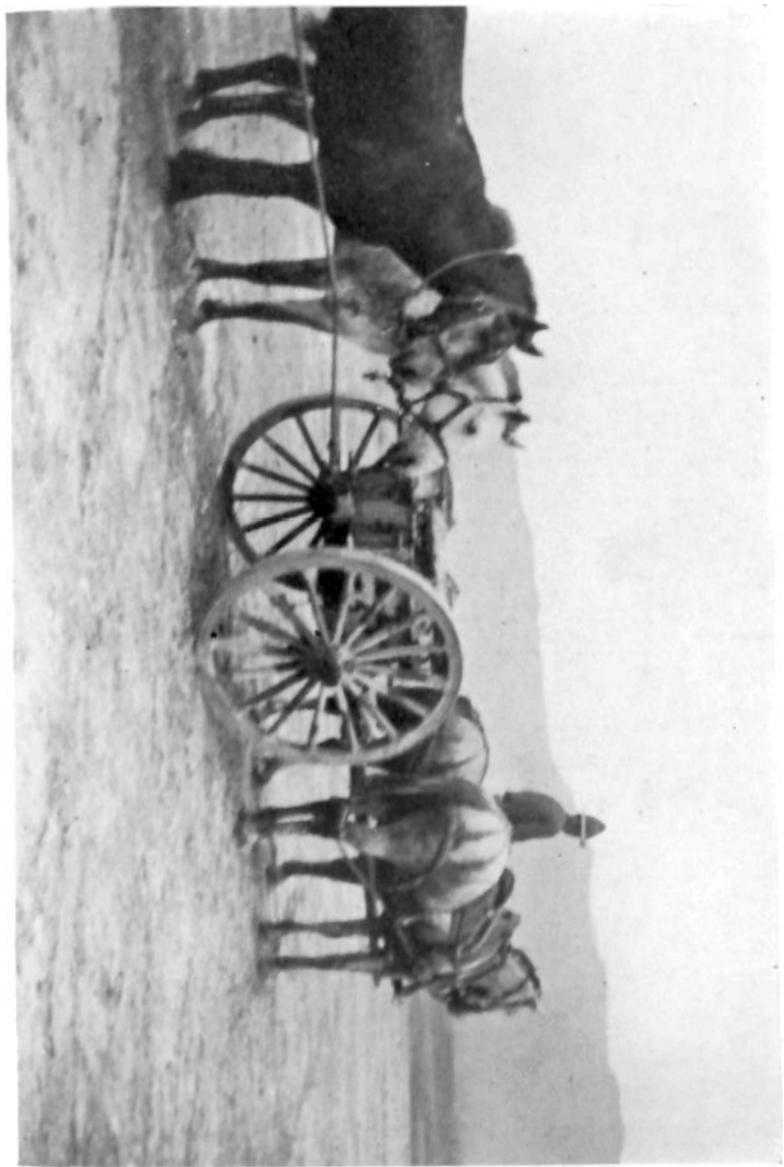
Horse Exercise with a Moving Picket Line, 82nd Field Artillery

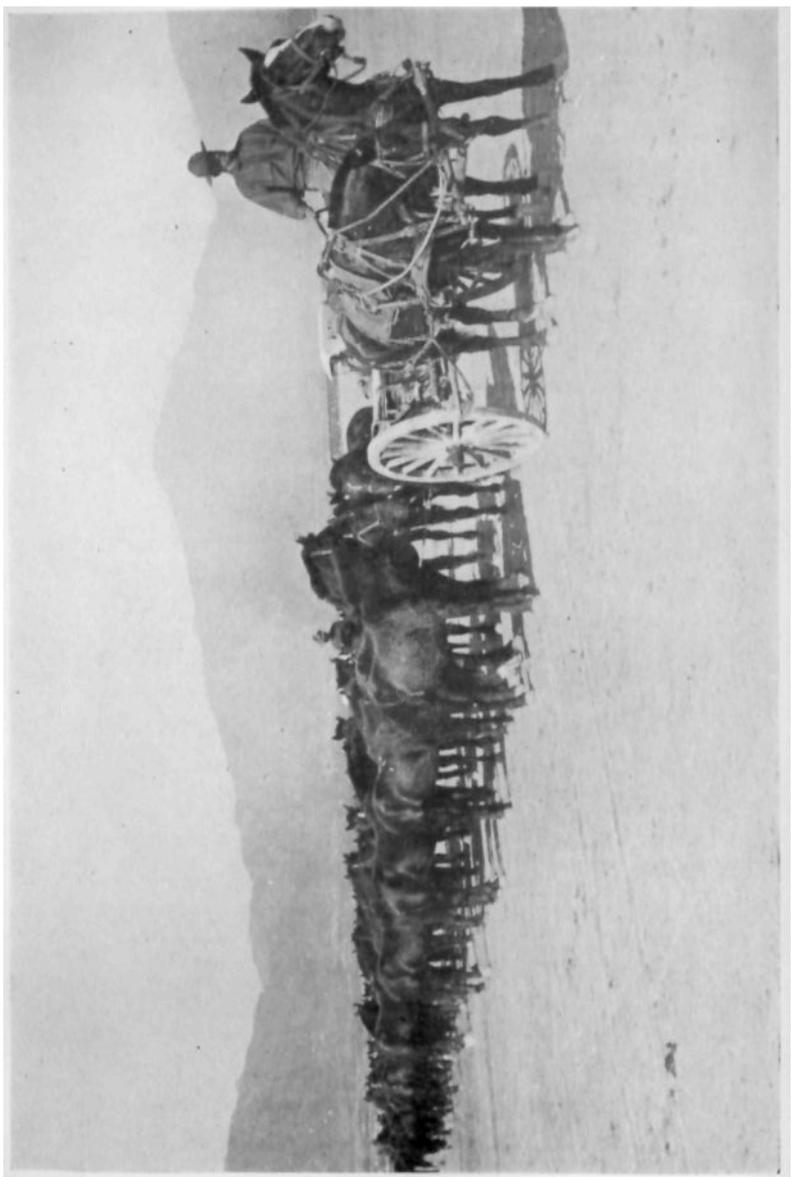
[EDITOR'S NOTE.—*The following description of a "Moving Picket Line," prepared by Colonel H. L. Newbold, 82nd Field Artillery, is published as of interest due to the depleted personnel from which some of our regiments have suffered.*]

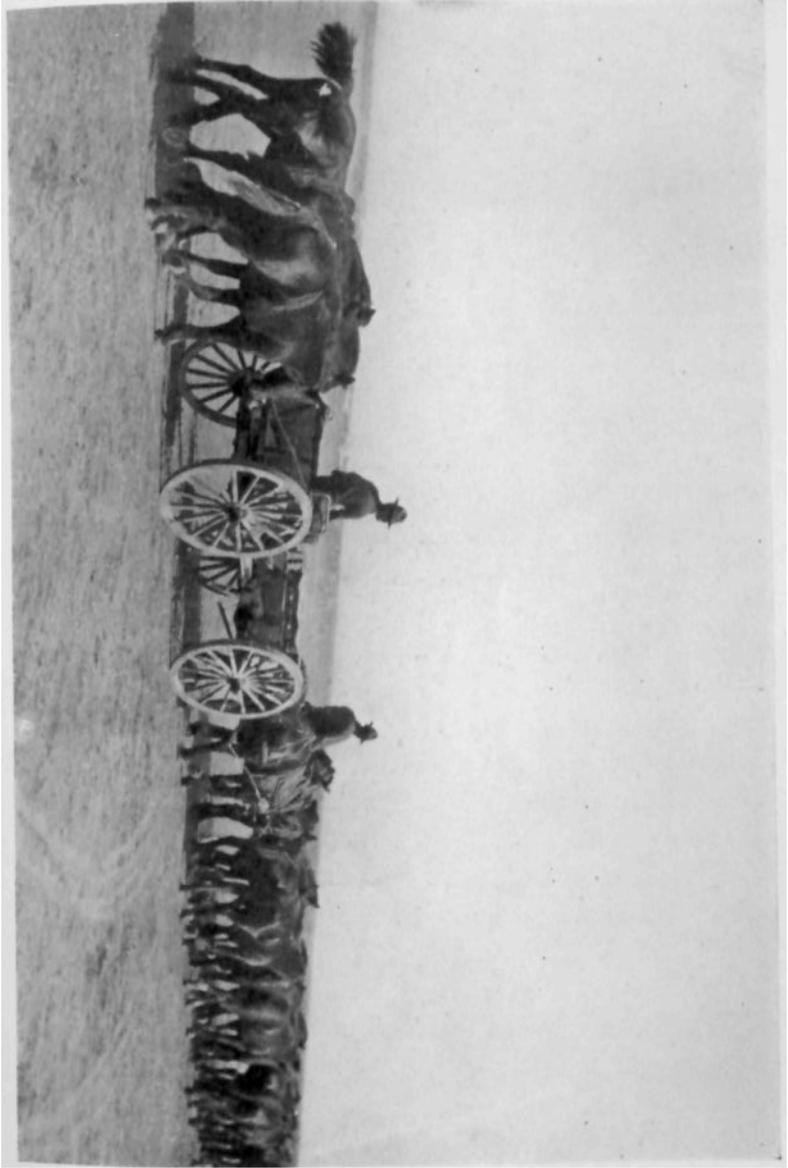
WHILE no originality is claimed for the method of exercising horses as described below, it is felt that other regiments, handicapped by a shortage of men, might find some suggestion of value.

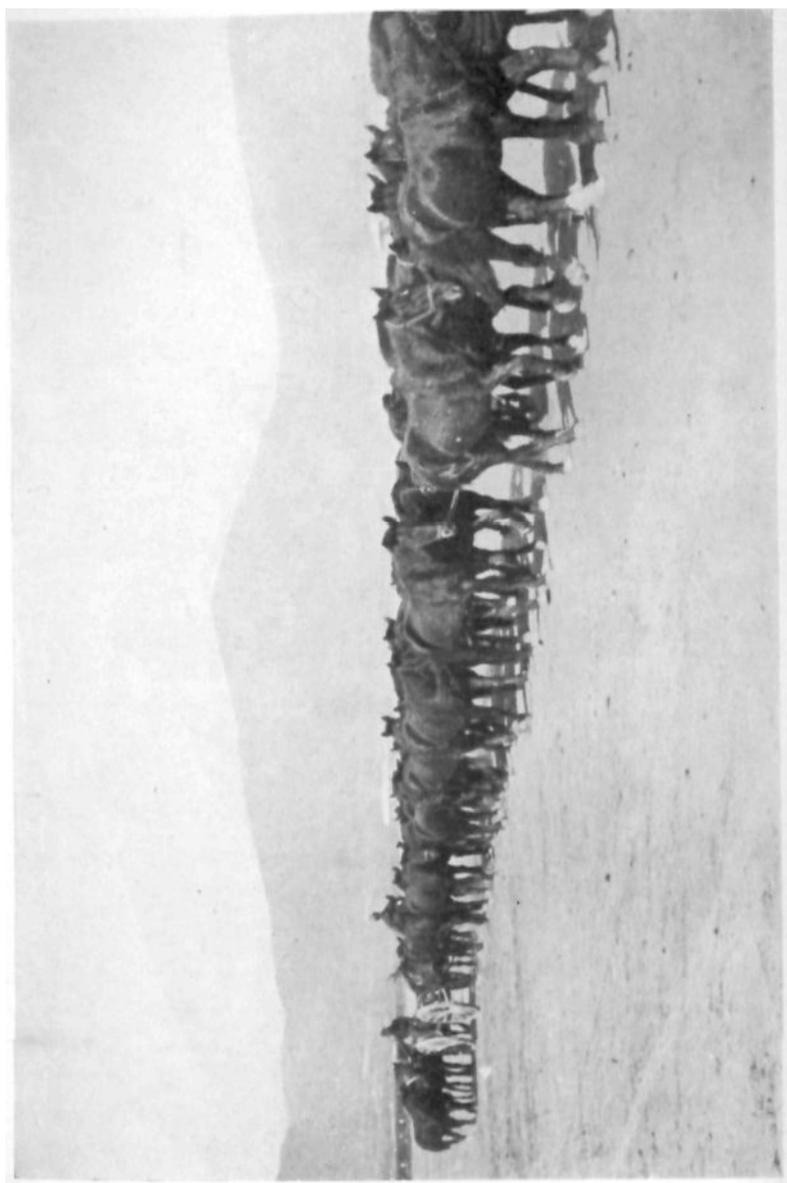
This regiment being confronted with the problem of keeping in condition a total of 1233 animals, with a total available strength for such duty 306 men, it was found almost impossible to take out during a draft period, followed by the ordinary horse exercise, more than two-thirds of the animals in one day. The moving picket line was tried out, and was found to be a distinct success from the beginning.

First, a picket line was rigged up between two harnessed horses, the rope being made fast to the breast collar of the rear horse; and his traces hooked to the breeching body. Then fifty horses were tied to the rope, four abreast, two on each side. With a man on the front and rear horses, and a separately mounted man on each side, to quiet the restless animals at the start, it was found that the horses could be exercised at the walk and trot quite as well as though a large number of men were used. It was necessary to use a great deal of care in turning corners, in slowing down, and in coming to a halt; for most of the horses are of the heavy draft type, and all high spirited and well conditioned. Battery commanders then tried a wheel pair, with a limber at each end of the line. This was found to be a great improvement, as the horses near the end of the column









HORSE EXERCISE

do not have as strong a tendency to rush at the trot, while the added weight at the rear makes it possible to slow down and to halt much more quickly, and to turn corners more readily. To gain additional weight and the advantage of the brake, battery commanders have now added a caisson to the rear limber.

From fifty to eighty horses may be exercised at one time on the moving picket line; and after it is ready to start, only three to five men are needed to manage it efficiently. The remaining men can then be used at the very necessary work to be done around the stables and gun park.

In order to save time in making a shift of horses, while the first group is out a second is tied to a second picket line fastened to uprights. When the first group comes in, the change is then quickly made. As the strain on them is often considerable, lead and rear horses should be carefully watched to see that they are not overexercised; and these horses should be changed also when a fresh group is taken out.

In order to raise the front end of the line, thus preventing the leading horses from entangling themselves, the picket line is passed around and over the chest of the front limber, and the rear end is fastened to the pole of the rear limber.* To make the halter shank secure, the ends are braided into the picket line.

* [See photographs accompanying this article.]

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The 102-mm. Motor Batteries

SALVATORE GATTO, COLONEL OF ARTILLERY. RIVISTA DI ARTIGLIERIA E GENIO, APRIL-MAY, 1919

Synopsis

THE first proposition looking toward this type of weapon came from the Ansaldo Company. The Army was anxious to secure long range, medium calibre, mobile guns; the company had under construction sixty guns intended for the Navy, and proposed to mount twenty of them on motor carriages for the Army. Two battalions of three batteries each appeared on the Trentino front the next spring, just in time for the Austrian offensive, and two others joined in July. During this whole campaign the batteries operated successfully with the infantry and field artillery, in spite of the difficulties due to improvised matériel, making marches on occasions of 100 kilometres or more, over difficult country.

At the end of July three of these battalions and one new one were moved to the Isonzo for the Gorizia offensive. By reason of their mobility they were used in a demonstration northeast of Monfalcone to deceive the enemy as to the direction of the attack; then at the last moment withdrawn to join the main force. The 5th Battalion remained on the Trentino front, very actively engaged; on one occasion it made a night march of 130 kilometres to take part in the surprise attack upon Mount Cauriol.

The 1st Battalion returned to rejoin the 5th in October. In December the 6th Battalion made its appearance, on the Carso; and during the winter of 1916-17 all six battalions were concentrated on the Julian front.

In the spring two battalions were sent to the Sette Comuni plateau; the others took part in the operations on the Isonzo in May. On the plateau, the weather conditions prevented much activity, except for a short time in June, and the two battalions rejoined the others on the Isonzo in July. All

CURRENT FIELD ARTILLERY NOTES

were actively engaged in connection with the operations on the Bainsizza plateau until October, when three battalions went back to the Trentino.

In the Caporetto retreat, the 4th and 5th Battalions were closely engaged. The 4th effected its withdrawal, losing one piece destroyed by a direct hit; the 5th continued its fire for six hours after receiving orders to withdraw, and covered the retreat of the 50th Infantry Division. The 6th Battalion also, on the Bainsizza plateau, held until the last moment, and barely succeeded in getting out its pieces. The 2nd and 3rd Battalions were employed in the retreat to the Tagliamento. Here the 2nd was cut off and lost its guns, but had time to render them unserviceable; the personnel escaped. The 1st Battalion, which had been at Padua for motor repairs, rejoined on the Tagliamento, and after a few days' heavy fighting all fell back to the Piave.

During November such batteries as were still fit for service participated in the final defensive actions of the campaign, and in January, 1918, joined in the offensive.

The armies were now reorganized. New artillery matériel was constructed, and it became possible to assemble again a mass of army artillery, at the strategic centre of the line. Of this the motor batteries formed a special part. Improvements were made in the matériel, increasing mobility, and special mobile repair shops, both for motors and artillery matériel, were added. Much attention was given to the instruction of both cannoneers and drivers. Reconnaissance parties were sent out, and more than three hundred battery positions were selected and prepared in view of all prospective operations.

In May the six battalions were distributed along the Piave, and were in action opposing the Austrian attack of the 15th. On the 17th one battalion had to fall back; but on the 23rd all took part in the counter-offensive. Three battalions, ceasing fire late that evening, moved 100 kilometres by the flank, climbing 1500 metres on the way, and came into action again on the 24th, after only nineteen hours' interruption of the fire.

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All the battalions were then reassembled near Pressana, while the Army was preparing for its great counter-offensive. In August all were again in line, distributed along the Piave, where for two months they were employed in reconnoitring and preparing positions. In October four battalions were placed in advanced positions under the orders of the 11th Army Corps, which was to make the first attack; the others were farther to the rear.

On October 27th fire was opened, first in counter-battery and later to accompany the infantry. The battalions with the 11th Corps were so favorably placed as to be able to support the advanced troops while the light artillery was trying to cross the Piave.

On the 30th the battalions on the right assisted in protecting the flank of the Third Army in its crossing of the Piave. On the 31st the battle became a pursuit, and the 102 mm. batteries were ordered across the river.

All six battalions, with the 61st F.A. on motor trucks, were now formed into one command and assigned to support the three cavalry divisions advancing to the Tagliamento. After crossing the Piave on November 1st and 2nd, one 102 mm. and one light battalion were assigned to each division, the three remain-102 mm. battalions being held as a central reserve. This was the situation when hostilities were suspended on November 4th.

Thus we have seen the 102 mm. motor batteries were used in every action of importance, on every part of the front, and always with success, in spite of the difficulties due to an improvised equipment.

The guns themselves, designed for the Navy, gave too high a velocity and too flat a trajectory for land use. Their high power involved rapid deterioration, so that it was necessary to limit the fire, thus nullifying the advantages of the rapid fire mounting. The ammunition also was not entirely satisfactory.

The carriage was very heavy, the sector of fire small, and the cumbersome system of abatement necessitated by the high mounting and short recoil greatly reduced mobility. The caissons

CURRENT FIELD ARTILLERY NOTES

and the trucks carrying accessory equipment were not suitable, and made up a very heavy and awkward battery.

For these reasons the 102 mm. motor batteries have been discontinued. For them have been substituted 149 mm., 105 mm. and 100 mm. field guns, carried on motor trucks.

Coöperation Between Infantry and Artillery

ETTORE ASCOLI, COLONEL OF ARTILLERY. RIVISTA DI ARTIGLIERIA E GENIO,
APRIL—MAY, 1919

Synopsis

VICTORY consists in breaking down the spirit of the hostile infantry and pushing our own infantry into or beyond their positions. The infantry, then, is the principal arm, even if the artillery should be numerically preponderant. This principle should be emphasized in all combat training for the artillery, for the greater the power of the gun the greater the danger that the artillery may claim first place.

From this primary duty of serving the infantry are derived all the specific duties of the artillery. It must, then, seek to establish the closest of relations with the infantry, based upon absolute confidence, even if this involves yielding to requirements that are not strictly legitimate. It must try to discover the needs of the infantry before they are transmitted officially and regulate its action according to the moral as well as the material needs.

On the other hand, the higher commanders and the infantry must do their share. They must facilitate the visits of artillery officers to infantry units, and their study of methods, and must welcome and assist the work of artillery patrols. Artillery officers should be assigned to duty with infantry units.

The divisional artillery commander should systematically regulate all this work and insist that it be carried out. He should maintain the closest personal relations with the infantry commanders; see that a perfect intelligence system is in operation throughout his command, in touch at every step with the infantry; keep plans for the use of the artillery constantly up

to date, discussing them with the infantry commanders and with his counter-battery officers; be always in touch with the artillery on his flanks and with the next higher artillery commander.

A consideration of these duties indicates that the divisional artillery commander should be the principal factor in securing coöperation; to this end, he should be considered as belonging to division headquarters and should always move with the division, so as not to lose personal touch.

Rapid Method for Constructing Graphic Tables of Trajectories

GIOVANNI BRUNO, MAJOR OF ARTILLERY. RIV. DI ATTIG. E GENIO, JUNE, '19

5000 WORDS; TABLES AND DIAGRAMS

ORDINARY range tables assume gun and target on the same level, and provide means for making more or less accurate corrections when this is not the case. But now, when guns of all calibres have come to be used in mountainous country, and at extreme angles of elevation, corrections made in the usual manner are misleading, and many efforts have been made to construct new tables and new correction methods which shall be sufficiently accurate without being too complicated.

Graphic tables have many advantages over numerical ones, provided they can be put in form for convenient use in the battery. In particular, their use in connection with a map solves by simple inspection problems in angle of site, in clearing a mask, in range corrections over broken ground, etc.

Several methods of constructing such tables have been used, but none that was rapid and convenient, and at the same time reliable for high-angle fire. This paper proposes a method of calculation based upon substituting for the actual trajectory a fictitious one composed of two parabolic arcs, drawn on a single vertical axis, and having in common with the true trajectory the tangents at the origin and point of fall respectively. At the intersection of the two arcs on the common axis, the tangent is parallel to the axis of x , and the tangents intersect on the axis of the curves prolonged. From this relation are drawn formulæ for calculating any point on either branch of the curve. Tables

CURRENT FIELD ARTILLERY NOTES

are appended, showing a satisfactory degree of approximation between these results and those obtained by rigorous methods of calculation; this approximation is found to be closest near the origin and point of fall, and near the latter point the error is generally less than that of the gun.

The construction of the parabolic arcs is very simple. The only necessary elements are the range, angle of departure and angle of fall. The tangents at origin and point of fall being constructed, the ordinate through their intersection is the common axis of the arcs, and their common vertex, where the tangent is horizontal, is midway between the intersection of the tangents and the axis of x . To plot the curves, draw the horizontal tangent at the vertex. Divide that part of the tangent between the vertex and the axis of y into any number of equal parts, and through each point of division draw an ordinate. Divide that part of the axis of y between the origin and this tangent into the same number of equal parts, and connect each point of division with the vertex. Points of intersection of corresponding lines in these two systems are points of the curve. Proceed in the same manner for the descending branch.

The "Mil" as the Gunner's Unit*

As long ago as 1864 the Swiss introduced the system of measuring all artillery angles in "mils"; that is, the angle subtended by 1/1000 of the range. This system was copied by the French in 1879 and by the Germans when the new Swiss guns were ordered from Krupps. After this, all nations introduced the "mil," with the exception of the English, who obstinately stuck to the old degrees and minutes, which are as obsolete as their feet and inches. But during the war even the English had to change over to the "mil" as a unit; this we (Swiss) know to be the fact, since a great many English artillery instruments were made during the war in our factories at Zurich, Aarau, and Winterthur. It is certain that in future the Swiss "mil" will be the only military unit in use.

* Reprint from the Journal of the Royal Artillery, January, 1920.

EDITORIAL

IN this number we present certain proposed amendments to the Constitution of the Association, which appear to be necessary because of changed conditions since the organization of the Association. Article IX of the Constitution provides that:

This Constitution may be amended or altered by a three-fifths vote of the active members, either in person or by proxies in writing. To secure consideration of a proposed change, application must be made to the Secretary, in writing, signed by not less than twenty-five active members, setting forth clearly the alterations desired and the principal reasons therefor. This application must be submitted at least six months prior to the time of the meeting. The Executive Council will direct the Secretary to give notice, by mail, to the members entitled to vote, so they may receive it at least ninety days prior to the meeting. The notice will contain the proposed amendment with the names of the proposers. The notice will also be published in all copies of the JOURNAL issued between the receipt of the application and the date of the meeting.

It will be seen that in order to amend the Constitution it is necessary to secure a three-fifths vote of the active members, in person or by written proxy. In the past it has been impossible to adopt amendments because members have failed to send in their proxies. At no annual meeting has the Secretary held the proxies of three-fifths of the active members. It is intended to mail, at an early date, blank proxies to all members, and it is earnestly requested that these proxies be executed and returned to the Secretary promptly in order that a check may be made and second requests mailed to the members who fail to respond. Members can save the management considerable labor and the Association considerable expense by making it unnecessary to mail them second requests for their proxies.

The United States Field Artillery Association

PROPOSED AMENDMENTS TO THE CONSTITUTION

WASHINGTON, D. C.,
December 31, 1919.

The Secretary, United States Field Artillery Association,
Washington, D. C.

SIR:

In conformity with Article IX of the Constitution of the United States Field Artillery Association, the undersigned, being active members of the Association, hereby propose certain changes in said Constitution for the following principal reasons:

(a) At the time of the adoption of the Constitution of the Association there were no officers of the Field Artillery Section of the Officers' Reserve Corps. There are now approximately eight thousand of these officers, all of whom were in the Field Artillery of the United States Army during the World War, and a considerable number of whom are subscribers to the FIELD ARTILLERY JOURNAL. It is believed that the service and interest of these officers merits the privilege of active membership in the United States Field Artillery Association, and representation upon the Executive Council of the Association.

(b) It is believed that the natural interest in Field Artillery matters of those persons who served in the Field Artillery of any of the United States forces during the World War should entitle them to the privilege of associate membership in the United States Field Artillery Association.

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The proposed amendments to said Constitution are clearly set forth as follows:

1. It is proposed to amend Section 2, of Article III, by inserting the words "and commissioned officers on the active list of the Field Artillery Section of the Officers' Reserve Corps" between the words "District of Columbia" and "provided" in line six of said Section, so that said Section shall read, when amended, as follows:

Sec. 2.—The following shall be eligible to active membership:

Commissioned officers on the active lists of the field artillery of the regular army and of the organized militia of the several states, territories and District of Columbia and commissioned officers on the active list of the Field Artillery Section of the Officers' Reserve Corps; provided, that officers of the regular army when separated from the field artillery, by promotion or detail in staff departments, shall not thereby lose their status as active members.

2. It is proposed to amend Section 3, Article III, by adding thereto the following sub-paragraph:

"(g) All persons who, in any war, served in any capacity in the Field Artillery of any of the forces of the United States Federal Government, so that said Section shall read, when amended, as follows:

Sec. 3.—The following shall be eligible to associate membership:

(a) Commissioned officers on the retired lists of the regular army and of the organized militia of the several states, territories and District of Columbia.

(b) Those who, as commissioned officers, either regular, militia, or volunteer have served with batteries or larger units of field artillery in time of war.

U. S. FIELD ARTILLERY ASSOCIATION

(c) Commissioned officers of the regular army and of the organized militia of the several states, territories and District of Columbia, not now belonging to the field artillery, who have served at least one year as commissioned officers in field artillery.

(d) General officers of the regular army, except as provided in Section 2 of this Article, and of the organized militia of the several states, territories and District of Columbia.

(e) All commissioned officers and former officers of the United States Army, Navy and Marine Corps, and of the organized militia in good standing, not included in the classification hereinabove set forth.

(f) Those in civil life, whose applications are approved by the Executive Council hereinafter provided for.

(g) All persons who, in any war, served in any capacity in the Field Artillery of any of the forces of the United States Federal Government.

3. It is proposed to amend Section 1 of Article VI by striking out the word "five" in line two of said Section and substituting therefor the word "nine"; by striking out the word "three" in line two of said Section and substituting therefor the word "five"; by inserting a comma after the word "army" in line three of said Section; by striking out the word "and" in line four of said Section; and by inserting the words "and two officers of the Field Artillery Section of the Officers' Reserve Corps" between the words "militia" and "to" in line four of said Section, so that said Section shall read, when amended, as follows:

Sec. 1.—The Executive Council shall be composed of nine active members, five of whom shall be officers of the regular army, two officers of the organized militia, and two officers of the Field Artillery Section of the Officers' Reserve Corps, to be elected biennially for a term of two

THE FIELD ARTILLERY JOURNAL

years by a majority vote, in person or by written proxy of the active members. The Council shall hold its meetings at the headquarters of the Association, which shall be in the city of Washington.

4. It is proposed to amend Section 3 of Article VI by striking out the word "Three" in line three of said section and substituting therefor the word "Five," so that said Section shall read, when amended, as follows:

Sec. 3.—The Executive Council shall meet from time to time, at the call of its senior member present in Washington. Five members shall constitute a quorum for the transaction of business.

Respectfully submitted,

E. P. KING, JR., Col., F.A.	J. F. BARNES, Major, G.S.
JOHN B. ANDERSON, Lt.-Col., F.A.	CLIFT ANDRUS, Lt.-Col., F.A.
W. C. POTTER, Col., F.A.	M. CHURCHILL, Brig.-Gen., G.S.
R. E. LEE, Col., F.A.	D. F. CRAIG, Major, F.A.
G. R. ALLIN, Major, F.A.	MANUS MCCLOSKEY, Col., F.A.
T. W. WRENN, Major, F.A.	WM. BRYDEN, Major, G.S.C.
WILLIAM E. BURR, Lt.-Col., F.A.	MAXWELL MURRAY, Col., F.A.
T. D. SLOAN, Col., F.A.	WM J. SNOW, Maj.-General.
W. W. HESS, JR., Major, F.A.	OLIVER L. SPAULDING, JR., Lt.-Col., F.A.
C. S. BLAKELY, Major, F.A.	J. N. Greely, Col., F.A.
E. T. SMITH, Col., F.A.	H. W. BUTNER, Lt.-Col., F.A.
F.W.HONEYCUTT, Col., F.A.	
H. D. HIGLEY, Lt.-Col., F.A.	
C. P. GEORGE, Col., General Staff.	

U. S. FIELD ARTILLERY ASSOCIATION

WASHINGTON, D.C.

December 31, 1919.

The Secretary, United States Field Artillery Association,
Washington, D. C.

SIR:

In conformity with Article IX of the Constitution of the United States Field Artillery Association, the undersigned, being active members of the Association, hereby propose certain changes in said Constitution for the following principal reasons:

It is believed that no good reason exists for the requirement of the Constitution that the Secretary-Editor and the Treasurer of the Association shall be active members of the Association. Since the policy and records of the Association and the editorial policy of the FIELD ARTILLERY JOURNAL are under the close supervision of the Executive Council, the members of which are required by the Constitution to be active members of the Association, and since the Executive Council selects the Secretary-Editor and the Treasurer, it is desirable that the Constitution be amended so as to permit those offices to be held by retired officers. It is necessary that the Secretary-Editor and the Treasurer should be stationed in or reside in Washington. As officers on the active list are constantly changing station, the number of troublesome changes in the officers of the Association will probably be diminished by making retired officers eligible to hold these offices.

The proposed amendments to said Constitution are clearly set forth as follows:

1. It is proposed to amend paragraph number three, of Section 2, of Article VI, by inserting the words "or associate" between the words "active" and "members" in line two of said paragraph, so that said paragraph, when amended, shall read as follows:

THE FIELD ARTILLERY JOURNAL

3. A Secretary-Editor, to be selected from its own members, or other active or associate members of the Association, and who shall be an officer of the Regular Army.

2. It is proposed to amend paragraph number four, of Section 2, of Article VI, by inserting the words "or associate" between the words "active" and "members" in line two of said paragraph, so that said paragraph, when amended, shall read as follows:

4. A Treasurer, to be selected from among the active or associate members, and who shall be an officer stationed or residing in Washington, D. C.

Respectfully submitted,

(Signed)

JOHN B. ANDERSON, Lt.-Col.,
F.A.

WILLIAM E. BURR, Lt.-Col.

R. E. LEE, Col., F.A.

E. P. KING, JR., Col., F.A.

T. D. SLOAN, Col., F.A.

W. C. POTTER, Col., F.A.

T. W. WRENN, Major., F.A.

CLIFT ANDRUS, Lt.-Col., F.A.

D. F. CRAIG, Major, F.A.

MANUS MCCLOSKEY, Col.,
F.A.

M. CHURCHILL, Brig-Gen.,
G.S.

WM. BRYDEN, Major, G.S.C.

F. W. HONEYCUTT, Col.,
G.S.

MAXWELL MURRAY, Col.,
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WM J. SNOW, Maj.-General.

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Lt.-Col., F.A.

J. N. GREELY, Colonel, F.A.

W. S. BROWNING, Col., G.S.

H. W. BUTNER, Lt.-Col.

ALFRED A. STARBIRD, Lt.-Col.,
F.A.

DWIGHT E. AULTMAN, Col.,
F.A.

M. E. LOCKE, Major, F.A.

C. D. HERRON, Lt.-Col., F.A.

A. S. FLEMING, Col., F.A.

A. J. BOWLEY, Col., F.A.

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

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