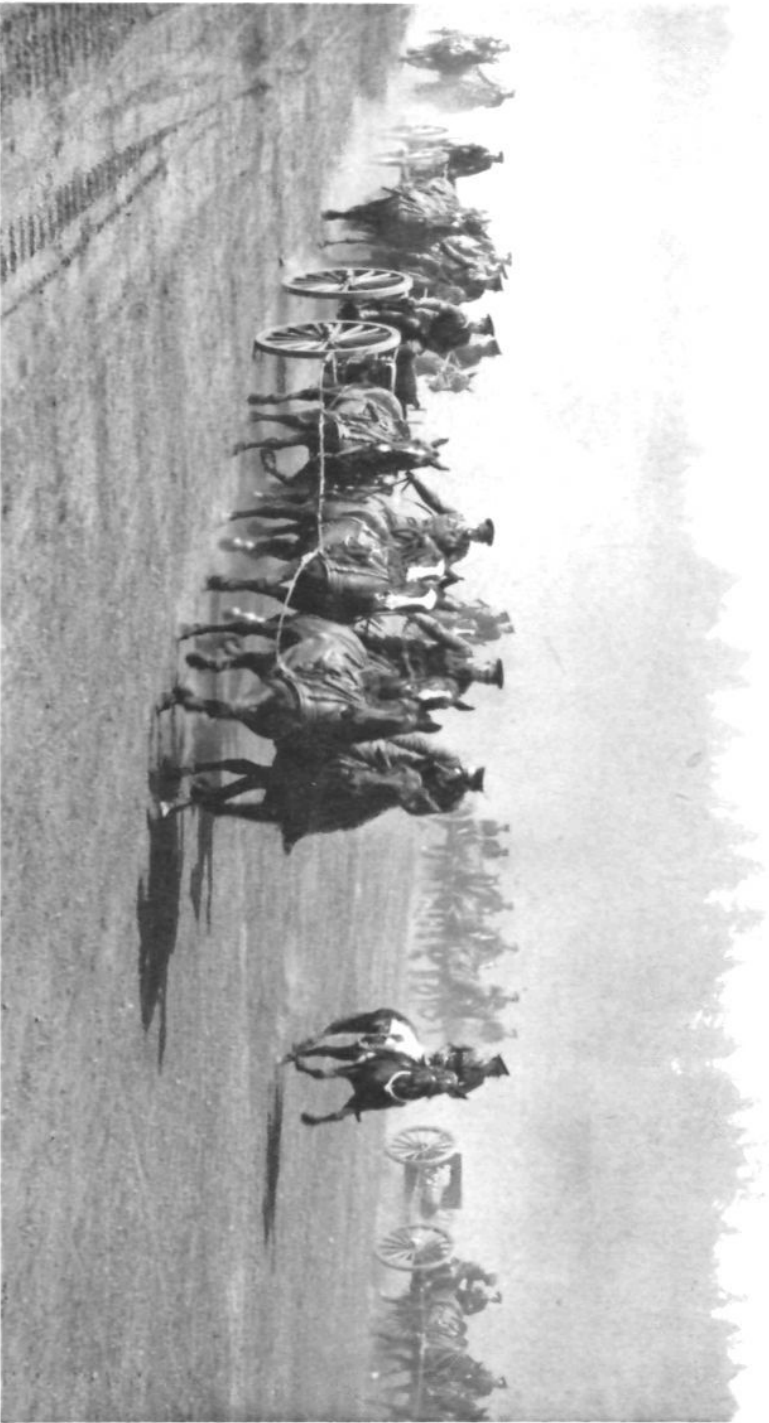


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AT FORT LEWIS, WASHINGTON: A BATTERY OF THE TENTH FIELD ARTILLERY

Courtesy Seattle Times

# THE FIELD ARTILLERY JOURNAL

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No. 5

## THE DIVISION LIGHT HOWITZER

BY MAJOR LEROY P. COLLINS, F.A.

### THE NEED FOR A HOWITZER

PRIOR to the World War the need for a light howitzer as a weapon for the field artillery component of the infantry division was not universally recognized. Germany and England had had such a weapon for years, but they stood alone. The importance of the light howitzer in divisional armament is one of the most valuable artillery lessons derived from the war. This is evidenced by the fact that the United States and France are the only two great nations unprovided with such a weapon today, and we have adopted one to be supplied when funds are available while France has adopted it in principle.

The recognition of the need for a howitzer in the division arises out of the following facts derived from experience on the battlefield:

(1) The light gun lacks the power to perform effectively all the missions assigned to the division artillery. The development of frontal and overhead protection of a heavier nature than that generally used prior to the World War, has brought out the need for a projectile of greater striking power. This requires a greater mass of metal with a heavier bursting charge.

(2) The howitzer with its greater angle of departure can occupy positions denied to guns of a flatter trajectory. Wooded and hilly terrain thus afford more battery positions than are possible with the gun.

This fact was well illustrated during the war when the emplacing of large masses of artillery within a limited area was only possible by mixing howitzer batteries with gun batteries in order that every use might be made of suitable battery positions. Furthermore the howitzer is better protected from hostile fire by virtue of its deeper defilade.

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(3) The better organization of positions, utilizing deeper entrenchments, dugouts, the general use of concrete and the searching of defiladed areas all require a high angle of fall to assure maximum damage to targets, or, in fact, to assure reaching there at all with fire.

(4) The frequent calls on the division artillery for counterbattery for which the howitzer is much better adapted than is the gun.

(5) The light howitzer is particularly suited for the destruction of wire entanglements, an important factor in modern warfare.

(6) It is also more effective than the gun in the use of gas projectiles, a factor which may be even more important in future wars than in the last.

(7) Pound for pound the ammunition fired from the howitzer has a greater percentage of effectiveness than that fired from the gun under similiar conditions. Extensive test firings conducted by the Field Artillery Board at Fort Bragg during the past several years has borne this out. This has an important bearing on the question of ammunition supply.

It is quite natural, therefore, that there was a great unanimity of opinion among our own as well as French, British and Italian artillery officers at the conclusion of the war that a light field howitzer is essential for division artillery. This feeling is growing stronger each day until the question now is, not whether we need one but whether it should not take the place of the gun.

### IDEAL TYPE

Before proceeding to a study of the ideal type of light howitzer we must first consider the missions which it has to perform. Obviously the one which can perform satisfactorily all of the missions for which the division artillery may be called upon is the ideal.

All artillery missions may be classified as follows:

- (a) Direct support and protection of the infantry by accompanying it by fire wherever it goes.
- (b) Destruction of organized enemy forces.
- (c) Destruction of material obstacles.
- (d) Counterbattery.

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- (e) Interdiction.
- (f) Accompanying guns or batteries to accomplish (a) when supporting artillery is unable to do it.
- (g) Defense against tanks.
- (h) Defense against airplanes.

The mission given in (a) is the primary role of the division artillery and it must be able to do it satisfactorily. The missions in (b), (c), (d) and (e) belong primarily to the heavier types of the corps and army artillery. However, the division artillery may be called upon to accomplish one or more of these in addition to its primary missions. It therefore follows that the kind of gun which can directly support the infantry best and at the same time is the most suitable for the occasional missions named is the best division weapon. This will be discussed more in detail later.

The last then are special missions which require special material. Although not a part of this discussion, it is believed that the best type already developed by our service for use as accompanying guns and batteries is the newly adopted 75 mm pack howitzer. It might be used with its pack mule transport in which case it can readily be carried disassembled by the cannoneers for short distances; or it might be better mounted on a small tractor mount. It is a remarkable gun of great promise. It would be entirely suitable as the special anti-tank gun also. Anti-aircraft artillery is of course a special branch of the artillery and is not a part of the division artillery.

In order to accomplish these missions properly light matériel, whether it be howitzer or gun should have the following characteristics:

- (a) Sufficient mobility so that it can follow, over practically any terrain, the infantry which it must support, and remain in close supporting distances.
- (b) Sufficient power to crush the usual obstacles which the infantry encounters in open warfare.
- (c) A small enough caliber so that the weight of its ammunition will not handicap the supply of ammunition which must be ample and easy.

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

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

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

The sine qua non of light matériel is mobility, for without it our infantry advances will be held up because of the inability of its artillery to keep up with it, and this is fatal. Tactical mobility, which is the ability to move at increased gaits over difficult terrain, to go into and out of action quickly involving easy man handling, and thus always to keep up with its infantry with the maximum number of guns in action at any one time, is the kind of mobility which division artillery should possess. Strategic mobility, or the ability to cover long distances rapidly for the purpose of effecting strong concentrations of artillery at distant points, has become very important since the World War. While it is desirable for the organic division artillery it is more properly a function of the artillery of G. H. Q. Reserve which reinforces that of the divisions when necessary.

It probably is a fact in all wars, and it certainly was in the last, that the demand for increased strategic mobility and fire power increases as the war goes on, while the need for extreme tactical power becomes less apparent. However, we must not lose sight of the fact that wars are won in the open and that artillery which cannot keep up with the infantry is useless.

Our present training regulations, written in the light of war experience, contemplate that, in order to obtain this requisite mobility, the walk and trot must be the normal gaits for light artillery, the gallop an exceptional gait. It may be observed that even though exceptional, when the necessities of the case require guns to change position and go into action at the gallop or even the run, the need is so great that inability to meet the test may have dire and far reaching results.

Mobility is almost entirely dependent upon weight. We may increase horsepower of team or tractor, but by so doing we make the motive power more cumbersome and thereby decrease its flexibility; also we add to its upkeep. An eight horse team

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requires one-third more forage and drivers than one of six horses, and a five ton tractor requires more gas and oil than a two and one-half ton. Furthermore, a heavier gun is harder to man handle than a lighter one and requires stronger bridges. It seems evident, therefore, that whether the division artillery is to be horsed or motorized, there is a limit in weight beyond which we cannot safely go. And it is believed that the weight which a six-horse team or tractor of equivalent draft power can handle easily should be taken as this limit. Six hundred pounds per horse or a total of 3,600 pounds is the most advantageous weight for the horse and certainly we should not exceed 4,200 pounds. Approximately 1,000 pounds of this will be taken by limber, ammunition, etc., and 3,200 pounds by gun and carriage.

Weight limits caliber, which in turn limits striking power. However, an examination of the characteristics of various howitzers given in Appendix 1, shows that a howitzer of 105 mm caliber can be constructed within the weight limits given. The great fire power of a projectile of this caliber makes it desirable. Certainly it should not be less than 85 mm. As stated previously, pound for pound the howitzer projectile is more effective than the gun, and this increases with difference of caliber, therefore fewer howitzer than gun projectiles are required to do the same work. However, more ammunition by weight is necessary to maintain the same volume of fire, that is rounds per gun per minute with the larger caliber howitzer than is necessary with the smaller 75 mm gun. This makes ammunition supply more difficult, always a serious question at best. One solution of this, of course, lies in a smaller caliber for the howitzer. The adoption of a non-cellular type limber and caisson which is now being considered, partly because of the decrease of dead weight carried, appears to offer the solution of the question of the ammunition carrying vehicle by making it possible to carry a greater number of rounds.

As for range, it is believed that 10,000 yards is sufficient. This also can be secured with the weight limit as given.

The "Caliber Board" convened by the War Department at the suggestion of General Pershing, at the end of the war concluded that the ideal type of light howitzer should possess the following characteristics:

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Caliber—105 mm.

Vertical arc of fire—minus 5 deg. to plus 65 deg.

Horizontal arc of fire—360 deg.

Range maximum—12,000 yards.

Mobility—equal to that of light guns.

Ammunition.

Semi-fixed—zone charges.

Weight of projectile—30 to 35 pounds.

Both shrapnel and shell.

In connection with the above the following should be noted: It was assumed that both a gun and howitzer were necessary. A horizontal arc of fire of 360 deg. is partly ideal—a traverse even approaching 45 deg. makes a split trail necessary. This also facilitates obtaining the elevation desired. Since this report was written, the trend of opinion has inclined to the belief that shrapnel should be discarded and shell alone used.

In the development of a satisfactory American light howitzer three models have been built. The 1925 model has a box trail. The other two models T-1 and T-2, both heavier than the last named, have spit trails—the T-1 model requires a 16-inch pit to be dug under the breech for elevation of 40 deg. and over, while the T-2 model requires a 7-inch pit. The last named has been adopted as standard, as model M-1, and is described in Appendix 1.

A comparison of the M-1 howitzer with the ideal type shows that it possesses all of the desired characteristics except the most important one—mobility, and the disadvantage of difficult ammunition supply. It is heavier than our present light gun, the French 75. It is even heavier than our recently adopted American 75 split trail model, which is too heavy.

The Field Artillery Board report states: "It is not as mobile as the M-1 75 mm gun, and will probably need an eight-horse team to attain the proper mobility for divisional service." Note that, as stated before aside from the question of mobility, this will result in lengthening the column and more horses to feed and care for.

If, in order to get a 15,000 yard range, it is necessary to add



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unduly to the weight, it is better to be satisfied with a range of 10,000 yards which after all is sufficient for division artillery, no matter how desirable a longer range may be at certain exceptional times. If, in order to get a 45 deg. traverse on the carriage, it is necessary to use the heavier split trail, it is better to be satisfied with less and keep the lighter and simpler box trail. The sacrifice of extreme traversing ability is compensated for by the fact that the piece is more easily shifted by hand, and large shifts of direction of fire require a change of battery front for safety purposes. And finally, if the improvements in design of ammunition carrying vehicles do not correct the difficulties of ammunition supply resulting from the use of the 105 mm caliber with the 30-pound projectile, the caliber should be decreased and the shell lightened. This in itself would allow an increase in gun weight elsewhere, as, for instance, in employing a split trail. In other words the ideal can rarely be attained, a compromise is usually necessary, but the compromise should not involve the essential points—only the non-essential ones.

### PROPORTION OF LIGHT HOWITZERS FOR THE ORGANIZATION OF THE DIVISION ARTILLERY

Granting that we need and can get a light howitzer sufficiently near the ideal desired for all practical purposes, that is, one of sufficient mobility and at the same time combining the requisite range and fire power, the questions which remain to be answered are: Do we need both a gun and howitzer? How many of one or both do we need? How should they be organized?

General Herr, the French artillerist, says in a book published since the war:

"Two distinct matériels are necessary, a gun for range and a howitzer for steep angle of fall. All the belligerent armies except the French have had a light howitzer for several years. We often suffered sadly because we lacked a light howitzer, and the adoption during the war of a reduced charge for the 75 mm gun, was an absolutely inadequate palliative. Today it is no longer possible to hesitate. There is unanimity of opinion that the future matériel for direct support includes both a gun and a howitzer." His own conclusions elsewhere in his book tend to contradict this, however, for he states that the light howitzer is

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the ideal weapon for direct support. This is believed to be correct.

The Caliber Board, previously referred to, states, that it would be ideal if one type of weapon could accomplish all the requirements that the division artillery should fulfill, and some artillery officers in one of the foreign armies have made a study of a gun-howitzer with this in mind. The objections to such a gun-howitzer are:

(1) That it would require the use of a projectile of about 30 pounds, which is about twice that of the normal field gun ammunition, thereby greatly increasing the tonnage of ammunition supply for the same volume of fire.

(2) That it would require a complication of the ammunition supply to individual batteries in that both fixed and semi-fixed ammunition would have to be supplied if the double function of the piece was to be taken advantage of at any time. To meet this by having all the ammunition semi-fixed, would result in a decreased rate of fire when the piece was used as a gun.

(3) That to obtain fairly good gun characteristics the weight of the piece and carriage would be increased and, therefore, the mobility decreased.

(4) That in any case the piece would not be the best type of either field gun or field howitzer.

The above statements are true if we assume that the howitzer must be one of 105 mm and that a flat trajectory gun is necessary at all. The 105 mm howitzer can fire 100 rounds per hour. A lighter howitzer of 95 or 85 mm can fire 150 to 200 rounds per hour. A recently developed 85 mm Schneider howitzer is an attempt at a solution, but in order to get extreme range and fields of fire, both horizontal and vertical, it is made too heavy.

Just as missions had to be considered in studying type, so they must be in arriving at conclusions regarding the number necessary and the organization.

The infantry and artillery of the division must work as a team in which the artillery responds to any call made upon it by the infantry to the limit of its ability. The better the artillery, the fewer such calls will be, because it will have anticipated the needs of the infantry. These vary from those occasional uses on

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the march, to the other extreme of a highly stabilized situation requiring a great volume of fire, and hence a corresponding mass of artillery of all classes per mile of front. It is obviously out of the question to keep with the division habitually the amount necessary for the latter case. Hence we must fix upon the amount necessary for the average or normal case, if such a term may be used, and depend upon a reinforcement from a G. H. Q. pool for additional amounts where more is necessary. During the World War the proportion of meters of front to one gun in the French corps rose from an average of 1 to 50 in 1915 to 1 to 6 or 7 in 1918.

The primary missions then for the division artillery are those of direct support—the neutralization of those hostile elements which impede the advance of our infantry, and, in the defense, those which directly assist the advance of the hostile infantry, such as troops themselves advancing or in reserve, intrenched or in the open, and infantry supporting weapons. In addition to this it may be called upon in the absence of, or to supplement, the corps artillery for missions of indirect support—counterbattery, neutralizing command and observation posts, communication centers, and interdicting roads and other localities. The targets of direct support are designated to the artilleryman by the infantry or located by the artillery commander or his liaison officer who is with the infantry. Those of the latter class, or those of indirect support, usually are indicated from sources other than infantry.

From the above it is evident that there must be in an attack a part of the division artillery available for direct support and a part for general support. Furthermore the system must be made as flexible as possible by an understanding that, at any time, the artillery brigade commander may supplement that part of his command in general support by assigning general missions to any of the division artillery. It is highly desirable that such action be kept at a minimum, due to the fact that an infantry commander having been assigned an artillery unit to support him, should be allowed the exclusive support of such unit. If it can be foreseen that a majority of the missions assigned the artillery unit will be in support of a particular infantry unit, that

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artillery unit should be designated to support that infantry unit; if this is not the case such should not be done.

The artillery battalion is the smallest unit assigned to direct support. It is the smallest unit with the staff and equipment for liaison duties, and the battalion commander is the fire director par excellence.

On the other hand, the infantry battalion commander is the one who is in the best position to discover and report suitable targets to the artillery. Therefore it would be advantageous to have one artillery battalion for assignment to the direct support of each infantry battalion actually in the attacking wave and, in addition, some artillery held out in general support. Deducting reserves, there are usually not more than six of the twelve infantry battalions of the division actually in the attack at any one time. This requires six artillery battalions for direct support, or eighteen batteries, plus that in general support, say two battalions. But this is a greater proportion of artillery permanently with the division than considerations of road space and ammunition supply will allow. We might use two-battery battalions, but this increases overhead and decreases fire power of the battalion too much. With three batteries in each battalion, each artillery battalion commander can very conveniently divide the infantry regimental zone into two parts, assigning each as the zone for each of two of his batteries with the third battery covering the entire zone to take under fire such special targets as are designated by him. Then by assigning one artillery battalion to support each infantry regiment, providing liaison facilities so that each artillery battalion can maintain liaison with the two infantry battalions simultaneously, and providing for a temporary reinforcement from G. H. Q. reserve artillery where a larger proportion is desired, we have the best solution, while requiring but the three regiments, each of two three-battery battalions—a total of 72 guns—for supporting artillery. In addition, we must have at least two battalions (preferably the pack howitzer previously mentioned) for accompanying gun and anti-tank work, as a part of G. H. Q. reserve artillery.

It is apparent that artillery organization should be based largely on infantry organization or the infantry-artillery team

## THE DIVISION LIGHT HOWITZER

is unbalanced, and any change in our present division, as for instance, one to decrease its size and reduce its road space, should be made with this fact always in mind.

To answer the questions proposed at the beginning of this section, it is believed that we need only a light howitzer as supporting artillery, and that these should be organized as three two-battalion regiments.

### CONCLUSIONS

That a howitzer of the proper weight possessing the necessary mobility can accompany the infantry anywhere. It can fire over their heads from positions very close to them onto terrain very close in front of them due to its great angles of departure and fall. It can do everything the gun can do and do it better, and in addition it can do many things the gun cannot. That such a weapon is the ideal materiel for the supporting artillery of the division and should eventually supplant the gun as such.

That the howitzer adopted, the M-1 model, is not such a weapon, but that it should be made lighter, firing a projectile of not to exceed 30 pounds with a range of 10,000 to 12,000 yards.

That even if and when we do get a real light howitzer, there is just one factor which will prevent its being a sensible move to make it the sole arm of the division artillery—that is the fact that we possess a large number of French 75's as our legacy from the war. It is out of the question to expect the money in time of peace to completely reequip our light artillery for a major war. The most we can expect is sufficient for development and preparation for war time production; partial equipment of each brigade initially by replacing one battery in each battalion and a gradual complete reequipment as guns become unserviceable and money becomes available.

That the division artillery brigade should consist of the following:

Three regiments of light howitzers of two 3-battery battalions each.

That the G. H. Q. reserve artillery should include 75 mm guns as at present, and, in addition, 75 mm pack howitzers for antitank and accompanying guns, to be assigned to the division as needed.

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APPENDIX I  
TABLE OF CHARACTERISTICS OF LIGHT HOWITZERS OF VARIOUS ARMIES

Country	Caliber and Make	Issued	Carriage	Weight of Projectile	Weight in Battery Lbs.	Maximum Range in Yards	Degrees Elevation	Degrees Traverse
United States	105 mm U. S. T-1	Discard	Box trail	33 lbs.	3300 lbs.	11,800	- 8 to +65	6
	105 mm U. S. T-2 M-1	1928 ad	Split trail	33 lbs.	3750 lbs.	12,000	-10 to +65	45
Austria	100 mm Skoda	1914	Box trail	35.2 lbs.	3146 lbs.	8,700	- 5 to +70	7
Belgium	100 mm captured German materiel	1916	See Germany					
Czechoslovakia	100 mm Skoda	1914	See Austria					
England	4.5 in Vickers Maxim	1912	Box trail	35.2 lbs.	3014 lbs.	6,800	- 7 to +50	6
Germany	105 mm SN	1916	Box trail	32.6 to 36.1	3036 lbs.	10,300	- 9 to +40	6
Greece	85 mm Schneider gun-howitzer	1927	Split trail	19.4 to 22 lbs.	4334 lbs.	16,500	- 6 to +65	54
Holland	120 mm Krupp	1909	Box trail	44 lbs.	3542 lbs.	6,600	- 4 to +43	6
	105 mm Hollandsche 6 zones	On trial 1928	Speed ability 19 mi/hr.	33 lbs.	3200 lbs.	11,300		
Italy	100 mm Skoda captured Austrian mat.	1914	See Austria					
Poland	100 mm Skoda	1914	See Austria					
	121.92 mm Schneider	1914	See Russia					
	105 mm SN	1916	See Germany					
Rumania	121.92 mm Schneider	1914	See Russia					
Russia	105 mm Schneider	1910	Box trail	36.1 lbs.	2530 lbs.	8,100	- 3 to +43	6
	121.92 mm Schneider	1906-09	Box trail	50.2 lbs.	2816 lbs.	8,700	- 3 to +45	4½
Spain	105 mm Vickers	1922	Box trail	26.4 lbs.	3469 lbs.	13,000	- 5 to +37½	9
Sweden	105 mm Krupp-Befors	1910	Box trail	31.9 lbs.	2534 lbs.	6,700	- 5 to +45	10
Turkey	120 mm Krupp	1909	See Holland					
	100 mm Skoda	1914	See Austria					
	105 mm Schneider	1910	See Rumania					
Yugoslavia	4.5 in Vickers	1912	See England					
	120 mm Schneider	1907	Box trail	45.1 lbs.	3102 lbs.	8,700	- 3 to +43	5
	100 mm Skoda	1914	See Austria					

# THE DISTRIBUTION OF SHOTS IN LONG-RANGE SALVOS

BY COMMANDER G. L. SCHUYLER, U. S. NAVY

[This article should be of interest to field artillery men. The MPI referred to is the center of impact determined by weighing the errors with their numerical values. The Median is the center of impact determined by considering the overs and shorts without any numerical values but only considering their signs.

In Field Artillery Firing, since most of the firing is at fairly short ranges and since the center of impact is determined from a limited number of rounds, either method is satisfactory. Usually it is impractical to measure the amount of the deviation of the rounds from the target, but it is practical to sense the shots as over or short. Therefore the "Median" is the center of impact generally used.

\* The article is reprinted from the United States *Naval Institute Proceedings* by kind permission of the author.—EDITOR.]

MOST gunnery textbooks lead one to believe that the range distribution in a group of shots fired under conditions as nearly alike as possible, is always a symmetrical distribution typified by a pure probability curve like Figure 1. With this the MPI is obviously the best part of the group to put on the target.<sup>1</sup>

But in modern long-range gunnery it is becoming increasingly evident that this classic theory is not entirely applicable because in general the actual range distribution of such shots is frequently an unsymmetrical distribution typified by a curve like Figure 2.<sup>2</sup> With distributions of this sort, the MPI is obviously *not* the best part of the group to put on the target.

Shots tumble "short" rather than "over," and it is easier to imagine something going wrong with the flight of a projectile and causing a certain decrease in range, than it is to imagine an analogous effect causing an equal increase in range. The part of the dispersion caused by flight characteristics is therefore not safely assumed to be of symmetrical distribution. It may be expected generally to show a preponderance of "shorts."

In firings at very small ranges where flight characteristics contribute only a relatively minor part of the dispersion (which total dispersion is then caused principally by the symmetrical velocity variations) it is not surprising to find that dispersions are very nearly symmetrically distributed. But to get any general rule, particularly any rule applicable to present-day conditions, results of firings at extreme ranges must also be taken into account.

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<sup>1</sup> "The maximum probability of hitting, i.e., the greatest percentage of hits, will occur when the MPI is at the center of the danger space of the target." Par. 1616, *Exterior Ballistics*—Herrmann, 1926.

<sup>2</sup> Compare, "An Introduction to the Theory of Statistics"—Yule, 1919, figs. 21 and 22.

For example, par. 1615 of *Exterior Ballistics*, 1926, gives in support of Figure 1, data now nearly fifty years old, showing the distribution in deflection of shots fired from a 4.7-inch gun at a range of 3,000 yards. As one might expect, these data from firings at such a small range show practically a symmetrical distribution of shots. Furthermore, the distribution of such shots could be expected to be more nearly symmetrical in deflection than in range.

Possibly this last throws some light on why those who continue to use these particular firing data in support of Figure 1 prefer to deal with deflection results rather than with range results. For they must have had range results also, and it would seem more natural to have used them had they supported Figure 1 as well as deflection results did. Furthermore, why should any of these data, which are probably of greater age than the reader, be now used if examples from modern firings will serve the same purpose?

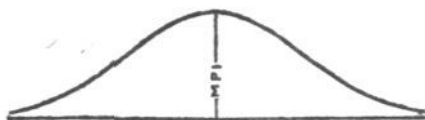


FIGURE 1

So in this, and in other stock examples in the textbooks, there is little evidence to impress one that Figure 1 holds very closely for modern long-range firing, but much to make one suspect that it does not. Thus in modern long-range gunnery, where flight characteristics contribute a fairly large and an unsymmetrical part of the total dispersions, it is not surprising frequently to find range dispersions fairly unsymmetrical and represented by the family of curves which Figure 2 typifies. Under modern conditions Figure 1 seems, therefore, only the limiting case to which the more general family of curves typified by Figure 2 finally reduces as the range shortens so as to make range distribution more and more symmetrical.

The present-day statistician, when studying variations, approaches his subject open-mindedly with the idea of finding what sort of distribution exists. He accepts a symmetrical distribution only after proving he actually has one.<sup>3</sup> So in this idea of unsymmetrical

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<sup>3</sup> *Memoriale de l'Artillerie Française*, 1926, p. 336, shows for instance, the unsymmetrical variations of the barometer.



## DISTRIBUTION OF SHOTS IN LONG-RANGE SALVOS

range distribution there is no novel thought which need surprise one. In fact it is the other way round—the surprising thing being rather that writers have clung so long to the assumption of necessarily symmetrical range distributions while apparently disregarding much of the ballistic data obtained under the very changed conditions of present-day gunnery.

Unsymmetrical variations are thoroughly treated in standard textbooks on statistics.<sup>4</sup> There are three sorts of "centers" which a group of this kind may be considered as having.<sup>5</sup> One is the simple "mean," or the MPI commonly used in dealing with positions of the shots of a salvo. Another is the "median," which has equal numbers of points each side of it, e.g., in a twelve-gun salvo the median is halfway between the shots which are sixth and seventh in order of range. In a nine-gun salvo the median is at the impact of the shot which is fifth in range. The other sort of "center" is the "mode," or the point on each side of which the density of points systematically decreases.

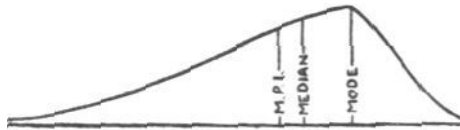


FIGURE 2

In illustration of these terms we could, in speaking of ages in a large community, refer to the "mean" age of individuals, or refer to the "median" age (which exactly half the time is exceeded) or refer to the "modal" age (which is the age of the most numerous age group). And in general these three figures would not be identical, for they correspond exactly with one another only in the case of symmetrical distributions which do not in general exist. In Figure 2 the ordinate through the MPI passes through the center of gravity of the curve's area, the ordinate through the median bisects the curve's area, while the ordinate through the mode is the curve's maximum ordinate.

In general, the mode, and not the MPI, is obviously the best

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<sup>4</sup> Yule, chapters on Frequency-Distribution and on Averages, particularly pp. 108, 116 and 120.

<sup>5</sup> See Century Dictionary (Supplement) for definitions of "mean," "median" and "mode" as used in statistical work.

part of the group to put on the target. But with the small number of shots in a salvo, one has not the same escape from the capricious workings of chance that he would have in dealing with very extensive data (e.g., age groups in a large community). A mode from two shots falling together at one end of a salvo would hardly indicate the ideal part of the group to spot on the target, because that particular agreement of ranges came probably from workings of chance not very likely to be approximated in the next salvo, nor even in the average salvo. The real average mode or the true mode which we wish to spot on the target is, therefore, not at all well directly indicated by the intervals between impacts in any one salvo. But we can know the true mode's position indirectly from a steady approximate relation which holds between its average position and the not very variable relative positions of the MPI and of the median. At any rate, we can locate it sufficiently accurately to serve our present purpose.

The average mode lies on the same side of the MPI that the average median does, but is about three times as far away from the MPI.<sup>6</sup> Thus, although the median is not the ideal part of the salvo to put on the target, it is at any rate better for this purpose than the MPI. Since no single salvo is likely to directly indicate the true mode by the intervals in the small number of impacts in that one salvo, about the best one can do in spotting is to use the median.

Can our spotters, in the few seconds they take to announce spots, be really judging the position of the MPI by some instinctive sort of true averaging process? Probably not. But since they are called upon to spot the MPI, they cannot be expected to go very far in voluntarily admitting such inability. If there are "doubtful" shots at the ends of the pattern there is insufficient time to apply any good criterion for retaining or for rejecting such shots. It is very hard to say what goes on in one's mind in a process which has to be so nearly instantaneous.

But it seems no great reflection on spotters to suspect that what they really do is about as accurately described by saying that they spot the "50-50" point in a salvo as it would be by saying that they spot its MPI—or in other words, say that something which is

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<sup>6</sup> Yule, page 121, and Figure 2 opposite.

## DISTRIBUTION OF SHOTS IN LONG-RANGE SALVOS

practically median spotting is of necessity probably already with us, although not officially admitted.

Enough has been said to show, however, that far from having to feel apologetic about the use of the median, even in theory also this practice is to be preferred.<sup>7</sup> The median coincides with the MPI when, with symmetrical distributions, the MPI is the proper thing to use. And at all other times the median lies even closer to the true mode than the MPI does.<sup>8</sup> One practical advantage of using the median is that it saves the spotter worry about rejecting or retaining doubtful shots at the ends of pattern.

We could, therefore, rewrite in more honest and in simpler terms much that existing textbooks say about spotting salvos by their MPI's, and so legitimize a kind of spotting which should not only be better, but which probably anyway is in actual use.

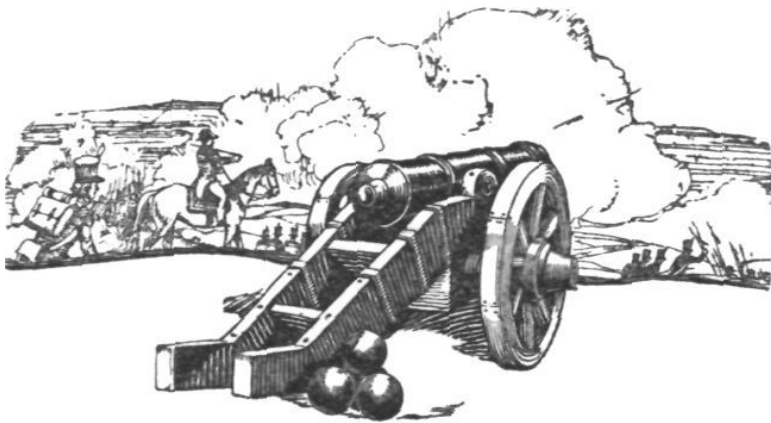
An extension of these ideas to one other matter appears logical. Since the median seems the better part of the salvo to put on the target, the "range" defined by it (instead of by the MPI) should be better to use in analysis of proving-ground and of target-practice results.<sup>9</sup> Not only would the theoretical basis then be quite as sound or sounder than it is now, but possibly much numerical work could be saved.

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<sup>7</sup> Compare Improvement Firing in field artillery work.

<sup>8</sup> Even if one claims Figure I can be verified by experiment (*Memoriale de l'Artillerie Française*, 1926, p. 456) this can be no basis for objecting to using the median of spotting.

<sup>9</sup> *Revue d'Artillerie*, 15 May, 1926, "Introduction to a rational theory of the errors of observation." In this, General Estienne, by different reasoning, reaches a similar conclusion.



# FISHING IN THE CHAGRES RIVER

BY GEORGE D. CROSBY, 1ST LIEUT., 2D. F. A. BN.

THE Field Artillery in the Canal Zone is stationed at Gatun on the Atlantic side of the Isthmus, a very satisfactory side from the point of view of fishing. It is true, as the Pacific siders proudly claim, that there are more fish in Panama Bay than in the available parts of the Caribbean. The waters of the Pearl Islands, off the Pacific terminus of the Canal, abound in bonita, mackerel, jack and amber-jack, snapper, shark, and many others, even on rare occasions the magnificent sail fish. Few trips to the Pearl Islands are anything but very successful. But the islands are eighty miles off shore and the fishing in the nearer waters is not as good. A trip to the Pearl Islands requires a good-sized launch, much preparation, and two or three days. On the other hand, the Chagres River, on the Atlantic side, is available for fishing on any afternoon off. And another consideration to which Atlantic siders point with pride is that tarpon, the best-known and possibly the gamest of all game fish, are caught on the Atlantic side only. Here they are plentiful, and are caught in large numbers. Or hooked in large numbers. There is quite a difference!

The Chagres River is the tarpon's favorite playground. This is the river which, in the construction days of the Canal, was dammed to form Gatun Lake, which now divides the river into two parts: the Upper and Lower Chagres. The Lower Chagres is the nine-mile stretch below the big Gatun Dam. It furnishes the channel through which the fish come up from the ocean to play in the rapids below the Spillway. The Spillway is equipped with fourteen discharge gates, any number of which may be opened to lower the level of Gatun Lake when, as it frequently does, it rises so high as to endanger the lock installations of the Canal. During the dry season, and when the gates are closed, the river is fed by the overflow from the hydro-electric plant. The water rushes down the smooth concrete apron below the dam and into the narrow channels and rocks below where the big fish play.

## FISHING IN THE CHAGRES RIVER

Two hundred yards below the apron the river widens into a deep and placid stream, winding through the jungle to the sea. So deep is it that the rushing waters below the Spillway become a gentle, almost imperceptible current. It is fed by three or four small streams which have almost no flow, except after the heavy rains of the wet season. The river is some hundred yards across, widening slightly at the mouth. The dense jungles crowd close to the river's banks for its entire length, and afford glimpses of strange birds and occasionally animals. Pelicans, fishing ducks, herons, and flocks of parrots make the river their home, and the banks are lined with land crabs and weird lizards that have to be seen to be believed. In the evening the smooth surface of the water is broken by the splashing of many fish, from sparkling little minnows to "His Honor, the Tarpon."

Eight miles west of the Atlantic entrance to the Canal the Chagres reaches the sea. Here a point of land swinging out into the river turns it slightly so as to form a shallow bay, and leaves a large area for trolling. On the point of land are the ruins of Fort San Lorenzo, built by the Spaniards as a defense for the Chagres River route across the Isthmus, centuries ago. Although considered impregnable, situated as it is on a cliff rising sharply eighty feet above the water and approachable only by a narrow neck of land, it fell to the pirate Morgan in a bloody battle preceding his march across the Isthmus and the capture and sack of Old Panama. The attack on the fort was made by land, and would probably have failed had not a fire arrow reached the magazine of the defenders. The ensuing explosion breached the walls, and Morgan's men took such excellent advantage of this that it is said that there were no Spanish survivors of the fight. The fort was rebuilt by the Colombians a century ago, and is today in an excellent state of preservation. Though choked by the jungle growth, the walls still stand, and provide a maze of moats and corridors. The old arched barrack rooms could shelter a battalion. Cannon are scattered throughout the ruins and on the rocks beneath, and hundreds of cannonballs are still piled neatly, ready for use. Tradition says that Morgan searched in vain for the large treasures that were in possession of the Spaniards when the fort was taken; hence the

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treasure must still be nearby, and the ground is scarred from the efforts of many digging parties.

Across the river from San Lorenzo the coast stretches away to form a long sand beach, constantly swept by the waves of the Caribbean Sea and fringed by hundreds of cocconut palms; an ideal place for surf bathing for anyone whose imagination is proof against the thought of sharks and slashing barracuda.

But to return to fishing. Several of us Second Field Artillerymen decided that it was something to take seriously, and began scouting for ways and means. Since tarpon appear to prefer the Chagres River to any other place, we decided that we would, too, and gave up fishing in the bay and ocean where the sport is, at best, poor. Then, too, Caribbean weather can never be trusted, and many a good fishing day is spoiled by storm and rough weather that does not affect the sheltered river. Except, of course, that it rains in the river with remarkable success.

The Spillway offers good fishing, which has the advantage of requiring no boat. All that is required besides pole and line is a pair of spiked shoes, to be used on the concrete apron over which an eighteen-inch head of water flows with sufficient velocity to make it impossible for a man to keep his footing without spikes. Steel rods are popular, and rod and line must be strong enough to withstand the strike of a hundred pounder. The largest fish taken from the Spillway in recent years was a two hundred and sixty-seven-pound jew-fish, caught by a soldier from France Field. Fishing with hand lines is not permitted. A current story is that a soldier once had so many hand lines broken for him that he decided to take steps. Baiting a large hook with a piece of raw meat, and using a rope for a line he tied the line around his waist and sat down on the bank to wait for a strike. He got it and has been missing ever since.

The curious brand of fisherman who considers it a social error to fish with live bait is bound to be disappointed in his artificial favorites at the Spillway, for, although the current is sufficiently swift to give considerable movement to even the heaviest spoons, the fish apparently want movement with respect to the bottom, and not with respect to the water. They ignore anything but live bait. Noodle fish, minnows about an inch and a half or two

## FISHING IN THE CHAGRES RIVER

inches long, are plentiful in the shallow back waters, are easily caught with a seine, and form the favorite bait. Perch and other small fish are caught on light rods immediately under the hydro-electric plant, and they, sometimes weighing up to two pounds, are just bites to the big babies down below. The favorite bait for the little fellows is a piece of banana. Parties sometimes start for the Spillway with one banana, eat most of it, and convert the rest into more fish than they all can carry. When the snook are running an enterprising B. C. with an eye to ration savings can take care of his meat substitute for two or three meals by giving fishing passes to a few of the men.

Far from confining their activities to the Spillway, the fish strike the length of the river. It is true that they congregate at the Spillway, where there is an abundance of live bait, but many of them, and particularly the largest tarpon appear to favor the open river. A few hundred yards below the Spillway is a large and quiet lagoon, a favorite lurking place of tarpon, and of larger jack and snook than are generally found near the Spillway itself. Alligators are there in numbers, but the man with a yearning to shoot them must restrain himself, since hunting is prohibited within a mile of the dam. The very best place for the very best fish is the mouth of the river, a place where the competition seems to be too much for the small ones, and where the fishing is much more pleasant than further up the river because of the beauty of the Caribbean coast, the coolness of the uninterrupted trade winds and the interesting element of rough water.

Of course, to take advantage of the fishing any other place than at the dam necessitates the use of a boat. By far the most popular type is the row boat powered by an outboard motor. Due to the recent craze for outboards they have become so sturdy and dependable as to nullify most of the previous advantages of the inboard type, which is more expensive, and generally much heavier.

As to the boat, its design depends on what can be found, if a second-hand boat is purchased. At present there are not many satisfactory ones available. Workmen can be found, however, that have the use of the Cristobal ships, and who can turn out

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small boats of very nearly any design that is desired for a reasonable price, and of excellent workmanship. Many outboard boats now in the Canal Zone are of the racing type, low-hulled and light, with a view to being equipped with the more powerful type of outboard. It is, however, a great mistake to sacrifice seaworthiness to speed if the primary object is fishing, for, as I have hinted, the mouth of the Chagres is by no means a mill pond, and a few extra inches of freeboard are sometimes the difference between bringing home the fish and not getting home at all. We have been very well satisfied with an eighteen-foot boat, V bottomed, with a little more beam and a little more freeboard than normal for its length. Such a boat can, if necessary, hold eight people, and with three or four will ride a very choppy sea. Powered with a five-horsepower motor, it is capable of from eight to ten miles an hour.

Though for still fishing at the Spillway, the steel rod is the more popular, for trolling in the river and at the mouth, the wooden pole, preferably of greenheart wood seems to be generally used. This is because the long and limber steel rods are too unwieldy for use in the boat, and have not the resistance to a heavy strike that the stiffer wooden poles afford. Tarpon generally hit a moving bait harder than they do a still one. The weight of line used is a matter of choice; the lighter the line the more the reel will hold, but the more chance there is of its breaking. Until you are familiar with the feel of your pole and the tricks of a tarpon a fairly heavy line will often save you the sorrow of seeing your fish take part of your tackle out to sea.

The Canal commissaries and the local hardware stores carry an adequate line of reels. These are generally equipped with a drag handle, a friction device which may be set to resist any desired pull. When the strain becomes excessive, the handle allows the reel to slip and give off line. The reels are also equipped with a thumb brake, which may be used if preferred, but which requires more experience to handle than do the automatic drag handles, as a sudden, and, when a strike occurs, instinctive clamping on of the thumb brake will often prove too much for the line.

A decided advantage in using a boat is that the fish appear to be perfectly satisfied with artificial bait, providing of course that



## FISHING IN THE CHAGRES RIVER

you troll and do not merely let the spoon drift in the current. This saves the time and trouble in finding or catching live bait. I decline to commit myself on the best type of artificial lure to use. As a matter of fact, the scoundrels appear to work up enthusiasm over almost anything; nickel spoons or enameled spoons; white or red; plugs of various kinds; pieces of cotton and chunks of white wood on the shank of a hook. Or in the case of a barracuda your foot if you want to hang it in the water. Whether or not they consider these things as food, or merely resent the presence of a strange object in their domain I cannot say, but they take them.

Since, when the gates in the Gatun Dam are opened to lower the lake level the river rises and the current becomes powerful, it is not safe to leave a boat where it can be swept away or smashed by the flood. Half a mile below the Spillway there is a landing free from rocks and in a back-water, where a boat can be tied without danger, no matter what the condition of the river. There are several native shacks nearby, the occupants of which are glad to care for your motor and the oars and smaller articles that might otherwise be stolen. In return, they ask only for the fish that you catch and cannot use.

Let's go down the river and meet a few fish. We leave the post early in the afternoon, riding in a car the short distance to the Gatun Locks, crossing the Canal there, and walking the mile or mile and a half to the landing where the boat is. Here we bail out many gallons of accumulated rain water, ship the motor, and start off down the River Chagres. Not much chance of a strike here, so we spend the time shining up the spoons, sharpening hooks, and looking over the tackle for kinked leaders and loose swivels. We reach the mouth of the Chagres in about forty-five minutes, where we put ashore to fill up the gas tank. Then out into the river where, with lines out, we ride slowly down the ledge under San Lorenzo, past the cape into the rough water and back around in a large circle. If you troll with too long a line you have less reserve on your reel to stop the run of a big fish: too short a line and it is more apt to break, since there is less stretch to it, and the jerk of a striking fish is sharper. Fifty or

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seventy-five feet does nicely. The man at the motor is making his turns wide so as not to cross and snarl the two lines.

Suddenly the boat lurches slightly. No need to ask why. The sudden scream of a reel and the wild activity of the end of a pole show that it is a strike. The odd line is rapidly reeled in to keep it from fouling, as everyone looks hopefully to see if a tarpon will break water. Not this time. The fish stops, tired from taking line against the drag, but there is no sign of him at the surface of the water. Probably a jack. In that case don't worry about him, for, once hooked, they seldom get away.

But stopped or not, he isn't caught yet. He has a hundred feet of line out, and any attempt to wind him in results in the handle slipping; giving the impression that the fish is sitting on the bottom on his haunches, with his fore-feet braced on a rock. The boat is circling at right angles to the line. Cut the motor if you want, but don't let the current carry the boat into the rough water, or onto the reef. At last the fish weakens a bit and we begin to get our line back. Closer and closer he comes until at last we have a glimpse of his shining sides, but he sees us at the same time and the reel sings. But he slows down and stops after fifty feet and the fight starts again. This business is getting wearing on the arm and wrist. A jack, with his flat sides and wide tail, swims with the plane of his body perpendicular to the line, and it takes a remarkable amount of heaving to turn him from his course. He's alongside at last and quick work with the gaff brings him over the side, where he covers everyone with blood and bilge-water as a dying protest. A fair to middling jack; fifteen pounds maybe. The man who caught him takes the motor, flexing his wrist thoughtfully. What happens when you hook a forty pounder?

We let the lines over the side again. If you think the jack did better than the perch in the lake back home, wait till you fight it out with the tarpon. You see plenty of them, their black backs rolling slowly out of the water, displaying their long dorsal fins. The scales along their spines are black, but their sides have given them the well-known title of "The Silver King."

And then as we come back past the point under the cliffs of San Lorenzo, your heavy pole, which seemed capable of holding

## FISHING IN THE CHAGRES RIVER

a horse, bends almost double, and you fight wildly to regain your balance as the screaming reel announces a big one. Almost before you realize what has happened he's in the air. Eight, ten, twelve feet clear of the water, shaking like a pup, his gleaming sides scattering the spray. Lord, he's a beauty! But there's no time to admire him now. He's back in the water and off again on a long hard run. The spool of line on your reel grows alarmingly small and the drag handle is becoming too hot to hold. Use your thumb brake and don't give him any slack line. If you do they get away three times out of four. A last surging rush and he jumps again, well out to sea now, and comes down in a smother of foam. Try and get your line back.

Rather than take a chance on the treacherous currents or play him with the help of the motor, we put ashore and work on him from the beach. If the weather were quiet we could cut the motor and keep the line from under the boat by the use of the oars, but the waves on the reef look a little sticky. We work slowly into shore, taking in a reserve of line if we can. If he jumps as you get out of the boat he'll get slack line sure.

He comes in readily enough, and you wonder if he isn't about played out, but suddenly he heads out again. Brace your feet and watch that he doesn't throw the line as he jumps. Still he runs. The friction drag is smoking-hot and as you shift your grip the handle slips from your hand. Listen to that reel now! You stop the handle at the expense of a burned hand and half the skin of your thumb as way out in the middle of the river the tarpon breaks water again. Lucky to hold him then. A few more feet and he'll have all your line, so you're waist deep, out in the water, fighting for every foot. In he comes at last, tired now. His jumps are not so high and his shaking seems less apt to break your line or pole. Tired though he may be, you wonder if he's in as bad shape as yourself. Your arms have been under a constant strain for twenty minutes and your aching wrists can hardly turn the drag handle. But if you ease up for a second the fish starts out again. At last you have him at the water's edge, but he is still far from being gaffed. As though he knows what is in store for him, the sight of the hook sends him out into the water again, where every jump is one more chance of

losing him. He can hardly leave the water now, but he's willing to try. You wish that the butter-fingered ass with the gaff hook would hurry up and do something with it, but every time he gets near the big fish it moves out in a flurry of spray. Watch him, or he'll break your line under that log, so you play him away from it as though he were a trout, except that a heave of the back replaces a twist of the wrist. In he comes again, and this time the gaff hook catches him under the gills, and up the sand he comes, struggling heroically, but not for long. He wouldn't be there if he had any strength left. You lie down on the beach where the sand is nice and soft.

The great difficulty in actually bringing a tarpon to gaff lies principally in the construction of his mouth. Almost free from membrane, it is so bony and hard as to make it almost impossible to drive the sharpest hook into it. If you have the good fortune to hook him through the V of the lower jaw or back near its joints, the chance of landing him is excellent. If, however, your hook is merely lodged on the hard surface of his mouth, as it generally is, the first slack line will enable him to shake himself free. Tarpon will generally jump from four to a dozen times before they can be landed, and each jump is a wild attempt to shake the hook loose. It is successful all too often.

Jack and tarpon are the fish most frequently caught in the mouth of the river. There are others, however. Barracuda are there, but not in large numbers, which, in view of their disposition, is just as well. They are willing and anxious to tackle anything that moves in the water, and on rarer occasions, out of the water. They sometimes strike the whirling propeller of small boats, usually with serious results to the barracuda, and I know of one case where one left the water and smashed into the bow of a boat, apparently resenting the yellow insignia which had been painted there. Since these fish are equipped with razor-sharp teeth and grow to a length of six feet, they are a very real peril to a swimmer, more feared than sharks. A hard fighter, they tire more easily than a jack or tarpon because of their slim conformation and lack of bulk. Snook are frequently caught, a fish that is very excellent to eat. Ranging from little fellows up to twenty-five pounds, they fight hard for a short while, and since they

## FISHING IN THE CHAGRES RIVER

have a tender mouth, from which the hook easily tears out, they require some skill to land. Red snapper come large enough to be worthy of heavy tackle, and on rare occasions jew-fish move out to sea with all your line. Nothing can stop those big ones, who are so large that their weight nearly qualifies them for a first mount.

Many overnight camping trips are made in the vicinity of the river's mouth, with a view to taking advantage of the hunting as well as the fishing. Alligators, cat, wild turkey, wild pig, and deer are plentiful, although not easy to locate because of the protection afforded them by the dense jungle. At times, during the winter months, one or two flocks of teal or mallards make the river their home, but all in all, when hunting, take along a slab of bacon and don't depend on living off the country, unless you have a yearning for coconuts.

In all fairness, perhaps I should mention some of the disadvantages of playing around the Chagres. First, is the walk to the landing. Though not much over a mile, it is, during most of the year, through deep mud and over railroad ties, not pleasant walking. Coming home it is up-hill, and seems longer. There is always the question of Canal Zone weather. About six months of the year it rains a large part of the time; for two or three more months it rains; and during the remaining months it may rain. We don't count drizzles; only nice thick cold rains, that pile into the boat so fast as to require almost constant bailing, that soak through everything you own. When it isn't raining, ten minutes' exposure to the hard-working tropical sun will do as much damage to a tender hide as a blowtorch. Another consideration is that the river is dangerous. Two or three open gates in the Dam transform the river's mouth into a swollen flood with a four or five-mile current that piles into the choppy waves from the sea, a constant menace to a small boat. A stalled motor is sure to result in the boat's being carried onto the sunken reef, where two of Morgan's ships went down. An overturned boat means a long swim for the occupants out of the current and back to shore, providing shark and barracuda don't interfere. In the Chagres fishing isn't the gentle contemplative sport Ike Walton thought it was.

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Further (this admission is unfishermanlike, and I am ashamed of it), every afternoon does not see the boat returning, loaded with fish to the water's edge. There may not (and this is going to ruin me with my fellow-fishermen) even be any. But even on those sad occasions there may have been two or three tarpon strikes, particularly between March and September, when they are running best. Probably were, in fact. I hesitate to mention the number of consecutive tarpon strikes I have had without catching any, but the strike itself is an event.

A pair of fine flat feet, a waterproof gadget for your tobacco, and a little reasonable care are all that are necessary to overcome the discomforts and dangers of the river. If you come to Panama, get some one to take you down to the mouth, and troll once or twice past the ledge under San Lorenzo. There may be a big one waiting. If there is, unless I'm very much mistaken, you'll be lost forever to the ranks of those who come home and tell their friends about the one that got away.



CHICKASAW BAYOU AND THE VICKSBURG BLUFFS. UNION ARTILLERY SUPPORTING THE ASSAULT,  
DECEMBER 26, 1862

# THE AMERICAN LEGION

NATIONAL REHABILITATION COMMITTEE

710 BOND BUILDING

WASHINGTON, D. C.

July 22, 1929.

Editor, FIELD ARTILLERY JOURNAL,  
1624 H Street, N. W.,  
Washington, D. C.

DEAR SIR:

I have the honor to invite your attention to Section 310 of the World War Veterans Act, 1924, as amended May 29, 1928, which permits the U. S. Government to grant, upon application and payment of the initial premium, Government life insurance in any multiple of \$500 and not less than \$1,000, nor more than \$10,000, to any veteran of the World War who has heretofore applied for or been eligible to apply for yearly renewable term (war-time) insurance or converted insurance, provided that such person is in good health and furnishes evidence satisfactory to the Director to that effect.

I am deeply interested in bringing to the attention of all veterans of the World War the full significance of the above amendment, and it would indeed be a valuable service as well as an extreme courtesy if you would lend recognition to the splendid possibilities and advantages of Government insurance by inserting an explanation in THE FIELD ARTILLERY JOURNAL of the liberal provisions of the amendment, as many veterans among your subscribers may be unaware of the privilege afforded them.

The Government is offering seven plans of insurance to meet the needs of the veteran. The policies participate in dividends and the premiums are based on the net rate and do not include any charge to cover the cost of administration or the total permanent disability provision. Further, the insured under a United States Government life (converted) insurance policy, may designate any person, firm, corporation or legal entity, as the beneficiary under his policy, either individually or as trustee.

Additional information and application forms for insurance will be furnished promptly by the U. S. Veterans Bureau, Washington, D. C., or by any of the Regional Offices of the Bureau, upon request.

Thanking you for your courteous consideration of this matter, I am,

Cordially yours,

WATSON B. MILLER,

*Chairman, National Rehabilitation Committee.*

# USE OF CHEMICAL SHELL BY THE FIELD ARTILLERY

BY FIRST LIEUTENANT T. MCMAHON, 6TH F. A.

*(The following article was prepared by the author while a student in the Line and Staff Officers' Class at The Chemical Warfare School, Edgewood Arsenal, Md.—EDITOR.)*

WAR continually becomes more scientific; military art is ceaselessly drawing on all innovations and using all new discoveries applicable. Chemical shell, an innovation of the World War, was first employed by the Germans and its use taken up in turn by the Allies and by our own Army. There was a considerable "lag" in time between its first use by the Germans and its retaliatory firing by the Allies, occasioned by the necessary time required to determine the kinds of chemical agents used and to devise methods of using these agents as fillers for allied projectiles.

It is interesting to learn from German sources that they first resorted to chemical shell at Neuve Chappelle on October 27, 1914, several months prior to the Ypres cloud gas attack, in the form of a 105-mm. shrapnel, containing a small charge of "dianisidine", which, in the form of dust, produced an irritation of the eyes and nose. Toxic gas shells were fired for the first time in May, 1915, and mustard gas was first used as a shell filler on July 12, 1917. In their 1918 offensives the Germans used enormous quantities of toxic shells. In the attack of May 27th, on the Aisne, their VIIth Army provided its artillery with 80% toxic shell for counter-battery units; 40% for rolling barrage units, and 70% for batteries with protective missions. In September, 1918, the French General Headquarters asked that toxic shells should constitute about 30% of their ammunition production. On September 8, 1918, General Pershing cabled Washington a recommendation that beginning November 1, 1918, 20% of all projectiles produced for calibers up to include the 9.2 inch, should be filled with gas; that beginning January 1, 1919, for the same calibers 25% of all projectiles be filled with gas; that production capacity for gas should be increased from 25%



## USE OF CHEMICAL SHELL BY THE FIELD ARTILLERY

to 35% by January 1, 1919. Great quantities of gas shells were fired by the British also, and lesser amounts by the other smaller Allies.

Hence, during the World War artillery attained great importance as an instrument of chemical warfare. It is still the principal means of placing gas and smoke accurately at ranges greater than those of the Livens projector and Stokes mortar. Artillery chemical shell may be fired on nearly all occasions, as its use, within limits, is independent of meteorological conditions and without danger to our own troops. Both persistent and non-persistent chemical agents are used as shell fillers and it is intended to provide chemical shell for the following calibers: 75-mm. gun, 4.7 inch gun; 155-mm. Howitzer and 155-mm. gun.

Prior to the introduction of chemical shell, high explosive shell and shrapnel were the principal projectiles of field artillery. The HE shell is a standard type of projectile for all types and calibers. Shrapnel is fired by the 75-mm. gun and the 4.7 inch gun; it is obsolete for the 155-mm. caliber. The efficiency of HE shell depends upon the effect of splinters resulting from the shattering of the shell envelope by the burst. A bursting shell has three distinct sprays of fragments: the lateral spray, the ogival or forward spray and the base, or rear spray. The lateral spray, which is the most important and the only one counted on for effect, consists of at least a thousand splinters, the weight of which varies from 2 to 20 grams each. These splinters have a very high initial velocity, but the jagged irregular fragments have little ballistic efficiency and quickly lose their velocity. They are not effective at distances greater than 20 meters for the 75-mm. shell and 50 meters for the 155-mm. shell, although a small number of the larger sized splinters are effective at greater distances (100 to 500 meters). The burst of a HE projectile may be regulated above the ground by making it burst in air at a certain height, or after ricochet from the ground. Our field artillery is not equipped with a time fuse for HE shell. Ricochet fire is used only by the 75-mm. gun for the purpose of obtaining bursts at a height of from 2 to 10 meters above the ground, to utilize the maximum effect of the splinters of the lateral spray. To accomplish this, it is necessary to fire so that the angle of impact

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will be less than 15 degrees and to fit the shell with a delay action fuse.

When a shrapnel bursts, the balls, weighing 12 grams each, are projected forward in a conical sheaf, called the cone of dispersion. The area on the ground covered by the balls depends on the height of burst above the ground and the angle of fall. To be effective, a shrapnel ball must be able to put a man in campaign equipment and winter clothing entirely out of action. To do this, it has been computed that the ball must have a velocity of at least 180 meters per second. Shrapnel balls lose their velocity rapidly, their maximum effective range varying between 300 and 400 yards. The effective pattern of the 75-mm. shrapnel when burst in air at a suitable height may be taken roughly as between 100 to 150 yards in range, varying with the range, and 25 yards laterally. The effect of shrapnel bursting on graze is slight. If there is a ricochet the effect is comparable to an air burst, but ordinarily the balls are merely scattered on the ground with a very local and mild effect.

Great controversy has arisen over the further use of shrapnel, and its future is not assured, although it survived the World War. Ludendorff, in his Memoirs, condemned the shrapnel. On the other hand, Lt. General Rohne of the German Army, a great field artillery officer, is a strong proponent for its continued use. General Herr of the French Army believes that if the research now in progress with a view to improved fragmentation of HE shell leads to satisfactory results, the shrapnel could safely be abandoned. Our Field Artillery Board has been conducting an extensive shell-shrapnel test during the past two years at Ft. Bragg, but has not yet published its findings. The opinions of British artillerymen are divided on the subject. Some of them conclude that opportunities for shrapnel firing have greatly decreased; that the days of massed riflemen are gone and the present tendency is to replace men by machines for the destruction of which HE is required. Shrapnel, which is pre-eminently the projectile for a war of movement, where targets are relatively numerous, in the open and with little cover, surrendered its place to HE shell during the position warfare of the World War.

## USE OF CHEMICAL SHELL BY THE FIELD ARTILLERY

Later in the war, chemical shell was introduced and it has been computed that 57,000,000 of these shells were manufactured and used by the Allies and the Germans. About half of the total gas shells fired were around 75-mm. caliber. That chemical shell proved effective is evidenced by the great number of these projectiles fired by each side. Some of our division commanders were so impressed with the effectiveness of these shells when used against their troops by the Germans that they requested the proportion of chemical shell for their own divisional artillery be increased to 50% or higher.

Chemical shell is powerful both as a casualty producing agent and for harassing effect. The 155-mm. Howitzer is best equipped to shoot non-persistent gases such as phosgene, and is an excellent weapon for putting down a white phosphorus smoke screen. Non-persistent gas shoots demand a large concentration in a minimum of time, usually two minutes, and the capacity of the 155-mm. projectile lends itself to this type of chemical agent. The 75-mm. gun is the ideal weapon for firing mustard gas or other persistent agent. This type of agent should be fired in small quantities over a large area with the concentration built up over a period of time. The only chemical agent planned for the 155-mm. gun is mustard or other persistent agent, Chloraceto-phenone is an excellent harassing agent with lachrymatory effect to be fired by either the 75-mm. gun or the 155-mm. Howitzer, probably mixed with HE shell.

It is believed that some HE shell should be interspersed in all shoots of chemical shell to enhance the surprise effect, which is a very important element. Gas shells have a characteristic sound when they strike and detonate, and this can be deadened by the loud detonation of some HE shells arriving in the same area at the same time in addition to providing the important morale effect of the HE explosion. This may complicate the firing data for the shoot somewhat, which brings us to a disadvantage in the use of chemical shell by field artillery. The ballistic properties of chemical shells vary considerably from those of shrapnel and HE. The chemical agent in the projectile has a "braking effect" on the shell in flight, which in turn has a marked effect on the range and dispersion. There should be further study and experiment

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toward improving the ballistic efficiency of chemical shell.

High explosive shell and shrapnel both have a place and function in modern artillery and should be retained, and chemical shell should be added as the third projectile in the proportion of 25%, the figure prescribed for January 1, 1919, based on the lessons of the World War. The relative importance of each type of projectile in an attack is well set forth in the following excerpt from a study of "Artillery Preparation in the Attack", prepared by the Artillery Sub-section at the Staff and Command School several years ago:

"The kind of fire most suitable for an artillery preparation is high explosive shell. Smoke is exceedingly valuable for neutralization of observation. Shrapnel is ineffective when not properly adjusted, and it can be adjusted only in daytime under good visibility conditions. In case gas is employed, neutralization fire, especially over large areas, can be made more effective, and the length of preparation correspondingly reduced."

General Herr, Inspector General of French Artillery during the World War, made the following significant statement on the subject of toxic gas shell in his book, *Field Artillery—Past, Present and Future*:

"It is understood that the use of these projectiles is forbidden by the Hague Conference, the Versailles Treaty and the Washington Conference. In the future France is clearly decided not to act contrary to signed agreements. However, she may have to deal with an adversary who will not have entered into these agreements, or, who having made them, will violate her word. If we are to avoid the risk of again being caught at a disadvantage we should, therefore, be prepared to engage in gas warfare, if not as an offensive measure, at least as a means of retaliation and defense. Chemical warfare has had time to make its redoubtable efficacy felt. No one can foresee what progress will be made in chemical warfare by the research of specialists. No one can affirm that it will not replace tomorrow, by the will of any belligerent, the war by means of explosives."

# SOME ASPECTS OF MECHANIZATION

BY COLONEL H. ROWAN-ROBINSON, C.M.G., D.S.O., p.s.c.

[This is the sixth and last installment of a short book which gives some very new and interesting British views on this important subject. The writer is a distinguished military author whose opinions are receiving great attention in England. The book is reproduced in serial form in the FIELD ARTILLERY JOURNAL through the courtesy of the publishers, William Clowes and Son, Limited, London.—EDITOR.]

## CHAPTER VIII THE PASSAGE OF OBSTACLES

The tank was primarily designed to penetrate the greatest obstacle conceived by man—the deep intrenched zone that stretched from flank to flank in the Western theatre and rendered warfare static for nearly four years. And it succeeded in its task. Yet the conditions of success in the execution of this wonderful feat were such that their fulfilment produced a weapon eminently unsuited to the passage of obstacles likely to be encountered in the course of an ordinary campaign. These conditions were: protection against the bullet at close range; capacity for traversing wire, wide trenches and steep banks; and offensive power adequate for the destruction of protected guns and machine-guns. And they resulted in a heavy, wide, noisy and slow-moving machine, whose weight made demands beyond the carrying power of the field bridging equipments, whose track was too broad to admit of movement across mountains except by main roads, whose noise militated against surprise, and whose lack of speed banned wide turning movements.

Mechanization, however, in this case as in many others, provided its own cure. Once it was found that an intrenched zone could be penetrated, the thoughts of men turned from static to dynamic warfare; for it was realized that the defender was unlikely any longer to pile up wire, concrete and intrenchments. The tank designer, therefore, strong in the pride of having solved one problem, sought new worlds to conquer in the more fascinating field of open mechanical combat. The new conditions with which he was faced demanded the same amount of protection and offensive power, but less climbing, crushing and ditch-crossing capacity; and they, therefore, permitted the construction of lighter and more speedy vehicles not only more suited to open warfare but also better adapted

to the passage of natural obstacles. The continued pursuit of this policy in design is creating possibilities of even greater progress in these two directions, the general tendency being shown by a comparison between the last product of the Great War—the Mark VIII tank, which weighed 40 tons and had a cruising speed of 3 m.p.h., and the most recent tank (leaving the tankette out of account) whose corresponding figures are 11 tons and 15 m.p.h. respectively. There are obviously limits to increase in speed and reduction in weight where there are definite requirements in hitting power and protection; and it may be assumed for the purpose of this chapter that these limits have been reached.

To deal now with the passage of obstacles. In mountain ranges infantry and pack-guns will remain supreme both in attack and defence to the end of time. The tank can there be but a subsidiary arm useful for action on roads and in easy valleys. Decisive battles are, however, not often fought in mountains, and a mechanized force will certainly not choose a line of operation that will lead across them if it can in any way be avoided.

The river and canal are the obstacles that will ordinarily be encountered in the flat and rolling plains which have furnished most of the battle grounds of history. How are they to be crossed?

If the enemy is in position on the far side of the waterway on a normal frontage—say 6,000 yards to a division—a frontal attack by a mechanized force is doomed to failure. In such an operation tanks would be unable to turn to account any of their good qualities, and their inherent defects would preclude any chance of success. There could be no more perfect target for artillery than rows of these vehicles advancing to a canal bank, there to cover the construction of a bridge with their flat trajectory weapons. Only superiority in supporting artillery so overpowering as to silence every enemy gun could enable them to win through; and this would entail so high a proportion of dragon batteries to tank battalions as to render the mechanized force unwieldy in battle, vulnerable to aircraft, and weak in hitting power. Alternately—and this scheme is often recommended—the force might be organized to contain a large proportion of infantry transported in carriers with which to force a passage by methods normal to the prewar

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period. Here again, however, considerable artillery support would be needed with its attendant drawbacks. Moreover, the infantry having forced a passage and formed a bridge-head might be faced with a tank counter-attack. The main objection, however, to such a scheme is that the proportion of infantry needed to render it effective would be so high in relation to tanks as dangerously to reduce the mobile hitting power of the force. In a recent and otherwise valuable publication, it was recommended that as many as three carrier infantry battalions should be permanently brigaded with all tank battalions in order that the army might be equal to the forcing of passages, and this organization formed the base of the author's ideal Army Corps. The truth is, however, that frontal attacks are never undertaken in such cases. Feints are made here, there and everywhere. There is the utmost secrecy in preparation and the greatest celerity in execution. And there is concentration of force at the chosen point. No river has ever held up a great commander; nor will it do so in future. There is no need for change in old-time tactical methods. The devices which enabled Moreau to pass an army across the Rhine in 1796 can be applied today over longer distances and at a greater pace. The march-speed of a mechanized army enables it to deliver widely distributed feint attacks and to move 100 miles in a night if necessary to reach the real point of crossing. Imagine the position of the defender even if mechanized or partially mechanized! He may expect attack anywhere on a front of 200 miles. How shall he distribute his forces? To guard all likely approaches entails a wide dispersion of force; and the cross-country mobility of the tracked vehicle multiplies largely the number of possible approaches. His best method, applicable only if mechanized, is to hold his force in hand in a central position ready, on the report of aerial patrols, to move immediately to the threatened spot with a view to throwing the assailant back over the river before he shall have completed his passage. But the task will not be quite as easy as that presented to the Archduke Charles at Aspern. In fact, the general problem is more difficult for the defender than at any earlier period of history.

As regards the attack—when it is known that serious obstacles will be encountered, special preparations will have to be made long beforehand to surmount them, and, just prior to the operation, the

necessary material will have to be brought up either on one night or on a succession of nights. Or it may be decided to force a passage at a bridge, by the secret concentration and sudden onset of forces there. The obvious objection is that the bridge might be blown up; but that objection has always existed, and yet many passages have been forced at bridges. A principal point in passages will be, as of old, the quick establishment of a bridge-head. Infantry will be needed for this purpose, possible at the rate of one battalion to a brigade. They will be the first troops to cross and with them must go in transport—hand, horse or motor, as conditions permit—all 3-pounders not on fixed mountings. The early establishment of these anti-tank weapons in forward positions is of the utmost importance. They can be supported by artillery sited on the near bank; and aeroplanes will endeavour to delay the enemy by bombing him at defiles and by the destruction of bridges. It may be said that aeroplanes will be a powerful aid to defence. They might indeed locate the day position of the big bridging unit, and they might, by dropping flares, spot the movement of the main enemy body. But in both cases, if the assailant had made his preparations in full secrecy, they would be lucky. The defenders' air force would, of course, be quickly concentrated to repel the crossing, but naturally the assailants' planes with the greater foreknowledge of events would anticipate it, and might be able to defeat it in detail in the process of arrival. Generally speaking, it may be said that the passage of a waterway will present no particular difficulty to a mechanized force unless it is opposed by a force mechanized to an equal extent. In the latter case, relative strengths and the relative skill of commanders will decide as of yore, with the proviso that the assailant has always the advantage inherent in the initiative.

It cannot be too often repeated that the strength of a mechanized army lies mainly in its protected mobile hitting power, that is in the heavy tank as a central force and in the other armoured fighting vehicles as auxiliaries. It must have balance; that is, the various arms must be present in the correct proportion; but that proportion may bear no relation at all to what has been previously considered correct. There is certainly nothing in the passage of rivers to demand a large proportion of infantry or of guns other than those in tanks. It is quite possible, however, that bridging may



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acquire greater importance, and that a small bridging unit may be needed with each brigade as well as a powerful bridging unit under Force control.

### CHAPTER IX INDIA AND MECHANIZATION

The Cardwell system has been a main feature of British Army administration for fifty years and has served its purpose admirably. It would indeed be difficult to find a system equally suitable to our needs. Alternatives are either long-service or short-service armies enlisted specially for India. Political and domestic conditions would combine to render the former unattractive, nor would it fulfil the military need for reserves. Financial reasons rule out the latter. Moreover, any system that were to consist of a home-service army and a foreign-service army, independent the one of the other, would break up all existing organization, dualize training and destroy great traditions. It should, in fact, be fundamental in any future organization we may adopt that where we can restrict the sacrifice of the best of the old without handicapping the progress of the new, we must endeavour to do so. Mechanization in itself will entail tremendous changes. Are we to add to them at such an overcharged moment by jettisoning the Cardwell system?

The only sound reason for such a course would be a definite refusal on the part of the Indian Government to proceed with mechanization at a rate parallel to that regarded as minimal for the expeditionary force, it being obviously impossible to maintain *formations automobiles* at home to furnish drafts for *formations hippomobiles* in India. It is understood that the attitude of the Indian Government is not one of refusal but of extreme caution, its attitude being dictated by a real doubt as to whether or not mechanization can be satisfactorily applied on a large scale to the solution of its particular problems. The first step is therefore to discover on what points the doubts arise.

As far as can be ascertained they are that the country in the borderland is unsuited to tanks, the heat too great and the expense too heavy. The first may be regarded as the principal objection; and if it could be removed, opposition on the other grounds would probably be withdrawn.

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The main claim is, in fact, that India needs not machines but foot soldiers, and many of them—infantry, mountain; artillery and engineers—for tackling her perennial problems on the North-West Frontier. This is indeed true to some extent; but does she need quite as many as of old? Is not the penetration of the tribal areas by first-class roads, which is now accepted as a permanent policy, having the threefold effect of introducing civilization and trade, of enabling military columns to strike quickly and of permitting an extended use of armoured fighting vehicles, thus facilitating control and enabling it to be executed with fewer men and more machines? If the answer is in the affirmative then surely the 10,000 cavalry, 80,000 infantry, six brigades of mountain artillery and numerous sapper and miner companies of the Indian Army should suffice to provide for operations which have to be undertaken in country unsuited to tracked vehicles. The small additional number of fighting machines that would appear to be required under the present policy could be found by mechanizing the British portion—some 15 per cent to 20 per cent—of the infantry in frontier formations; and this would give an enhanced and more flexible power to the wardens of the marches.

If we turn to the other more occasional problems with which India may be faced—the suppression of mutiny or rebellion, war in Afghanistan, Persia or Mesopotamia, or war in Europe, the objection on the score of country can hardly be maintained, given that India retains the troops of her army proper indicated in the previous paragraph. To take the first case: revolution is an internal malady occurring in a well-roaded area, where mechanized forces are of much greater value than ordinary troops in that—they arrive more quickly at the danger point, they have an immediate power of distant movement from any point chosen as railhead, and they are admirably protected in the event of street fighting. The aeroplanes, armoured cars and infantry allotted to internal security duties already suffice for the fulfilment of their task. Were the British infantry, who are very strongly represented in this service, to be mechanized, the change would add greatly to our power of maintaining control; and, owing to this enhancement of efficiency, it would be possible to spare a number of mechanized units from

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internal security duty for service on the border or with the field army.

The question at once arises whether it would be possible to utilize on the border the services of any greater body of mechanized troops than that already suggested. The situation there shortly is this: We are, as already stated, pushing forward roads into tribal territory as opportunity occurs. The simplest way of maintaining these roads and of dominating the tribal areas through which they lead is to keep strong mixed brigades at each roadhead. But, were we to do this, we should have a large number of our best troops grouped right forward on the frontier in stations from which they could not be removed in the event of a great war either on or across the frontier; for their departure would be at once followed by an outbreak on the part of the tribes concerned and by the destruction of their huddled encampments. This then, though an effective method of controlling the tribes, fulfils its purpose at too high a cost in personnel. An alternative would be to hold the border territories by militia recruited from distant tribes and commanded by British officers, and to keep groups of mechanical units centrally placed with regard to groups of roads, so as to be able to operate in support of the militia in various tribal areas in an emergency. The militia have not a great history of staunch loyalty behind them, but it is generally found that they will stand firm given two conditions: the one that they shall not be enlisted locally; the other that, in an emergency, aid shall be rendered to them very rapidly, both of which conditions are fulfilled by the suggested scheme. In the event of a rising, reinforcements would arrive in the danger area in the following order: aeroplanes, mechanized units, ordinary columns of infantry with mountain artillery. It may be objected that tribesmen would damage the roads and thus prevent the movement of the mechanized units. This is a possibility that must always be considered. But it is not a probability. While the militia men at roadhead are holding out, those on the L. of C. will also stand firm. Moreover, any khassadars or levies also employed on the L. of C. will not be actively disloyal until they see the way the cat is likely to jump. The quick support afforded by aeroplanes and mechanized troops will usually persuade them to retain their pay rather than join in a war of

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doubtful issue; for immediate action exercises a very strong effect on every oriental mind, especially when that mind is sitting on a fence. The group of mechanized units, unlike advance brigades mentioned above, would, should the local situation admit, be available for service elsewhere, the militia remaining, of course, in their stations in peace and war.

Thus the mechanization of the British infantry on internal security duty and on the frontier would provide for the former task and should eventually solve the tribal problem which has exercised the minds of statesmen and soldiers for so many generations. Further, if our problems—transfrontier as well as cis-frontier—could be solved, as they might be, for instance, were Russia and Afghanistan to become members of the League of Nations, then it would be possible to effect a large reduction in our Indian Army. Whatever the conditions elsewhere, however, no serious reduction will be feasible unless the border tribes can be kept under control, and no policy to this end appears to offer such prospects as that of a continuation of road-building and a serious advance in mechanization.

So far we have considered the application of mechanization to the British infantry employed as covering troops and on internal security duties. There remains to consider the feasibility or otherwise of its application to the British infantry who form one-quarter of the infantry of the field army. The tasks of the field army are, firstly, to reinforce and pass through the covering troops when acting against border tribes; secondly, to undertake operations across the frontier; and, thirdly, to serve ex-India, east or west, as required. In the first case a proportion of mechanized troops would be of considerable value. Under existing conditions, a column moving into the heart of tribal territory can, owing to the vast transport requirements of a modern army, only advance at the same rate as the metalled road on which it depends for subsistence. This very slow movement gives an indecisive aspect to operations, prolongs them considerably and offers a strong encouragement to tribal resistance. By employing tracked and six-wheeled transport and fighting vehicles, it becomes possible to utilize roads prior to their being metalled. This, by easing the problem of supply, admits of a much quicker forward movement

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than would otherwise be possible, and it enables A.F.V.s to march with columns where they can be of great tactical use, especially in advanced and rearguard actions.

In the second case—that of a campaign transfrontier—mechanized troops would be equally valuable. Operations would normally take place in the area that lies between the Indian frontier and the Hindu Kush. On the Northern line—Peshawar to Kabul—the country, though difficult and generally suitable rather to the employment of infantry than of tanks, contains many localities suitable to the latter, such as the stretch from Landi Khana to Jella-labad, the Logar Valley and the Kabul Plateau; and the mechanization of 25 per cent of the available infantry would therefore add greatly to the total power of the force employed. On the Southern line, through Quetta to and beyond Kandahar, the area is well suited to the operation of tanks, and wholly mechanized forces could be employed there with advantage. And the same holds true for the third case, where the field army is operating in Europe, Persia, Palestine, or Mesopotamia. This brings us to the conclusion that it is advisable to mechanize all British infantry in India, whether employed on internal security duties, or as covering troops or in the field army.

It is unnecessary to argue the case for the mechanization of British cavalry, as the matter is well under way. The twenty regiments of Indian horse provide amply for our cavalry needs in all possible theatres. As regards artillery, the matter is rather more complicated. It has been treated in detail in a recent book by the writer\* and will therefore only be touched on briefly here.

Except that it eventually effects a minor economy, India does not gain greatly by exchanging horse for dragon draught in field guns. If, however, as may be anticipated, the artillery at home takes over the heavy tanks, then the artillery in India should follow suit, not only from the point of view of draft-finding, but also because the heavy tank is needed for the kernel of the mechanized force, particularly for the destruction of machine guns with which all organized Eastern armies are equipped. A certain number of field guns will still be required both in England and India and, as the former will eventually all be dragon-drawn, it would be a

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\* "Artillery, Today and Tomorrow," William Clowes and Sons.

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convenience if the latter were also furnished with mechanized draught.

Medium artillery is already tractor-drawn. Curiously enough, India refused to wait in this case till England had found and standardized a particular tractor, but took her own line and mechanized as far back as 1921. Horse artillery will add greatly to the hitting and protective power of cavalry formations if it adopts the 3-pounder, either self-propelled or carried in six-wheelers, as suggested in an earlier chapter for horse artillery in England. Finally, mountain artillery will, of course, retain its mules to the end of time.

It is not a matter of vital importance whether or not equipments are the same in India as in England. It is probable, in fact, that there will be many differences. Mechanization must always be based as far as possible on types of vehicles in common use in the countries concerned. India, like all other vast undeveloped countries, is certain to make considerable use of the six-wheeler, especially in the great freshly irrigated areas, where its use would obviate the need for building metalled roads and railways. On the military side the six-wheeler bids fair to transform the whole transport problem transfrontier in our favour. According to the *Times* of April 9, 1928, it has been recently tried out very severely over the Sind desert and on the North-West Frontier, over rough roads, rocky nullahs, sandy river-beds, trackless wastes and deep watercourses. "A distance of 783 miles was covered in nine days in one test. The general report is that six-wheelers are suitable for all classes of country and for any kind of employment." We may, therefore, expect to find the six-wheeler in use not only for transport and traction but also for every kind of armoured fighting vehicle. To build up the large numbers required in war the subsidization of civil transport is obviously desirable.

Two other points remain to be considered. The first concerns cooling arrangements; the second concerns expenses. As regards the first there is but little doubt that if the matter of producing a well-cooled tank were put into the hands of one of the great firms the goods would be produced. Possibly the low temperature research station at Cambridge might help. Certainly it would be absurd to accept the cooling of the tank to be beyond the resources of modern

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science. As already stated, it is by no means necessary for equipments in England and India to be identical. In India vehicles might be more roomy than at home, with less armament, and rather less armour on top and in rear; and this would facilitate cooling arrangements.

As regards expense, if the Indian Government is convinced of the need of mechanization, it will no doubt take the necessary steps to give effect to its conviction. As, however, a considerable amount of capital expenditure is required, it may regard its needs as satisfied by paying this out of current income by instalments spread over a long period of years. Such action might hold up mechanization in England to a dangerous extent. Should India, therefore, take this course, it might be advisable to offer her a loan or a succession of loans that would enable her to keep a parallel position in this respect, interest to be paid and capital eventually to be repaid out of the saving in expenditure effected by the substitution of mechanical for man-power units.

The conclusions reached in this chapter may be summarized as follows:

That it is both desirable and feasible, with regard to the countries to be traversed and the tasks to be performed, to mechanize the whole of the British troops in India—a procedure that will enable the Home Army to continue its mechanization without any change in the Cardwell system.

That the effect of such mechanization might be to solve the main problem of the Indian Government control on the North-West Frontier; and that it might eventually enable, under certain conditions, a considerable reduction in the Indian Army to be carried out.

That mechanical equipments as between England and India may, and probably will, vary considerably, but that this fact is of minor importance.

That, if India is convinced of the need of mechanization but does not feel financially equal to the capital expenditure involved in keeping level with progress in England, then that she should be offered a loan by the British Government for the purpose of effecting the necessary purchases of mechanical equipment.

THE END

# THE BARANOFF MACHINE

BY LIEUT. E. L. SIBERT, F. A.

IN the winter of 1926-27 there was installed in a room at the Field Artillery School a machine known as the "Appariel de Tir Fictif Baranoff". It was sent here by the Office of the Chief of Field Artillery accompanied by the rumor that it was the invention of an ex-lieutenant of Russian Artillery and that we (The U. S.) were the last first-class country to own one. Also that the cost was some fabulous sum running into the thousands.

After two years of use, this machine, now called simply the Baranoff Machine, has come to be regarded as essentially a laboratory instrument. By that I do not mean it isn't useful for instruction purposes, because it is. But other terrain boards cheaper and easier to handle are equally useful for instruction. However, if an artillery officer feels he has a short cut or a new method of adjustment or anything in that nature, he can try it out on the Baranoff Machine with the knowledge that he is getting *exactly* the same results as he would get with a battery and service ammunition. By *exactly* I mean just that, because the machine is designed to give range, deflection, site and corrector changes precisely to match such changes given by either the French 75-mm gun or 155-mm howitzer using various types of ammunition, and all with the proper amount of dispersion.

A description of the machine is impossible in the space allotted me, but a few of its principles will be discussed. One might as well try to describe comprehensively an automobile's technical workings to a Bermudan in five minutes, as to attempt to describe this machine to people who have not seen it—in five pages, and your editor asked me to be brief.

First the apparatus consists of the machine proper and two sections of reduced terrain, scale 1/1,000, each representing approximately 1200 × 1500 yards of country containing various features such as hills, trees, roads, a village, trenches, etc. The machine is set with its long axis parallel to the long axis of the terrain, and has an arm that extends out over the terrain carrying a burst indicator. The two pieces of terrain are interchangeable. One is home made of flat open country and has no map to



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accompany it. The other has considerable relief and is an accurate reproduction of a mapped area. (See Figs. 2 and 3.)

The whole installation is in a room about 20' × 30'. Space is allotted for setting up observing instruments and for the spotting of the theoretical positions of our own battery. A range is assumed to the near edge of the board such as 3000 yards, consequently the range of the far edge becomes 4500 yards. Deflection scales at the near and far ends of the machine are set for these respective ranges. A deflection shift is set off at both ends of the machine. For example, the command is: Left 20. An operator at the near end shifts left 20 mils at 3000, and the operator at the far end shifts left 20 mils at 4500; consequently at whatever range in between the burst carrier may be, it is shifted 20 mils at that particular range.

Ranges may be set off by means of range scales or by quadrant scales for various types of gun and ammunition.

Dispersion is taken care of by means of small roulette wheels based on the principle of the dispersion scale. The suits of the card deck represent the 2, 7, 16, and 25 percent zones, white for short, black for over. A spin of the wheel indicates the position of the burst on the dispersion scale. This system is carried out separately for each element, deflection, height of burst (if any) and range. The size of the dispersion scale varies with the range. This also is taken care of very ingeniously.

Rather than go into any further detail covering the mechanical features, I will include several photographs of the machine and go on to a discussion of the principle uses of the apparatus.

By changing the position of the observer and his instrument or of the assumed position of the battery, we can get any type of setup from axial up to 600 mils lateral on either side (the lateral angle is limited only by the size of the room). We can vary the ratio of OT and GT at will. Thus we can have instruction in all types axial and all types lateral. We can, by using the map of the reduced terrain, get map data and even map data corrected from an assumed meteorological message. The machine is also equipped for high burst ranging, transfers of fire, etc. Its use in time fire experiments is most interesting. For example, the angle of fall obtained from the range tables is set off on a short

## THE FIELD ARTILLERY JOURNAL

inclined plane. The horizontal position of this plane varies with the range and deflection settings plus dispersion and the burst indicator carrier is run up and down this inclined plane in accordance with dispersion in height of burst. Irregularities of the miniature terrain cause exactly the same changes in the point of impact as one would get with service ammunition.

All parts of the apparatus are metal and carefully machined. It is manufactured by the Huet Co., Paris.

We have used this layout at the school for instruction in lateral precision adjustments on rainy days, when we could not fire service ammunition to advantage, as scheduled. The greatest use, however, has been in the preliminary instruction in air observation. A rear cockpit section of an old fuselage was slung from the ceiling as shown in illustration No. 1. Two-way buzzer communication was made possible by wire and buzzer boards in the ship and on the floor below. Miniature panels of beaver board for emergency panel signals were also provided. A blackboard was installed on the wall where it could easily be seen.

In the instruction in air observation, we first give the students a lecture on the general subject of artillery adjustments from an airplane. They are required, prior to the beginning of this sub-course, to be proficient in radio buzzer sending and receiving. (Eight words a minute is the minimum). They are issued School Notes covering code groups, procedure, etc.

When a group of eight or twelve students come into the Baranoff Room, a student observer and a student battery commander are designated. The observer is taken to the map and has the target area pointed out and is shown the position of his battery and the target upon which he is to adjust it. He is allowed time to study the map to fix in his mind the following, so he may identify them when he gets into fuselage:

- a. The GT line.
- b. The target.
- c. A scale on the ground.

When ready, he gets into the fuselage, and the battery commander takes his place at the buzzer key on the ground floor and announces to the Baranoff Machine operators an appropriate

## THE BARANOFF MACHINE

shift from base deflection and an initial range. (These are given him by the instructor.)

The observer then runs through the prescribed procedure, checking communications, sensing, etc. The B. C. on the ground decodes the reported sensings and bases his new commands thereon. The Baranoff operators shift the point of fall of the projectiles accordingly.

These duties (observer and ground B. C.) are rotated. Before his first real outdoor adjustment, the student has had at least two, usually three, airplane flights to give him a feel of the air, local orientation, and some practice in the use of the SCR 134 radio set, using two-way buzzer.

The number of successful actual adjustments under this system more than proves the value of the indoor practice. During the academic year 1926-27 prior to the use of the Baranoff room for instruction in air observation, 56.1% of the total problems were successful. Using the Baranoff room in 1927-28 we had 81.4% successful, and in 1928-29, 80.3% successful.



FIG. 1—AIR OBSERVATION INSTRUCTION. BELOW: BUZZER AND PANNEL OPERATORS; ABOVE: FUSELAGE COCKPIT CONTAINING ORSERVER



FIG. 2

AN OBLIQUE OF THE MINIATURE TERRAIN  
 THE MINIATURE TERRAIN AND MAP SHOWN ABOVE ARE USED PRIMARILY FOR AIR OBSERVATION INSTRUCTION AND EXPERIMENTS INVOLVING MAP DATA

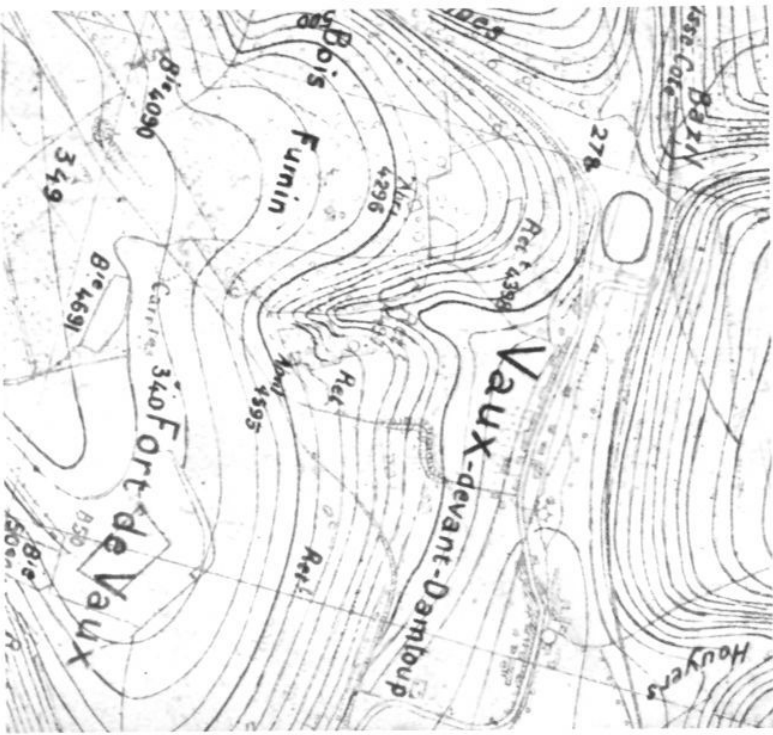


FIG. 3

MAP OF TERRAIN SHOWN IN FIG. 2  
 MAP DATA

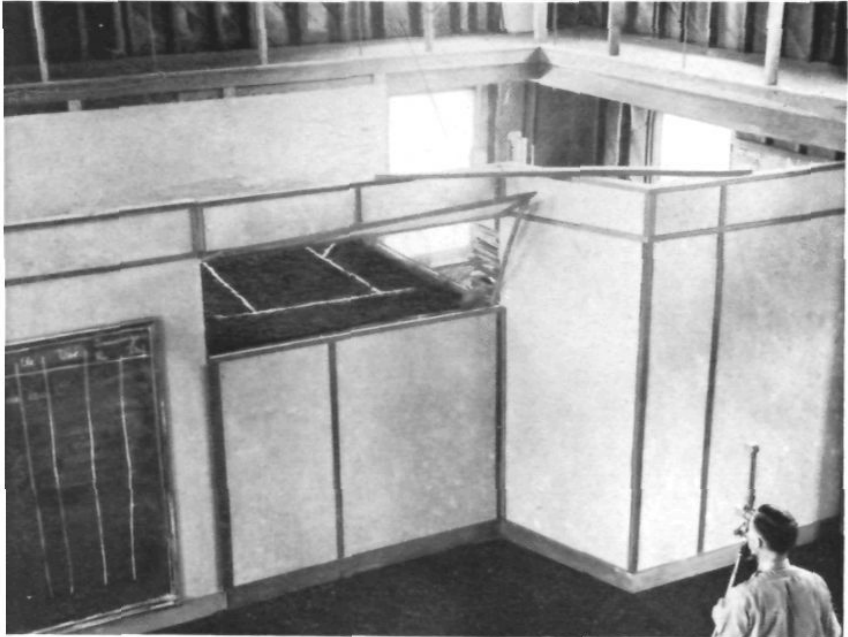
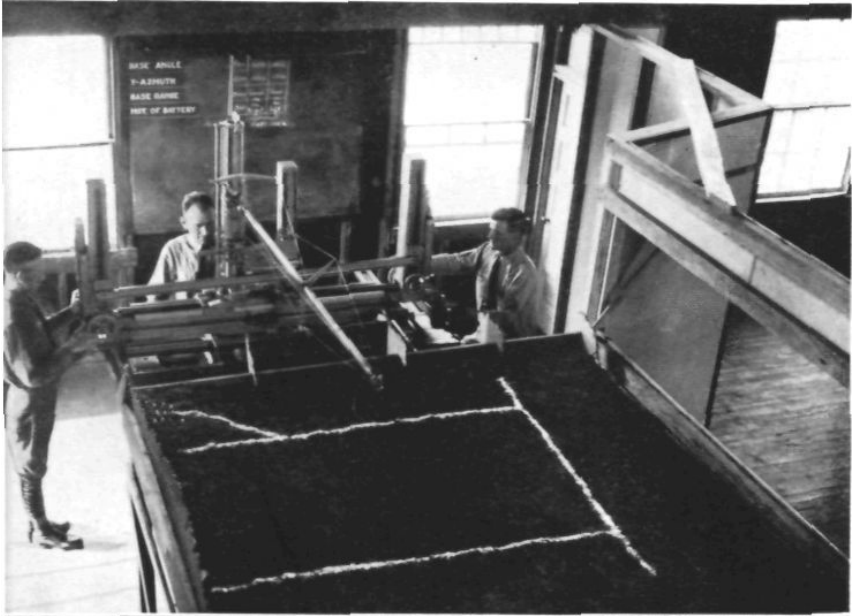


FIG. 4. BARANOFF MACHINE IN OPERATION; THE MAN ON RIGHT MAKES RANGE OR ELEVATION CHANGES, THE CENTER MAN MAKES "ARC" CORRECTION AND OPERATES BURST INDICATOR; THE LEFT MAN HANDLES DEFLECTIONS AND, WITH RIGHT MAN, ANGLE OF SITE

FIG. 5. A B.C. OBSERVING AND CONDUCTING FIRE

# THE R. O. T. C. AT COLORADO AGGIES

BY A STUDENT

THE R. O. T. C. Unit at Colorado Aggies is almost as old as the institution. In the fall of 1880 the first freshman class was organized, and four years later the first R. O. T. C. work was begun, the instruction given at that time being of an infantry nature. The unit in 1884 was very small, but has gradually grown to its present strength of 590 men.

Lieutenant Vasa E. Stolbrand had the honor of being the first in command. He served until 1887, when Warren H. Cowles, First Lieutenant, 16th Infantry, took charge. He was followed by Captain John P. Dent, who was in turn succeeded by Lieutenant Harry D. Humphrey in 1893.

In 1897 the course was changed somewhat in that the students were given infantry training in the spring, and artillery in the fall and winter. At that time there were two units, one composed of college men, and the other one of students from the Colorado School of Agriculture, which was a preparatory school for Colorado Aggies. Lieutenant William C. Davis was then in charge of the unit. He was followed in succession by Major Richard A. Maxfield, Captain Thomas M. Anderson, Jr., Major Harry D. Humphrey, Major George S. Scott, Lieutenant Joseph A. Rogers, Lieutenant T. J. J. Christian, Captain Louis R. Ball, Major C. B. Hardin, Lieutenant Colonel William Harrison, Major Gustav H. Franke and Major John P. Lucas, who came to us on September 1, 1924. Major Lucas leaves at the end of this year, being transferred to Fort Sam Houston. It is with much regret that we see him go. He is a real soldier and educator, and it is because of him that the unit enjoys such popularity and success as it does.

At the start of the second semester, in 1918, the course was changed entirely to artillery for the college students. The students of the Colorado School of Agriculture continued to receive training in Infantry Tactics until 1925, when this school was discontinued, the government refusing to support a school where the size of the unit was under 100 men.

## THE R. O. T. C. AT COLORADO AGGIES

When America entered the World War many of the male students volunteered and were assigned to training camps; others were soon drafted for service. This threatened to disrupt the military work on the campus.

As soon as war was declared, the President of the college, Dr. Charles A. Lory, was requested to train soldiers in two-month periods, taking a new contingent at the end of each 60 days. Barracks and dining halls and shops were hastily constructed, and the work was started in a surprisingly short time after the request came.

The recruits were to be trained in two units, one unit composed of men who were in college, or who had completed the requirements for college entrance: the second unit to be composed of men who could not meet college requirements.

The maximum load was set at 600 men, and this number was carried most of the time.

In addition to the regular military instruction, the men were trained for special forms of army service depending on their previous training, and their physical and mental qualifications and natural inclination. The following lines of service were included in the courses:

- Signal service (radio)
- General mechanics
- Automobile mechanics and truck repair
- Blacksmithing and horseshoeing

The entire institution was converted into a defense organization; our equipment and men being placed at the disposal of Uncle Sam. to be used in any emergency which might arise.

Prior to the World War a battery of the Colorado National Guard was organized among the Aggie men by Major Joseph A. Rogers. This was known as Battery A and was mustered into the service of the United States at the beginning of the World War, with Major Roy Coffin in command. Major Joseph A. Rogers, F. A., deserves much credit for the establishment of this unit of the service.

This Battery, which was a part of the 148th Field Artillery of the 66th F. A. Brigade, rendered distinguished service during

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the war and was held in much esteem by the other military branches. At the end of the war it was mustered out, and the guidon carried by it now reposes in the office of President Lory.

After the war, there was a reaction against military training, and a wave of pacifism which was difficult to overcome, but the vision and courage of President Lory, with the fine spirit, patience and wise counsel of the military officers who have been with us during the last ten years, and especially since Major Lucas came to us, have almost wholly wiped out the reaction which was evident a few years ago.

The first two years of military work at Colorado Aggies is compulsory for all men students who are physically fit: the last two years are elective. Of the 590 men taking the work, 60 are taking the advanced course. This is all that can be handled unless the curriculum of the college is changed. It has been found easy to enroll this number in the advanced course, the work being very popular on the campus.

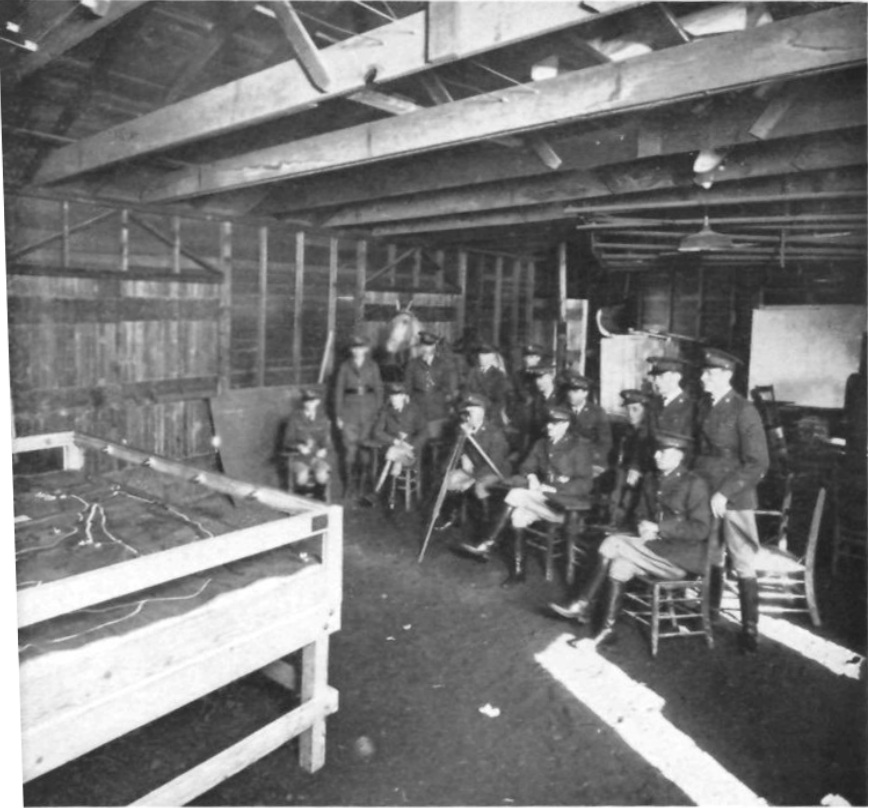
The student receives as much credit for taking the work in military courses as he does for work in any other department. If he successfully completes both the basic and advanced courses he is given 32 academic credits.

The entire unit is organized into one regiment of two battalions. These battalions are in turn divided into three batteries each.

One hour each week is devoted to drill, the whole regiment being under the command of student officers. The seniors taking the advanced course are given commissions as cadet officers in the regiment, the juniors serve as non-commissioned officers and the sophomores and freshmen as corporals and privates. This method has proven very successful, both in giving the men drill and in giving the cadet officers practice in exercising command and leadership.

The academic year is divided into two semesters. The freshmen and sophomores devote three hours each week to classroom and laboratory work, besides the hour which is spent in the drill of the regiment as a whole, called the Wednesday formation.





**TOP: ONE OF THE SUNRISE BATTERIES (EXTRA CURRICULUM TRAINING FOR FRESHMEN AND SOPHOMORES)**

**BOTTOM: JUNIORS DOING CLASSROOM WORK**

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The juniors and seniors put in five hours each week, including the Wednesday formation.

The following is an outline of the work which is required of a student taking the full four-year course: The first semester of the freshman year is taken up with Dismounted Drill, Military Courtesy, Field Artillery Materiel and Equipment; the second semester with Field Artillery Gunnery, Field Artillery Driving and Draft, and a course on Ammunition.

In the first semester of the sophomore year the student is given instruction in Field Artillery Gunnery, Hippology, Stable Management, and Telephones. In addition, he has practical work in these subjects and in the figuring of firing data. The second semester he is given lectures on Gasoline Engines and on the Military Policy of the United States. He is also drilled in the tactics of the battery mounted.

The first semester of the Junior year he is given courses in Field Artillery, Topography and Orientation, Leadership and Equitation. The second semester he has Field Artillery Advanced Gunnery and Artillery Firing.

The seniors have Military Law and Equitation in their first semester, and Military History, Organization and Tactics and Gunnery in the second semester.

The sophomores are required to write a paper on The Military Policy of the United States, while the seniors must write one on some important battle of the World War.

Throughout the last two years the students are given lectures and practical work in Leadership.

The other departments cooperate as much as possible in making out their schedules so that a student may take the military work if he wishes.

During the spring of 1927 the buildings which were constructed by the Government in 1917 and which were used as classrooms, offices, and gun sheds, were destroyed by fire. This necessitated finding some place to hold classes, at least temporarily.

The rooms in the Administration Building occupied by the Y. M. C. A. were remodeled into offices and classrooms, and the remainder of the classes were assigned to other buildings on the



**TOP: BEAKING GROUND FOR THE NEW MILITARY BUILDING. LEFT TO RIGHT—MAJ. LUCAS, P.M.S.&T.; DR. LORY, PRESIDENT OF THE COLLEGE; GEN. BOWLEY, CORPS AREA COMMANDER**  
**BOTTOM: MEMBERS OF THE SPONSORS CLUB, A GIRLS' SOCIETY AFFILIATED WITH THE R.O.T.C.**

## THE FIELD ARTILLERY JOURNAL

campus. Since that time there have been two gun sheds constructed, and a new building to be used as offices and classrooms is under way. When this building is finished. Colorado Aggies will have a very complete set of buildings for the carrying on of this work.

Although the unit has a range of its own, it is never used any more because of the danger of the bursting shells to farms in the vicinity. Instead of firing the guns, the students fire smoke-bomb problems. Then at the annual summer camp, which is usually held at Fort Russell, Wyoming, they get experience in actual firing.

A recently organized branch of the unit which creates a great deal of interest in R. O. T. C. circles, is the Sponsors Club. This is an honorary organization which was started in the spring of 1928 by the Advanced Course Students. Its membership is composed of girls, elected by the unit, from the upper three classes on the campus.

One of the major social events of the year is the annual Military Ball. It is put on by the Advanced Course Students, and all of the men in the unit are eligible to attend. The election for the Sponsors Club is held just prior to this event, and on the night of the ball the successful girls are announced.

That the students take a great deal of interest in the training is shown by the number of men who are enrolled in the Sunrise Battalion. This organization was started by Sergeant Onorio Moretti in 1928. It is at present divided into two batteries, with a total enrollment of 140 men. This number is increasing rapidly and will soon reach the limit or maximum, which is set at 150.

One battery meets at 6:30 a. m. two mornings a week and the other meets on Saturday. Coffee is served at one of the gun sheds for those students who miss their breakfast.

These men, who are mostly freshmen and sophomores, receive no credit at all from the college, but take the course for the instruction and training which they receive.

The honorary military fraternity. Scabbard and Blade, is very active, and does much toward securing the cooperation of the students and the public in military affairs.

## THE R. O. T. C. AT COLORADO AGGIES

The polo team, because of lack of sufficient ground upon which to play, was discontinued five years ago, but has been revived again this year. The department possesses some very good polo ponies, and the students take a great deal of interest in the sport.

The pistol team is another organization which helps to create interest among the cadets. The pistol range is located just west of the campus and is in use practically all of the time. The team ranks among the best in the United States.

The rank of the unit among the artillery schools is very good. It has been given a Distinguished Service Rating five times in the past seven years, and year before last was tied with the University of Utah for first place.



LIEUT. WILKESON HOLDING BATTERY G, 4TH U. S. ARTILLERY, TO ITS WORK ON THE FEDERAL RIGHT FLANK AT GETTYSBURG, JULY 1, 1863



# WAR BUGS

*BEING*

*A WORM'S-EYE VIEW OF THE WAR TO END WAR*

**BY CHARLES MacARTHUR**

Formerly Private Second Class, Battery F, 149th F.A., 42nd (Rainbow) Division,  
A.E.F. Pictures by RAYMOND SISLEY, Formerly of Battery C, 149th F. A.

**By courtesy of Liberty Magazine**

## PART FIVE

THE Germans were still running when we got to Chateau-Thierry. From the looks of things, it might have been Hallowe'en. Both sides had made a bum out of the town. Nothing was left but latitude, longitude, and broken brick.

We trotted through the rubbish in the general direction of the front. Up hill and down, cannoneers to the wheels, and how do you like the war by now?

By sunset we reached a marked down forest near Montreuil aux Lions. A few hours before it had sheltered the Twenty-sixth Division, now burning in the wake of the war. It was littered with dead horses and men, broken wagons, dirty blankets, shelter halves, mess kits, rifles, and miscellaneous junk to the value of three Liberty Loans.

The day was hot, the air clammy with death. Yet it's an ill wind that gathers no moss. For once, we were able to salvage all the food and equipment we wanted, including some curious luxuries.

## WAR BUGS

Somebody found a phonograph and one record. For the following twelve hours the deep tangled wildwood rang with the Gamblin' Man Blues over and over and *over* again:

Dis niggah wuz a gamblah  
An' a dice man frum-hum his heart.  
Ev'ry time he'd hit a game  
He'd bust it from th' staht.  
He'd say: "Kiss yo' money good-by, coon.  
It's mine befo' you staht."  
Wid a "Honey—money—fare—thee—we-ll!"

The officers had a foolish notion that the woods ought to be tidied up before we went out to play. A few burials were ordered.



*"I beg your pardon, sir," he said, "but is this gas for us or for you?"*

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Hunting for picks and shovels, the boys discovered a beer saloon, and there was an immediate and highly insubordinate stampede. The officers ran after and ordered Madame not to sell a drop. Madame took them seriously, waved her arms at the thirsty, and screamed, "Feeneesh, feeneesh, feeneesh!" like the silly goose that she was.

It looked like a dry night until McLaughlin discovered a shell hole six feet in diameter in the rear wall of the saloon. Because the café was built on a slope, the hole, although on the first floor, was thirty feet above the ground. Mac ascended like a Human Fly, using finger nails, teeth, and toes.

A case of Calvados descended, some beverage called Marc, several cases of wine. Triple Sec, Benedictine, Scotch, and cordials, until all of madame's storeroom stock was in her back yard.

We found wheelbarrows and pushed the booty back to camp. Several officers were about, but we disguised the loads with gunnysacks and swore loudly at the injustice of doing day labor after such a long and bitter hike.

Wild Bill was elected bartender, and the word went out—very cautiously—that the picnic was on. Looting rhymed too well with shooting to advertise the party.

There would have been no trouble at all if Rush Dyer hadn't sampled the Calvados and pronounced it ordinary American corn whisky. This point was debated by Bill, who owned two stills in Tennessee. Dyer's opinion was simply that of an amateur, said Bill, and proceeded to prove it.

The argument became bitter. Dyer offered to drink an entire bottle, intending to identify the stuff by the effect it produced. This reasonable plan was misunderstood by Wild Bill, who considered that a race was on—and offered to spot Dyer a bottle and drink the entire case.

Now, Calvados is peculiar stuff. Veteran French boozers limit themselves to a tablespoonful, and, at that, end up licking policemen and setting fire to the Are de Triomphe. So in fifteen minutes curious things were happening. Bill had killed a bottle and a half—Dyer a bottle. The rest of the boys were smoothing individual bottles more temperately.



## WAR BUGS

Dyer, whom we knew to be a Southerner from Mississippi, began talking in hard Northern style. For no reason, he recited the list of his loves and made all of them out to be daughters of Senators and Governors.

Wild Bill cocked his automatic and offered to bore places for earrings in anybody present; he was not angry, he explained, merely expert. Herb Toomey was discovered taking off his shoes. He said that it was very late and that he didn't want to wake his wife. When last



*That chateau was packed with more junk than a box from home*

seen, he was tiptoeing down the hillside carrying what looked like a couple of violin cases—if violin cases had heels. Bill had his ear to the ground by that time, and thought he could discern the approach of revenooers. We had to disarm him. In time we slept where we fell.

Oh, oh, oh, and oh, what a morning! We picked ourselves out of trees, shell holes, mud puddles, and from under the gun carriages, and tried to stand up while Captain Stone laid into us.

## THE FIELD ARTILLERY JOURNAL

The captain passed to the subject of identification tags—his favorite topic—and spoke of their use in the awful event of death. All of us felt that he was completely nuts. Death would have been a luxury at the moment.

A sick and sorry battery got the horses hitched somehow, and moved out with the morning sun, bulging with bottles. All day long we marched through the heat and dust. The sun came through, a gigantic burning glass. There was no water. When Kipling mentions heat "that makes your bloomin' eyebrows crawl," he's a fool. There wasn't a man in the battery who didn't envy the sprawling dead along the road.



*A doughboy sergeant called: "Stick wid us, Hunnert an' Forty-nine."*

## WAR BUGS

A rugged few sought relief with more Calvados. Rush Dyer, only the whites of his eyes showing, toppled in a heap of dead at the side of the road—and we didn't see him for weeks. A few fell off their horses. We passed wayside wells in the ruck of destruction. The sign POISONED was propped against their cool stone sides. We thought of Lazarus in Abraham's bosom, and wept.

The sun was never bigger, more blinding, more merciless. Through Lucy and Bouresches and Belleau Wood, every span of wrecked white road revealing another village pounded into dirty dust. Black and splintered sticks that had once been green forests. Rifles, rifles, rifles, upended in shallow graves. Over the butts, helmets jauntily tipped to one side. So the grave-diggers had been along. Yeah. Wait till they saw us!

On till midnight, our seventy-five pound packs weighing first ninety, then 100, then 1,000,000 pounds. Early in the morning we flopped in a wood near Epieds, inhabited by a number of lucky stiff—German, American, and French—and slept without removing our packs.

We woke and dug graves for our roommates. It was more comfortable with them out of the way. Jack Walsh and Kratchovil made crosses. We laid them with their faces to the east. Every forest and field was littered with bodies, and details poked among them for the sake of regimental records. The Germans had built a flock of dugouts and flop trenches in the field, a lucky break for us. We moved in, feeling comparatively safe, and mounted a dozen abandoned machine guns to feel safer.

Word came back that Ohio and New York were ready to attack. We pulled out of the woods at dusk and marched all night in a stinging rain—God knows why or where. Three times we were 1,000 meters from the German lines, with guns and carriages tobogganing off the greasy roads like bobsleds. At every halt we flopped in the mud, sticking our shins in the spokes of the carriages. When the column moved ahead the wheel yanked the sleeper's leg. He arose, swore, and slogged onward.

Seven hours of this, and we paused in a narrow ravine a short city block from the German lines. The machine guns were desperately near. Dawn began to lighten over the black trees,

## THE FIELD ARTILLERY JOURNAL

through the gray rain. There was a halt. The officers gumshoed back, whispering orders to hold the clanking harness joints in our hands for the sake of silence and the girls at home. We waited one hour, cursing so loud and sincerely that the officers were frantic.

At last a courier paddled up. He had been playing hide and go seek with us all night long. Naturally, it turned out that if he hadn't counted 500 by fives the night before we would never have started, as the attack had been called off five minutes after we left camp. Rain checks were in the mail.

We turned back, frothing at the mouth. It was daylight now—a soupy daylight, and the doughboys were shedding water like Airedales. Over their protests and those of our officers the men began making remarks that could be heard in Berlin. They weren't exactly detrimental to the Kaiser either.

In desperate whispers the officers begged us to shut our yaps, but with no luck. We kicked the horses back to our old position without getting killed or even shot at, and fell in the flops. Shelter halves were oozing with mud, another result of bonehead play; so we spread our blankets in the slime, with black words that turned to sweetness and light when somebody sang:

"Kind words will never die,  
Never die, never die.  
God knows how deep they  
lie, Deep in the breast."

Soothed by this thought, we started out again, slogging through two feet of mud, breaking our backs at the wheels. Up a long, long hill to a flat field full of dead people. French *cuirassieurs* had been quarreling with some *uhlans* the day before, and it looked like it. There they lay with their pretty lances—100 of them.

God's blessed sunshine came out and fell on the dead with such violence that we had to wear our gas masks in order to breathe. Burial details were doing their best; but, with shells bouncing all over the field, there was no use adding to the roll Up Yonder. So they let them lie.

We ran a bad gauntlet and got the guns in place, opening up

## WAR BUGS

at once and firing all day and night. The Germans were hammering hell out of the entire field. A dozen big shells whanged into a hospital a few hundred feet from the position. It went upsy daisy.

Rushing coffee to the guns was like crossing the Delaware. The poor boobs who drew the job had to flop every three feet. They were called The Acrobats and were applauded heartlessly by the battery after every burst. German planes swarmed over in a huff and raked every foot of road and field. It looked like plain bad temper.

We kept on firing the next day. From our ranges, German resistance was tightening. Their planes became more numerous and nervy. French batteries at our right and left were smashed to bloody bits. We rapped everything that looked like wood. Innumerable gentlemen were gathered unto their fathers; great trees were uprooted by the black bursts; horses and men came running from the surrounding woods to scream and die in the field.

Strange rumors: The German machine gunners were shackled to their posts. (We saw none.) The doughboys were taking no prisoners.

Endless stories of crucifixion, probably untrue. One German soldier leaned forward from an apple tree with a bayonet through his wishbone, but it looked to us as if some doughboy had been unable to dislodge his steel. Reports of officers shot in the back. Plain hooley, engendered by orders to the army to shoot any officer or man caught starting a panic. (Which orders were quickly rescinded.)

Directly in back of us a six-inch rifle blew up, and parts of the gun crew clumped past our ears. Seven men went by-by with that one, just when our own guns were hottest.

A German plane dived so low it nearly hit the camouflage. Jack Hamilton was shot through the foot—a *bon blessé* if he could get to the hospital without another wallop. Frank Gaddis had the fingers of his right hand torn off by a bomb. They were laying bombs like linoleum. It wasn't even funny.

Four days of this nonsense, firing all the time, sleeping in relays under the roaring guns, sweating, swearing, and singing

## THE FIELD ARTILLERY JOURNAL

the oldest songs we knew—Blue Bell, Where Is My Wandering Boy Tonight, Meet Me in Dreamland, and Kiss Me—and suddenly eight German planes discovered our little hideaway. They circled over us at 200 feet, machine gun bullets falling like hail. It looked like Good-by, Joe, and See You Later.

At this point in the war Vic Stangel and a hero who shall be nameless (except that he is the writer of this fascinating narrative) laid the forward machine gun on one of them and brought him down to teach the rest a lesson. The pilot was pretty badly bored by tracer bullets, and left apologies to the observer, who had been a bank clerk in Philadelphia—proving that Philadelphia bank clerks can't be trusted.

He tried to fraternize at once with a species of stale slang.

"Oh, you keed!" he said, and expected to get away with it.

The boys had difficulty in restraining the French, who wanted to work on him with their funny bayonets. His plane was split up into souvenirs, and the men returned to the guns, which had been operated by the cooler heads at the same cadence of fire. The aviator's seven pals were no fools. They beat it.

Up forward New York was crossing the Ourcq, which they insisted on calling the O'Rourke, the better to fit Irish orientations. They had been having a desperate time, getting knocked off like flies. Joyce Kilmer, the poet, died here—gloriously.

At last they broke through. We hitched and followed, through the ghastliest scenes of the war. The roads were strewn with our doughboys, gray faces in the mud, blue hands frozen to their guns. Near the Ourcq a sixteen-inch shell had blown a German from his grave for the third time. His face bore such real resentment that some doughboy wrote a sign and hung it on his chest:

"For the love of God, leave me alone. I got appendicitis."

More bundles of what had once held life sprawled on the river's edge. German, American, and French—all gone, and nobody gave a damn. In the poppy fields the living lay with the dead; it was hard to tell which was which.

We paused at the Ourcq to eat, and some of the men, contemptuous of the shells that still snarled on its banks, tried to spit across the little river. Vic Stangel finally succeeded—although

## WAR BUGS

there was talk of cheating. In view of the dreadful loss of life, it seemed important to put the river in its place.

Waist deep through the little stream, straining at the wheels, screaming at the nags and socking them with helmets and rammer staffs. They had learned that any laziness on their part was rewarded by incalculable hard work on ours. You can't fool a horse. Result: They stood still and cracked jokes with each other while we pushed the guns and carriages up hills and down dales by hand.

Over the river. We rolled along, turning out for shells and shell holes, until we reached a nasty crossroads reeking with enemy fire. A dozen machine gunners, hot from the slaughter, tended their wounds and rolled cigarettes behind a broken wall. They watched us paddle past and wearily indicated the front.

"Go get 'em. Good luck!"

Time and again we reached the front lines of doughboys, who also were feeling their way along. There was nothing spectacular about it. The Germans were running like hell in order to stand in the best possible place. Our principal danger was from machine gun fire and planes skimming low over the roads.

One of these babies rustled through the trees and ran his kiddy car directly above our heads—no more than sixty feet off the ground. To rub it in, he leaned over the cockpit and made faces at us. Two hundred automatics rang out and not one bullet hit. A plane with American markings dived at the column and rattled away, wounding several of our horses and giving the boys a real thrill. Our machine guns were mounted on the caissons. We put a ton of lead in the fathead's rudder.

Toward night we reached the Chateau de la Fère, which sounded like something from *The Three Musketeers*. It was a beautiful building of the ninth century, old and lovely and rather sad. The Krauts had wired it in anticipation of our coming, and the first man to pick up a Lueger automatic pistol, placed carelessly in the doorway, was supposed to send the chateau, battery, and several adjacent units smack to the Great Beyond. Very neat; but one indefatigable soul crept up to the tempting Lueger, clipped the communicating wires, and was taking target practice ten minutes later in the back yard of the chateau. Art Barker retrieved

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a lovely helmet in the same way. You can't fool a former electrician, either. Furthermore, all that high explosive which was supposed to have gone off was carefully removed and used to cook corn willie.

The French genii crept through the goof trap and nipped the remaining wires, after which we gave it a thorough prowling. That chateau was packed with more junk than a box from home. Some of the boys acquired slightly battered plug hats. Some delicate Louis XVI gilt chairs, upholstered in pale blue brocatel, were tied to the caissons by a couple of æsthetes who wanted to sit pretty during the long, hard days ahead. Some elaborate antique mirrors were nailed to the supply wagon for shaving purposes.

There were hundreds of patent leather helmets, ladies' corsets, fancy pillows, oil paintings, and a case or two of brandy. The officers tried to confiscate the latter on the grounds that it was deadly poison, a transparent and childish ruse if ever there was one. We tried a little of it on the replacements. There wasn't a headache in a barrel of it.

Early the following night it was Onward, Christian Soldiers, all over again. The battery pulled out looking like Santy and all his reindeer. Every carriage was hung with souvenirs. Doc Bristow was put under arrest for wearing a high silk hat in place of his tin helmet. Ken Hoy and a few others were pinched for smoking—although God knows what good arresting people did. Ten years in Sing Sing would have been a lark in comparison to the hoopla we were having.

That night's march topped them all for willful, premeditated discomfort. We weren't on the road five minutes before the Germans persuaded God to make it rain—a cold downpour that lashed up and down the mud roads all night long. Three times we lost our way. The trees dripped like great black sponges. The mud was so much cold mucilage. Everywhere pitch black and puddles of ink.

The Germans took to shelling the main roads with big cannon. Slop shot up in geysers. We took a detour along a little road slicker than lard. Every ten minutes a caisson shimmied over the side. Tender hands unloaded it, put it back, reloaded it, and



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honest soldiers asked God if there ever *was* such a war. Horses fell at every step. So did the men. In the long waits, caused by another gun carriage going kerplunk into the soup, we crawled under caissons, rolled forbidden cigarettes, and fell asleep before we could light up.

Morning came—rather, a depressing light tinged the mud and rain with gray. A string of New York doughboys appeared beside us in the road. They had flung all unnecessary equipment aside, preserving rifles, rations, and a single blanket apiece. They looked like washerwomen, each with a blanket over his head, shawl style, with sodden poppies in their hats. Ordinarily, we mixed with New York on sight and swapped experiences like monkeys. But it was no time for jabber now. The backs of our eyeballs were coated.

New York got forward march, and waded on. As they left, a sergeant called, "Stick *wid* us, Hunert an' Forty-nine!"—comforting confidence. New York felt invincible with our fire.

We had been waiting for Lieutenant Skinner, who had been making a reconnaissance a kilometer or two ahead. He returned with his customary Gloomy Gus prediction that it was suicide to go ahead. Shells were bouncing like Indian clubs all over the prospective positions.

We crept forward—slop, sop, slop—and found a home abreast of the infantry in a field near Chéry Chartreuse. Before the rain ceased and the German observation planes got busy, we had streached our camouflage and were digging deep.

Three days of shooting and bailing water from the pits. Our doughboys were relieved by infantry of the Fourth Division, who thought the war was played something like Post Office. Every day we gave them a swell rolling barrage with a vague idea that they were going over to clean up—an optimistic notion that vanished when we had to throw a defensive barrage ten minutes later.

Finally Colonel Reilly investigated and discovered that General Somebody-or-Other couldn't advance because he didn't even know where his men were. The bawling out that followed was adequate compensation for all our troubles. Reilly's vocabulary was hell on privates, but elegant on generals.

Somebody got a bright hunch, and we were moved to a position

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within spitting distance of the Vesle, then no man's land. Because of the defilade we were too close to fire into the enemy first lines, and it was worth your life to poke a nose over the sky line.

For a few days we sat tight and waited for the Fourth Division infantry to do their stuff, hoping that they would push the Germans back to something like our range. Horse lines were established near by; and the cannoneers amused themselves by crawling on their bellies to the top of the crest for abandoned blankets and doughboy toilet articles. The dead were plentiful and well equipped. Again we slept on twelve blankets apiece.

The new horse lines were shelled silly. Some E Battery men were killed. Paul Stewart stopped some shrapnel. When they returned him to us some months later his head was stitched up like a baseball.

A raspberry patch was discovered in front of the position, within full view of the German lines—and the war was off until we had collected a helmetful apiece. The Germans pestered the pickers with machine guns, but without much damage. Reserve rations were tapped for sugar, the Greek miraculously produced steak and potatoes, and for a few hours it was a good war.

It got around that we were having it soft, and teacher sent us back to the positions we had just abandoned. Our getaway was attended by a spectacular air battle not sixty feet over the guns. A beautiful German plane, painted like a swallow, had fastened on to a Frog and was burning him up. We finally rescued the Frenchman with some machine gun stuff of our own.

The old positions looked like hell on our return. The Fourth Division had been using them for picnics and card parties. We ran them bowlegged and moved in, full of apprehension. A position is good only as long as its location is a secret, and not so damned good then; whereas Hindenburg had a picture of *this* one in his watch.

This Fourth Division lived in a woods a few feet from the guns, and fought the war with their gas horns. Every fifteen minutes, day and night, *honk* would go the klaxons, and we had to scratch and scramble for our gas masks. Where *we* came from, boys as noisy as the Fourth Division were sent to bed

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without their supper. The first few times it happened we spoke to them like gentlemen, but as the days wore on and horns wore out, we began socking a few noses. At last the Fourth Division agreed to use their horns only for gas.

One night the Germans actually did gas us, and we honked our horns a bit. The Fourth Division, thoroughly impressed by our threat, didn't know whether to join in the alarm or not. So they sent over a top sergeant, who must have been a Harvard boy, from his manners.

"I beg your pardon, sir," he said to Lieutenant Kimball, "but is that gas for us or for you?"

He was advised to go back and see if his meter was working. If it was, the gas was for him. The meter joke was a favorite among the New York doughboys. They maintained that if we gave the Germans no quarter there would be no gas.

Once cured of their gas trouble, the Fourth went in for grazing their horses in back of our guns. Now, if there is anything the Germans like to do, it is horse shooting, and a hail of shells began landing short, right in our laps. We lost our temper completely and defied death to tell the Fourth Division where to head in.

We pegged shells for two days, and were finally relieved by the Seventy-seventh Division. Once more our horseshoe worked, as the gun positions were hammered to hell five minutes after the guns were safely out. Every battery in the field was getting it hot and heavy as we pulled away.

We raced to the rear, singing loudly. In six hours we tore off thirty kilometers, camping that night in the Forest of Chatelet. Mail and hot coffee were waiting; food, liquor, and a river. We peeled and washed our underwear. We hadn't had our clothes off in a month and they were pretty lousy.

Three days' rest. A steel and concrete foundation near by was identified as the base of Big Bertha, the Germans' 100-mile gun. Our initials and home addresses were immediately chipped into the stone.

Off again. According to universal rumor, we were starting for Paris, there to have the *fourragère* bestowed upon us by the grateful French and to be kissed by all kinds of women.

We hit Chateau-Thierry in a cloud of dust.

# THE CONDUCT OF WAR

BY MARSHAL FERDINAND FOCH

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TRANSLATED BY CAPTAIN W. F. KERNAN, FIELD ARTILLERY, U. S. ARMY

*(Fourth Installment)*

## CHAPTER VI

### PREPARATION FOR COMBAT

MOLTKE, in his memoranda on the various situations which might arise at the beginning of the Franco-Prussian War, studied the following case:

Assuming that the French should fail to attack, and that the German Army was able to complete its concentration at the frontier and assume the offensive, he said:

"In the event that by this time we have been unable to get sufficient information regarding the concentration of the enemy's main body, we shall then have at our disposal four divisions of cavalry (seventy-six squadrons) which, with the assistance of the infantry, should be sufficient to make the necessary reconnaissance."

The execution of Moltke's plan of attack, as we have already seen, was entrusted to a center and two wings. He planned to take the offensive against the enemy's main body and to obtain the necessary information by means of a reconnoitering force of cavalry, supported by infantry.

In the spring of 1870 Moltke gave the details of his scheme of attack to the various chiefs of sections of his General Staff in the following note, to which he attached a march table for the Armies of North Germany only:

"Operations against France will consist simply of an advance on French territory with all our forces united, making the necessary marches until contact with the enemy is gained, and then engaging him in battle.

"The general direction of this march will be towards Paris, because by marching against that city we can count most surely on attaining our objective, the French Army.

"The fortified city of Metz lies on the road from the Palatinate to Paris. We shall, however, pass to the right of it and only observe it from a distance. Our first strategic deployment, if

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no battle is fought in the meantime, will be along the line of the Moselle from Lunéville to Pont-à-Mousson (a distance of 50 kilometers as the crow flies).

"In this advance with the Second Army in the first line and the Fourth Army in the second line, our two flanks will be covered by the First and Third Armies. Our initiative will enable us to fix the conditions under which the enemy must accept battle.

"Once on the line Lunéville—Pont-à-Mousson, we shall have two railways in our rear. There can be little doubt but that we shall have a decisive battle after we reach this line, if not before, and it is thus impossible to foretell our movements with any accuracy beyond this point.

"Without taking into consideration any resistance that we may encounter along the route, this march of 15 miles presents peculiar difficulties because of the masses which will be forced to advance in such a narrow space.

"If the French advance to meet us with anything like equal forces, both armies will find themselves in approximately the same situation. This situation will be materially changed if the enemy elects to await us in a concentrated mass, or if they allow us to approach to within a short distance of them in order to march against us to give battle."

It is clear from the above that Moltke did not consider the possibility of the French attempting to change their formation by massing themselves on his right or left in order to make an enveloping movement against one of his wings. He seems, indeed, to anticipate no maneuver whatsoever except an advance straight to the front.

The fact is that the idea of a maneuver appeared to Moltke impossible of realization either by the enemy or by himself.

He continues thus: "In order to complete our concentration for battle we shall need one day, and this time will be assured to us by our advance guard. Also, it is by means of our advance guard that we shall gain definite information regarding the location of the enemy. Therefore, it must be particularly strong in cavalry.

"This advance guard will consist of the 5th Division of Infantry and a corps of cavalry. To form this corps the 3rd, 4th, and

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10th Divisions of Cavalry will be used, together with the cavalry of the Guard, making a total of seventy-six squadrons under a chief specially selected for this command. The 6th Division follows in support.

"The mission of the cavalry is not to remain massed at one point, as though it expected to be called upon to decide the issue of a battle; on the contrary, the cavalry divisions must be sent in different directions so as to cover the entire terrain, and each division must continue to send out detachments until the main body of the enemy is located.

"The infantry division can support these detachments to a certain extent by sending small bodies forward in carriages. But it will keep the main part of its troops united in one body at all times in order to maintain solid positions in which the cavalry can fall back and reunite. The cavalry can precede the infantry division by several marches. Its retreat will be guaranteed by its strength.

"On the contrary, the big infantry units must under no conditions attempt to fall back. It is by advancing that this infantry can always form for combat in a solid mass. The 5th Infantry Division then, already protected by the cavalry against the danger of meeting unexpectedly any large concentrated enemy forces, will be able to offer a determined resistance against an enemy corps for at least twenty-four hours. It will precede the army by one day's march."

This is the manner in which, according to Moltke, a commander-in-chief should employ his strategic advance guard—both to obtain information regarding the enemy's main body, and also to guarantee the twenty-four hours necessary for the concentration of forces sufficient to gain the decision.

With regard to the value of this advance guard as a means of obtaining information (seventy-six squadrons supported by a single infantry division) the following observations appear pertinent:

Moltke depended for his reconnaissance upon detachments of cavalry dispatched in different directions and supported by small bodies of infantry sent forward in carriages or otherwise. The means employed here are indeed feeble and insufficient to attain

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the end desired. They would be incapable of seeing through any carefully organized screen, and also incapable, due to lack of infantry and artillery, of forcing the enemy to disclose himself if he were not willing to do so. In short, any such plan of reconnaissance could only discover what the enemy *desired to be discovered*.

The system of Napoleon, as outlined in the following letter to Prince Eugene in 1809, was something quite different: "I have received information regarding your movement on Koerland (Prince Eugene had sent his cavalry on reconnaissance supported by a battalion of Baden Infantry). The cavalry should not have advanced separately from the infantry. I fear that your Baden battalion, being at such a distance from the main body, may be endangered. As it appears from the letter of General MacDonald that the enemy remains near Wildon, and that Gyulai's corps is at Radkersburg, a thrust against the enemy's rear at Koerland made by a strong division of cavalry is sufficient to protect our communications, provided that this thrust is supported by a strong detachment of General MacDonald's army dispatched to the same point. It is necessary that General MacDonald should send, not a reconnoitering party, but a strong advance guard, to Furstenfeld and thence to Koerland."

From the above it is evident that Napoleon denied to the cavalry the power of making a proper reconnaissance alone. He demanded that it should be reinforced by infantry and artillery before it gained contact with the enemy. The seventy-six German squadrons of 1809, scattered over an immense front and "followed by the 5th Division of Infantry by several days of Marching" could not expect to force the enemy's system of security, and while the 5th Division of Infantry did, indeed, offer a base upon which the cavalry could fall back and reassemble, the intervening distance was too great to permit it to take part in the reconnaissance.

But could this advance guard at least offer sufficient resistance to the enemy to permit the German concentration to be completed?

"The advance guard will precede the main body by one day's march."

Therefore, twenty-four hours for concentration would be

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afforded by the advance guard, and Moltke is very evidently counting on this, for he said:

"In order to complete our concentration for battle we must have one day, and this will be assured by our advance guard."

Moltke demanded twenty-four hours, and this much time he would have if the enemy attacked his 5th Division of Infantry; but at the end of this period what forces would he have concentrated? Obviously, only those which are within one day's march of the advance guard. Let us see what those forces were:

If we select from Moltke's table of marches any two days, as for example, the 23rd and the 25th, the location of forces would be as follows:

### Twenty-third Day—

First Army—On the front Merzig-Sarreburg.

Second Army—On the front Forbach-Sarreguemines-Rohrbach.

Third Army—On the front Inguweiler-Bouxweiler.

This is a total front of more than 100 kilometers.

### Twenty-fifth Day—

First Army—On the front Boulay-Bouzonville.

Second Army—On the front Falquemont-Saint Avold-Morharge-Rohrbach.

Third Army—On the front Drulingen-La Petite Pierre-Saint Avold.

A front extending 80 kilometers.

If the advance guard were attacked on the 23rd day, the concentration would be ordered immediately. This concentration would be completed on the 24th day for the Second Army on its own front; for the First Army at some point along its own front; and for the Third Army, on its own front.

Accordingly, if the enemy should attack on the 24th day, he would encounter only one army. That army might be either the First, Second, or the Third, but could be only one of the three, inasmuch as each third part of his total, namely, each army, is too distant from the others to permit them to take part in the same engagement. The same situation would result if, instead of



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assembling each army on its own front, Moltke attempted to concentrate all his armies at some other predetermined points.

Much worse, if the enemy managed to gain contact with any one of Moltke's three armies without first attacking the 5th Division of Infantry, which was by no means unlikely, considering the extent of the front involved, the twenty-four hours which he was so confident of having at his disposal for his concentration would cease to exist.

Moltke continued as follows: "The Second Army will, it is true, be concentrated on the 19th day along the frontier (around Bildstock and Saint Ingbert), but it will still be without its field trains. Also it will be necessary to bring up the Fourth Army. The first units of this latter to arrive will be directed to continue their march to Deux Ponds, but it will still require four days for the whole army to close up. Therefore, we are safe in assuming that the Fourth Army will not be in position behind the Second Army before the 24th day.

"Moreover, we will gain no advantage by crossing the frontier before being ready to give immediate battle. Under these conditions it is necessary that the movements of each corps and division be regulated by the commander-in-chief himself."

From the above it is evident that Moltke did not intend to command the armies, but rather the corps and divisions. These units, even before the commencement of an engagement, would have their every movement regulated by the commander-in-chief. No better proof could be given that these armies were incompletely organized. They ceased to be self-supporting units from the start. Moltke continued:

"It will be possible to direct the march as far as the Moselle. The Second and Fourth Armies will advance in three main columns and in two echelons over a front and at a depth not exceeding one day's march. One day's march will then be sufficient time to complete the concentration of 150,000 men at the center, or even on one wing of our front line.

"Each corps will have its trains with it. The trains will not halt (in order to form park off the road) except when information regarding the enemy, received from the advance guard, makes this action necessary. Short halts will be made every two and

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one-half miles. Camp will be broken every morning at an early hour. The IVth and Xth Corps will send out their own advance guards. Since the cavalry divisions of the Second Army are in the advance guard, the length of time necessary for the infantry divisions of this army to deploy will be about six hours. The Fourth Army will reach the trains of the Second Army around noon each day, which fact must not be allowed to prevent the Fourth Army from continuing to its own bivouacs, even if it should be necessary to prolong the march into the afternoon.

"It is not probable, if we consider the existing political situations, that the Fourth Army will encounter any resistance from the enemy in its advance to join the right wing of the Third Army.

"It is very possible, however, that the Third Army may be increased immediately by reinforcements from the Fourth Army. If this happens the remainder of the Fourth Army will follow the advance of the First and Second Armies. If, on the other hand, the French assemble their forces on our front, the Third Army will join the general advance in the direction of the Moselle. In any case, we must take into account the possibility of our having to change front to the south.

"In connection with any concentration of our forces in whole or in part, the question of lateral communications must be considered daily."

After having noted the inefficiency of Moltke's arrangement of forces with regard to parrying any attack of the enemy, let us now attempt to consider what this system would have been capable of accomplishing in an offensive.

If we admit that Moltke's contemplated reunion of forces on the line Wittlich-Neunkirchen-Homburg-Landau has taken place without trouble, that his forward movement has commenced, that the enemy fails to attack the 5th Division of Infantry, that the advanced cavalry succeeds in its reconnaissance and locates the enemy's main body, still the maneuver projected by Moltke consists of striking the enemy's main body with his center, or principal army, and by a frontal attack made by this army, seeking to immobilize and halt the enemy. Afterwards, with one of his wings (the left) he would maneuver and turn the enemy's flank.

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This last operation would be performed by the Third Army, which was organized with this mission in view.

That certainly is the idea we get from reading his instructions on the 6th of May, 1870; and, when the month of July arrived, that was the maneuver he endeavored to carry out. But the political situation was greatly improved by then. South Germany had by that time definitely thrown her fortunes in with Prussia, and had placed her armies under the Prussian High Command. The number of his armies, however, was not changed. They were only reinforced. Moltke's plan remained the same.

"It appeared to be in compliance with the basic plan of the war, as laid down by His Majesty's General Staff, to maintain the army in readiness for action, and to hold the French Army (of Lorraine) on the Saar until the advance of the Third Army made it possible to commence an effective engagement. In the event of a decisive engagement on the French frontier, the First and Second Armies would be able to make the thrust to the front, while the Third Army would hasten to launch the flank attack from the upper Saar." (History of the Franco-Prussian War, by the German General Staff.)

"After having accomplished this mission in lower Alsace, the Third Army, in order to commence operations against the enemy's central position on the Saar, must plan its movements so as to reach that river at Saarguemines on the 9th of August." (Von der Goltz, Operations of the Third Army.)

The facts which ensued clearly demonstrate the weakness of this combination, a study of which we will not take up. But from now on, however, let us consider the merits of Moltke's system without reference to the outcome—this, strictly speaking, is the duty of the critic.

I. The battle which Moltke is preparing to fight on the Saar on the 8th and 9th of August would be fought:

- (1) If the French did not attack sooner.
- (2) If the French did not retreat.
- (3) If the French did not execute a maneuver to the right or left. In short, this combination is only valid against an enemy who is just naturally immobile, since there was nothing in the

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plans for the attack to hold the enemy in position before the battle.

II. Furthermore:

(1) If the French should attack before the 8th or 9th, three German armies would not take part in the battle. This has already been pointed out.

(2) If the French should withdraw the maneuver would fail and it would be necessary to plan another. Circumstances would become critical during the time this second maneuver was in preparation. The German armies would have struck a blow at the empty air. They would have to be concentrated again, and this second concentration would immobilize them for several days.

(3) If the French should execute a maneuver to the right or left of the point selected, especially if they should move eastwards, Moltke's maneuver, firmly decided upon in advance, would have caused endless confusion, in the midst of which the new maneuver would have to be prepared.

III. The decision was to be obtained by one of the wings (the Third Army in the Battle of the Saar), about a third of the total force—unquestionably a respectable force in point of numbers and capable of accomplishing the tactical result demanded: the victory of a day; but, on the other hand, this Third Army was incapable of bringing about the immensely important results achieved by a maneuver planned in the manner of Napoleon, in which the decision is invariably obtained by the action of the whole army.

IV. The reunion of forces of the First, Second and Third Armies was to take place on the field of battle (as at Sadowa for the three armies of 1866). Thus Moltke's operations remain vague, uncertain and at the mercy of the enemy's maneuvers until the very last day. The final result sought by Moltke, namely, a tactical decision, is consequently left in the same uncertainty.

Let us compare the idea of this attack as conceived by Moltke, namely, the maneuver directly to the front with all forces, with the maneuvers executed by Napoleon in 1805, 1806 and 1807. The army which the Emperor employed in battle in 1806 consisted of three columns, three separate masses, and it had as its head the general advance guard. In 1806 this advance guard

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consisted of the I Corps and the cavalry reserve, all under the command of his brother-in-law, Murat. Napoleon's maneuver consisted of seeking the enemy with this advance guard, which had sufficient strength to accomplish the mission assigned to it, and it could be reinforced as needed. With his main body, his army proper, thus possessing all the necessary information, he maneuvered immediately before the battle and attacked an enemy which his advance guard had engaged and was thus immobilized, Napoleon's action consisted of a turning movement which forced the enemy to expose his line of communications. As a result of this system of attack we get those Napoleonic battles which were so far-reaching in their success, where the respective fronts of two opposing armies were completely reversed.

There is no doubt that Napoleon expected important results from his tactics (he invariably used his main body as his maneuvering force), but he also depended a great deal on strategy. He was very particular to get from strategy a direction, or at least the indication of a direction, in which his further efforts would render overwhelmingly decisive the tactical results he had already gained. (This is true economy of effort.)\*

To sum up: A comparison between these two generals as regards their ability to plan a battle brings out the following points:

Napoleon turned the enemy before the battle with his main body, which he had already assembled, and then, and only then, he advanced to the attack. Moltke turned the enemy during the course of the battle with only a part of his forces (the Third Army at the battle of the Saar), and he united his troops on the battlefield by converging columns.

It is evident that Napoleon won his victories more surely and more accurately. It is evident also that the victories he won were infinitely more fruitful because his strategic direction of attack

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\*NOTE: As his enemies multiplied, as his armies increased in number and decreased in value, Napoleon became more and more judicious in his employment of masses. He endeavored to decrease errors resulting from faulty technique and poor tactics. Following the natural trend of his genius he began to seek victory through a more and more methodical and classic strategy. In the end as his horizon widened and his vision extended he devoted less and less attention to the means, and more and more attention to the end, up to the point where he ceased entirely to see that the end he sought was no longer in proportion to his means, as in his march on Moscow.

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enabled him to obtain great results. His skillful use of advance guards gave him time and space to exercise his leadership.

One real danger is apparent in Napoleon's maneuvers: that of being turned while engaged in turning the enemy; of losing his own line of communication while engaged in cutting that of the adversary—hence Napoleon's worries about his lines of operations. We see him, for example, in 1806 establishing a double base: the Rhine and the Danube.

Modern armies are unable to support themselves on occupied territory and must receive their supplies from the rear. Consequently, any maneuver against lines of communication in modern warfare is bound to have a very important result and such maneuver, if successful, brings about the ruin of the enemy. On the other hand, modern lines of communication, being relatively short, are easy to protect and exceedingly difficult to cut. Taking into consideration the numbers of troops engaged and many other changed conditions, the preparation and execution of a battle with reversed fronts will be very difficult.

There is no doubt that the Napoleonic battles, with their far-reaching results, differed from other battles in the manner in which the Emperor used his advance guard; also they differed because of the immediate concentration of his forces on the enemy's flank (right flank in 1800 and 1805; left flank 1806) in order to gain possession of his line of communications at the very start. As a result of this system we have the battles of Ulm and Jena. However, in these maneuvers Napoleon makes use of considerable space. We must not forget the points of departure of his armies in each case or the long marches that preceded his concentrations. These spaces are greatly diminished in modern war and are soon likely to vanish completely. Railways can now be trusted to transport swiftly the armies of two hostile states to the common frontier. Furthermore, we have come to consider railways, utilized to their fullest extent, as nothing but a system of military transportation in an advanced form. Thus if it is desired to use all the space available for a wholly linear deployment, railways can be depended upon to throw two opposing states front to front along the whole of a narrow frontier such as that of the Rhenish Palatinate between France and Germany in 1870.

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In the Napoleonic period a concentration was accomplished gradually and over a considerable period of time. The Commander-in-Chief had plenty of time to reconnoiter the enemy's positions and could regulate his marches in accordance with the latest information received as to the situation and intentions of the adversary. In this manner it was easy to advance a column progressively with the end in view of turning the flank of hostile force.

Today in order to speed up a concentration the tendency is to regulate every detail of transportation in advance and therefore modern concentrations cannot be changed. The regulation of transportation in advance imparts a rigidity to operations which leads to forced concentrations in a direction previously determined. Generally, modern armies are concentrated in front of the enemy's center rather than on one of his flanks. This concentration, being executed as quickly as possible and during the same time as that of the enemy, is already completed when definite information arrives regarding the adversary's position, the flanks of his army, etc. It is then too late to change and no time remains to make use of the information received.

Thus it follows that of the two adversaries, the one who seeks the initiative by commencing a strategic offensive is forced by the rigidity of his plan, by the very rapidity of his own concentration to forego the opportunity of executing a strategic maneuver in accordance with the latest information received regarding the enemy's position. He is unable to attempt a decisive movement on the flank or against the rear of a hostile force unless, indeed, he wants to detach part of his army for such a purpose. In any case he cannot plan a battle with any hope of achieving strategic results comparable to those of Napoleon. Such were the considerations (except some ideas on strategy and advance guards) which influenced Moltke's maneuver in 1870. These considerations excluded *a priori* any attack on the enemy's line of communications. Only after the battles of Woerth and Spicheren was such an attack contemplated, and the result of these battles was the maneuver around Metz.

In the difficulties of execution which Moltke apprehended we must perhaps seek the reason for his adoption of a maneuver,

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which, prosaic as it seems when compared to the artistic and brilliant effects of Napoleon, is yet easier to execute successfully. Indeed, we must once more recognize the prudence and the foresight of a theory which maintains intact the principle which we have already accepted as axiomatic in warfare: the act of force—the decisive frontal attack. As a matter of fact, Moltke applied the principles which seemed to him not only best suited for the forces engaged, but which were also most suited to his own powers of conducting operations. Under the conditions which existed, he determined to make a division of forces which was unquestionably judicious with regard to front—unquestionably faulty with regard to depth. As to maneuvers against lines of communications of an enemy, the future will determine whether they are still possible under the conditions of space, time and numbers of troops which govern in modern warfare. For the moment let us rest assured that it is in this direction that the development of the art of war must proceed.



THE BOMBARDMENT OF FREDERICKSBURG, DECEMBER 11, 1862



# FOREIGN MILITARY JOURNALS A CURRENT RESUME

**The Journal of the Royal Artillery, July, 1929**

**"Duncan" Gold Medal Essay, 1928-1929, by Major G. E. A.  
Granet, D. S. O., M. C., R. A.**

THIS is the winning essay on the following subject: "What changes in training and equipment are necessary to enable artillery in the field to counter armoured fighting vehicles successfully?"

As we look back on it, perhaps the three most picturesque developments of the World War were those of the airplane, of gas warfare and of the tank. In spite of the subsequent and enormous development of aviation, perhaps the tank had as much to do as the airplane with forcing the change in methods in that war. In our Army, at least, it is the province of the infantrymen to develop the tank as an offensive weapon; it is the province of the artillerymen to stop it.

Major Granet begins:

"The railway, the aeroplane, the submarine and every other invention of public interest has had, in its early years, to struggle for general recognition of its value. Soldiers, for all their reputation, are not the only 'Diehards,' ready to oppose, tooth and nail, anything new which they do not understand and which, very often, they have not taken the trouble to study. The inventor and his friends, in order to obtain a hearing, are often forced, even against their own inclination, to put forward extravagant and sensational claims; and the opposition, exasperated at such palpable futility, vehemently refuses to allow that the new invention can have any merit whatever.

"So it is with tanks.

"A fault, to which the British soldier is rather inclined, is that of underrating his enemy. As far as tanks are concerned, let there be no mistake about it. Properly handled and supported and capable of making full use of the ground, they will not be easy to stop.

"Now, what shell power is wanted? It is said that the 18 pr. is too powerful. That it is like taking a sledge hammer to drive

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a tack. Certainly, the idea of a nice, light, handy little 3 pr. or 6 pr. is most attractive, but it means another special gun with complications in manufacture, training and in ammunition supply. It is a mistake to train artillery for one role only, and that a defensive one, if it can be avoided. It has had to be done in the case of anti-aircraft, but that is not a reason for continuing the process.

"And where are these special units to come from? Is the divisional artillery to be decreased? It is said to be too small already to cope with the increased fire power of the defense. Can we give up some medium or heavy gun? The Germans taught us their value at the beginning of the war, and we cannot afford to weaken our main counter-battery artillery. No howitzer is a thoroughly satisfactory anti-tank gun on account of its curved trajectory, low muzzle velocity and slow rate of fire. The light batteries are wanted for close support, particularly in country which is unsuitable for the other close support weapon, the tank. So we cannot give them up.

"We could, of course, increase the establishment of the Royal Artillery at the expense of some other arm, but we should at once come up against the Cardwell system; and there are many situations in war and many places in the Empire, where man power is more needed than gun power. We must just make the best of what we have got and use the gun batteries of the divisional artillery, and it won't be such a bad test either if they get a good gun. It will save a lot of complications. Any brigade will be able to push forward sections or single guns to give the infantry moral as well as material support, while the remainder, disposed in depth behind, will carry out their ordinary tasks and, unhampered by smoke, will be ready to deal with any tanks that succeed in breaking through. The complete mechanization of the divisional artillery is in prospect, so that the mobile reserve will be at hand to meet attacks from unexpected directions or to support a counter attack by our own tanks. These might well be the tasks of the Army Brigade if one is present, thus leaving the divisional artillery to work with its own infantry, which knows and trusts it. The result is that, instead of one battery of one brigade of antitank guns in a Division, there will be nine batteries without counting

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the field and light howitzers, whose fire is not altogether to be despised."

The above does not, of course, cover the whole of the article, but it does indicate its trend and the solution would seem, to at least one American artilleryman, a sensible one. In his final conclusion, Major Granet begins:

"It may be thought that undue mention has been made of tanks, to the exclusion of armoured cars. This has been done purposely, for the reason that, in the author's opinion at any rate, the tank is the more formidable of the two. If the heavily armoured tank is produced, this is the type with which, chiefly, artillery will have to deal. Infantry now have, or are in the process of getting, an anti-tank weapon of their own capable of piercing the armour of the lighter natures, and it is expected that these guns will carry out protective duties against such vehicles."

"**The Natural History of War,**" by Colonel J. F. C. Fuller, C. B. E., D. S. O." The author is a most prolific writer, some of whose work has appeared in previous copies of *The Journal of The Royal Artillery*. In quite a lengthy article, he here reviews the development of war and from it draws conclusions as to the future. He emphasizes, at times, the Roman influence on the development of war, as any military student is apt to do, and sees in the future something like a repetition of the history of Rome at its glory. A large part of his conclusion is worth quoting:

"The predominant characteristic of the present age is that everything is in movement, the world may retrogress or advance, but for a while there would appear to be no likelihood of it standing still. The war shattered an epoch and out of its ruins will either emerge a phoenix or a vampire.

"Whether Europe is to command her own destinies, or obey the will of America, the end would appear to be much the same, namely, the economic consolidation of the civilized world, and a return to the Caesarism of the first century of the Christian era.

"Does this mean that wars will cease, and that the millennium is about to be manifest? Not necessarily, for the approaching age is likely to reduplicate the last four centuries of Roman rule.

If it is correct to say that wars are symptomatic of social diseases, wars will only cease their troubling when society becomes perfect. That such a state will ever be reached in this world is unlikely, consequently if economic perfection eliminates foreign wars, unless simultaneously society becomes morally perfect, civil wars and revolutions will continue. Communism may possibly be the beginning of a new religious creed, for in Russia it has developed into a spiritual force, that is a weapon which can attack the soul and not only the body of man. If Russia, as she may well do, turns from fear to greed, as the Papacy did during the Crusades, her power will vanish, but today she is waging a war of the Word, just as the primitive Christians did, and her means of attack are internal disorder and revolution. The Roman Empire was destroyed not only by the barbarians without her frontiers but by the underworld within her bowels, an underworld begotten by a corrupt and shortsighted financial policy, and one so bereft of the joys of this world that the scum of Rome was willing, even eager to die for the next—a desperate and awe-inspiring brotherhood. Today Europe is confronted by Russia and Asia, industrially barbaric countries, and within her bowels is consolidating an underworld begotten of the diseases of civilization. If the fevers engendered by these diseases cannot be thrown off in the form of foreign wars, then they will take on the form of revolutionary conflicts."

**"A Maiden Effort After Markhor,"** by Brig.-General Cosmo Stewart, C. B., C. M. G., D. S. O." Again we find at the end of the issue of this Journal one of those readable articles on shooting which are so characteristic of British periodicals.

Almost all such articles are of great interest to the soldier, as they are apt to teach him much about his own profession. The reviewer had the pleasure of serving for a short time, a few years ago, with a distinguished Reserve officer who is also one of the most prominent living Americans. This officer, throughout a varied career, has had a great deal of military experience in positions of great power, in subordinate capacities in the National Guard, and eventually in battle. He found, as so many of us did, that battle had to be gone through with to be appreciated. He

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stated once to a group of officers that when he found himself actually in war what helped him more than any military peacetime training was a considerable experience in shooting bears in the Rocky Mountains.

This is a tale of shooting Markhor in the Himalayas, the Markhor being, I take it, some sort of a glorified goat. After reading the article, it is easy to see the great lesson which such a shooting trip teaches a young officer; it teaches alertness, resourcefulness and, above all, the soldier virtue, fortitude.

The following paragraph, taken almost at random, indicates the trend of the article and shows that a soldier may find hardship in other places than in battle:

"We sallied forth in the coldest of grey dawns next morning. Abdur Rahman had produced some strips of half-tanned ibex skin, called 'tauties,' doubtless taken off the man he had brought with him, which he wrapped round my feet, leaving the toes and heels protruding in their double socks, and then bound them securely in position with stout square thongs of ibex hide round under the instep. How I hated those tauties! The laces were so tight they bit into the flesh; I kicked my toes against stones innumerable till I could hardly put a foot to the ground; and whenever we sat still for five minutes my feet became like ice. But I got no sympathy; I was assured that *faute de mieux* in the shape of grass shoes, they gave an excellent foothold on rock, and that with my toes free they could not possibly get frost-bitten. There was no such skin as ibex skin, and all the natives used them. Then I had no woollen gloves, and my hands soon ceased to have any sensation save that of pain, as I gripped my way in steep places, often in snow. I had no Balaclava cap to turn down over my ears, and however much I toiled and sweated, the keen wind stung them like a whip lash. Certain—the gilt seemed wearing off the gingerbread!"

This number also includes the following:

"The Evolution of Armoured Fighting Vehicles," "Belleisle," "Weapons," "The Mechanised Battery Staff," "Tannenberg and the Masurian Lakes."

**Revue d'Artillerie, March, 1929**

Colonel Appfel, in his article, "**Gas Shell in 1750**," reviews a work published by the Polish General Siemienowicz in that year. This book, **The Grand Art of Artillery**, is especially interesting in its chapters on toxic, incendiary, smoke and illuminating projectiles.

The employment of toxic gases was then, as now, looked on with disfavor. The ancient oath of the artilleryman bound him "not to fire at night, to use no hidden mines, and to employ no poisonous gases; for these actions are esteemed as unfair as well as unworthy of a true soldier." However, "it is entirely legal to employ such devices, not against Christians, of course, but against the Turks, Tartars, and other infidels".

The poisonous matter employed included not only the common vegetable and mineral poisons, but such curious substances as "the brains of rats, cats, and bears; the frothy saliva of mad dogs; the blood of bats; a syrup made of the bodies of spiders" and others that cannot be mentioned.

Frogs and spiders played a particularly important role. "A powder capable of infecting the air and promptly killing those who inhale it is obtained by burying a frog in saltpeter, then placing it in a manure heap for fifteen days, after which it is removed and mixed with sulphur and charcoal". Or "melt saltpeter in a suitable vessel and throw in living spiders which in suffocating, will disgorge their venom".

Siemienowicz gives directions for rendering the toxic products heavy so that "they may remain near the spot where produced, being carried slowly along between the houses and reaching the most secret places of the besieged town". He also indicates the favorable meteorological conditions for their use "when the sky is overcast or in drizzling rain, in fog or snow, and on dark and cloudy nights".

The projectiles were made by enclosing the poisonous material in linen with lead balls or grenades and with a mixture of saltpeter, sulphur, powder, resin, turpentine; and finally building it up to a proper caliber by hemp wrappings.

Our sternutators and lachrymators had their prototype in the

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"stink pots" and "stink bombs" which were more favorably regarded from a moral standpoint. They were charged with pitch, sulphur, charcoal, resin, the parings from the hoofs of mules or horses, asafetida, etc. Also, with such bombs, Siemienowicz envisages the possibility of producing epidemics in besieged places.

The use of smoke bombs is outlined very clearly. Favorable conditions of darkness may be produced by bombs which produce acrid and disagreeable smoke, either to blind the enemy who is attacking or to cover our own attacks. The Tartars, Moscovites, and Cossacks are cited as being particularly adept in the use of such devices.

In this issue is a description of the latest **Bofors anti-aircraft cannon**. The piece is 80-mm. in caliber, 50 calibers in length and weighs 3,100 Kgs in battery. It is placed on a pedestal mount provided with four long cross trail pieces. Three of these are equipped with screw-jacks at their extremities in order to allow a level base on any soil with a minimum of digging.

In the traveling position, two of the trail pieces are folded back against one of the others and the whole is placed on an axle provided with two rubber-tired wheels. The piece, elevated to the maximum, rests with its pedestal on the fourth trail piece. By exact balancing of parts, the placing of the gun in the traveling position or in battery can be done by cannoneers. The load of 4,000 Kgs is drawn by a tractor.

The matériel has a semi-automatic breech mechanism and a hydro-pneumatic recoil system. The carriage is arranged so as to permit a level correction of 8 degrees. It has an all-around field of fire and allows elevations from minus 3 degrees to plus 80 degrees.

As the weapon is intended primarily for indirect fire, the corrected deflection and elevation are sent from a central station by electrical means as are also the fuse settings. On the left of the piece is a fuse setter holding three projectiles. On the right are the elevating and transversing mechanisms and a sighting apparatus for direct fire.

The projectile weighs 8 Kgs, has a bursting charge of 550 grams, and is provided with a mechanical fuse. The maximum

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horizontal range is 14,500 meters; the maximum velocity, 750 meters per second.

Captain Ragonnet's article, "**Fire by a Single Piece Against Tanks,**" is a continuation of the study made some months ago, a résumé of which appeared in THE FIELD ARTILLERY JOURNAL, May-June, 1929. In that study it was assumed that the site was negligible or accurately known, that the maximum speed of the tank was 6 Km an hour, and that the gun could be laid in a few seconds. Based on these assumptions, the following conclusions were reached:

a. No fire against tanks can be undertaken at ranges beyond 1,200 meters by a piece similar to the 75-M 1897.

b. A certain number of registration points must be located on the terrain, correct to within 20 meters of range.

c. The fire should be executed by beginning with the range of the registration point nearest to the tank whenever the tank arrives at a distance of three probable errors from that point. No range change is made until the tank has cleared the point by seven probable errors. The piece is pointed at the head of the tank with a wind blowing in the direction of march, at a point one-third of a tank length in advance when there is no wind, and two-thirds of a tank length in advance when the wind is opposite to the direction of march.

d. Fourteen rounds are fired at each range with a speed of one round per second.

The present study considers the question under the assumption that the tank is moving in any direction whatsoever, that the site is unknown and changing, and that the speed of the tank may attain 20 Km an hour.

Considering the 75-M 1897 under the first and third assumptions, the author shows that with the present practical displacement of only 80 mils on the axle and the consequent necessity for moving the trail, fire of the desired speed becomes impossible when the transverse speed of the tank exceeds 1.6 Km an hour. He concludes that the present 75-mm. gun does not meet the requirements of single gun action against tanks and that the employment of the guns of the present divisional artillery for such uses will give very limited results.



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Considering the changing site, he shows that a modern tank, moving on an average slope, passes very quickly through the zone of vulnerability, necessitating a site correction at each instant, correct to within  $\frac{1}{4}$  mil. Since the 75-M 1897 allows corrections to within one mil only, the conclusion is drawn that the mechanism must be changed to allow corrections of  $\frac{1}{4}$  to  $\frac{1}{8}$  mil.

The author gives as the requirements for an anti-tank gun:

- a. A large horizontal field of fire.
- b. A mechanism allowing instantaneous corrections in deflection and site, the latter correct to within  $\frac{1}{8}$  mil.
- c. Either great speed of fire or ballistic properties which will increase the depth of the effective zone.
- d. The ability to displace rapidly over any ground.
- e. Maximum protection of the gun crew against small arms fire.

### **Revue Militaire Francaise, May and June, 1929**

Lieutenant-Colonel Vauthier introduces his article, "**Anti-Aircraft Defense of Large Units,**" by stating that there are two solutions to this problem: (1) to assign special anti-aircraft weapons to the large units; or (2) to adopt for anti-aircraft fire the weapons which are normally used for fire against terrestrial targets. Lieutenant-Colonel Vauthier first studies various foreign organizations for anti-aircraft defense and then suggests his own plan for a suitable organization.

In Italy, many authorities consider it advantageous to assign anti-aircraft artillery as an integral part of an infantry division. In addition, groups are assigned to the corps and army. The tendency is toward decentralization.

In the United States at present, each army corps is given a regiment of anti-aircraft artillery. This regiment includes one artillery group of 12 guns, a machine group of 32 guns, and a battery of search-lights. An army of two army corps has, in addition, three regiments of anti-aircraft artillery. There are also regiments provided for the general reserve.

In Germany, the infantry division is to have one battery of automatic 37-mm. guns, 2 batteries of 88-mm. anti-aircraft guns,

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one battery of 76.2-mm. anti-aircraft guns and one section of searchlights. Here again the tendency is toward decentralization. Different authorities in Germany confirm this tendency and agree that the divisional artillery should consist of one regiment of light artillery, one regiment of heavies, an observation detachment and a group of anti-aircraft artillery of four motorized batteries. It is believed that, because of its special mission, the anti-aircraft group should not be placed under the divisional artillery commander. It appears preferable to place this group directly under the orders of the division commander. Moreover, it is recommended that this anti-aircraft group be used when available against ground targets.

Another German opinion suggests guns of two calibers for anti-aircraft artillery: a 50-mm. gun for use against low-flying airplanes and also against tanks; another 105-mm. gun for planes flying at high altitudes.

In England, during peace time, the anti-aircraft artillery is grouped in brigades, each brigade having from 2 to 5 batteries of 8 guns each. In the field, the anti-aircraft defense is directly under the Commander-in-Chief. This is the one outstanding case of a highly centralized anti-aircraft organization. However, many English officers recommend decentralization. Captain Loch, in a recent article, recommends that anti-aircraft defense be reinforced by fire from field batteries. Major Cherry advocates a motorized division of three brigades of infantry, the usual amount of divisional artillery and two batteries of motorized anti-aircraft artillery permanently assigned to the division or attached temporarily by the corps commander.

As his solution of the problem of defense against airplanes, Lieutenant-Colonel Vauthier suggests the following organization: for an army corps of two divisions, he proposes a group of light anti-aircraft artillery (3 batteries), and a group of automatic anti-aircraft artillery of small caliber. The light artillery should weigh less than three tons and be more powerful than the present 75-mm. matériel; its mobility should be comparable to that of divisional artillery. Its tube, munitions and mode of traction should be similar to light artillery. The automatic anti-aircraft weapons should be similar in weight and means of traction to

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the infantry accompanying weapons. With this organization, Lieutenant-Colonel Vauthier believes that the army corps can, under normal conditions, and on a front not too extended, organize an anti-aircraft defense which will satisfy its two divisions and the other corps organizations.

**"The Abyssinian Problem,"** by Commandant Cornet, is a study of political and commercial conditions in this independent Ethiopian country.

In 1906, England, Italy, and France defined their zones of activity in Abyssinia, and at the same time agreed to maintain the independence of that African empire.

England was assured that Abyssinia would in no way stop the natural flow of water of the upper Nile. This safeguarded the interests of England in the Soudan and in Egypt, where the fertility of the soil depends on the waters of the Nile.

France obtained the right to construct a railway from one of its colonial ports to the interior of Abyssinia.

Italy was allowed to establish a line of liaison between two of its colonies separated by western Abyssinia.

To quote Commander Cornet: "Having always fought for its independence, Abyssinia looked with mistrust upon foreign advances. The independent spirit of the inhabitants, their primitive customs, the defects of a backward administration, are obstacles to the development of this empire.

"To become a modern state, Abyssinia needs foreign aid, which alone can furnish the economic equipment necessary to the development of the country.

"It is necessary that the central government impose its will on the governors of the provinces, some of whom, thanks to their troops and to the difficulties of transportation, are practically independent.

"It is also necessary that the central government be reorganized."

It is apparent that the natives of Abyssinia do not appreciate the advantages of European civilization and are rather suspicious of the altruistic offers of European powers to take up the "white man's burden" in developing the resources of their country.

**"Three Conferences of the General Staff of the Army in 1902,"** by General Palat, is a study based on a general staff discussion of the Boer War. In spite of the many faults committed by both the Boers and the British, there were many new tactical developments to be studied at that time as a result of the war in South Africa.

The Boers, who were satisfied to fight on the defensive, made good use of field fortifications and demonstrated the capacity of resistance of an inferior force. The principle of "economy of forces" was emphasized.

During the war, the British decided that cavalry was effective only in dismounted combat. General Palat remarks that the events since 1902 have proved the truth of this opinion.

Little was learned from the artillery in this year. The Boers used their artillery as so many individual large rifles. The British artillery was poorly employed without liaison with the other arms, especially with the infantry, which it failed to support in the advance. However, the South African War showed the possibilities of heavy artillery in open country. The English used 5-inch and 12-pounder guns mounted on improvised carriages which were so heavy that as many as 32 oxen were required to move them. Even the Boers used a few 155-mm. pieces.

This war led the English to adopt a field uniform and equipment of lower visibility. Most European nations did not realize the necessity of this change until 1914.

Visual signaling was frequently used in the Transvaal. The clear atmosphere facilitated this means of communication.

**"The Pacification of Unconquered Africa,"** by General Armengaud, is interesting in that it gives information of the extensive use of aviation by the French and British in colonial warfare. Both nations believe that maximum use of airplanes permits great economy of man-power and provides the greatest guaranty of security. Two incidents will illustrate this contention: (1) a Moroccan incident, and (2) an English experience in Irak.

A French squadron in Morocco was frequently cited between 1922 and 1926, during which period it contributed greatly in conquering and policing a large zone north of the Great Atlas,

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in conjunction with a series of infantry posts. One characteristic action was that against the fortified town of Agoudin during May, 1926. This squadron was supported by a force of 700 friendly natives under the command of a French lieutenant, who approached the town under cover of darkness. The planes attacked at dawn and drove the population to the neighboring hills. Profiting by the enemy's panic the ground forces set fire to the town, while the planes pursued the fleeing enemy. The ground troops then retired, while the planes dispersed or retarded the enemy groups, which were forming in the vicinity to shut off the retreat of the ground troops. As a result the French had not a single man or horse killed or wounded, while the enemy lost 20 killed and 10 wounded; the stronghold was completely destroyed and with it the enemy resistance in that neighborhood.

This experience is confirmed by an incident at Irak. Since 1923 the English have occupied Irak with aviation as the principal arm and infantry as an auxiliary arm under the command of the Vice Air Marshal. The force included eight squadrons (120 airplanes), of which twenty-four planes were capable of carrying eleven passengers each, and a few other planes had a capacity of twenty-three passengers; a few battalions of infantry (four in 1925, which number is being continually reduced); and a few armored cars. The mission of this force was to maintain peace over a territory 700 miles long, exposed to a Turkish menace from the north and to attacks from Wahobite tribes from the south. The commander of this force has accomplished his mission with very few losses. In his report of 1925 he gives an account of a mutiny at Kerkouk, 150 miles from Bagdad. This uprising was almost immediately crushed by the direct intervention of airplanes and the airplane transportation of 200 infantrymen. The transportation of troops from Bagdad to Kerkouk was completed in six hours from the time the telegram announcing the uprising was received. Were it not for the airplanes the infantry would have had to make a journey of twelve hours by railroad and a march of four days to reach Kerkouk.

These planes have frequently transported detachments in other circumstances and have been especially useful in rapid evacuation of centers which were dangerously menaced.

**Italian Revista di Artiglieria e Genio, June, 1929**

Colonel Carlo Geloso, in an article, "**Notes on Artillery in the Advance into Action,**" points out that the regulations for tactical employment of the division assign to first-line divisions, from the very beginning of the advance into action, a mass of artillery of far greater power than was customary in the past. Its employment requires a precise and definite plan in order that, from the start, a large number of batteries may be available, and in order that the entire artillery may be in action at the proper moment.

Accordingly, the author examines the various matters which the divisional artillery commander must foresee. He discusses the echelonment forward of batteries and the limitations involved in having the commanders of the various artillery units precede their commands for the reconnaissance of positions and the establishment of observation and communications. He notes the necessity for the artillery commander giving, from the very beginning, precise orders, especially with respect to support during each forward echelonment and the establishment of an artillery axis of communication. He also points out the necessity of measures for timely topographic preparation, in framing which the intervention of the divisional artillery commander is of marked importance.

In conclusion, the author sustains that the employment of artillery in the advance into action and in advance guard action as contemplated by regulations is feasible; but that in order to make it possible to employ masses of artillery and at the same time to maneuver their fire during the few hours which will intervene between the decision of the Division Commander and its practical accomplishment, it is necessary that the organization of the division artillery be kept concentrated in the hands of its commander.

Among other articles appearing in this issue are: "Tests on the oblique resistance of air to velocities lower than that of sound", by Engineer Filippo Burzio; "Systematizing curves in mountain highways to meet military requirements", by Quirico D'Amico, Major of Engineers; "Consideration of the various

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systems of anti-aircraft fire", by A. C. Bernini, Major of Artillery;  
"Errors due to telemeters in the Montefinale instrument for seacoast  
batteries", by Rizzardo Rizzetto, Lieutenant of Artillery.



UNION TROOPS CAPTURING A GUN ON MARYE'S HEIGHTS,  
FREDERICKSBURG

## **FIELD ARTILLERY NOTES**

### **Snow Hall Burns Down**

Snow Hall at the Field Artillery School, Fort Sill, Oklahoma, caught fire on Thursday morning, August 1, and within two hours the entire structure was totally destroyed, nothing remaining but the chimneys.

The destruction of Snow Hall marks the passing of one of the landmarks of Fort Sill. It was constructed in 1917 and thousands of Field Artillery officers have passed through its portals, invariably improving their professional education by doing so.

The structure housed the administration building of the academic department, post headquarters and school offices. Fire broke out on the second floor of Snow Hall and an alarm was promptly answered by all three fire companies at Fort Sill. Old Post arrived first, followed by New Post and Post Field. The Lawton fire department was also called but did not reach the fire, as the truck broke down and had to return to Lawton. The Duncan fire department was also called but did not arrive on the scene, probably on account of delay on the road. For a while it looked as if the surrounding buildings were doomed. Hundreds of soldiers, boys and girls of the post, and civilians formed a line and moved the thousands of valuable books from the library to the safety of another building.

Arrangements are being made to house the school and headquarters in other buildings now occupied by officers as quarters. This, of course, will necessitate more officers going to Lawton to live on commutation.

### **Congressional Salutes**

Life in the national capital in these searing midsummer days is just one problem of etiquette after another. Hardly had the Gann episode been safely deposited in the archives of social precedent when along comes something else to set aflutter the breasts that beat in unison with written rule and formulated propriety. Now it is a problem of the etiquette of gunfire—whether members of Congress are entitled to military salute, and, if so, why and how?



## FIELD ARTILLERY NOTES

The Army's specialists in booming courtesy have settled it summarily—no salutes for individual law-makers, they say. Still, they admit that it was through the error of the commandant of a Southern post that the discussion has arisen. When Mrs. Ruth Bryan Owen, a member of the House from Florida, visited the post she received a salute of eleven guns, the regulation greeting for a brigadier general. That impressed her with the fact that such distinction was hers of right, as a representative in Congress, by both law and custom. Mrs. Edith Nourse Rogers of Massachusetts is reported as receiving a similar salvo on a visit to a post, and is quoted as saying that House members of Congress are ranked, in a military way, with generals by salute duly written.

It all results, however, from a curious and comical blunder. When General B. F. Cheatham, Quartermaster General of the Army, appeared some time ago before a congressional committee, he testified, as an incidental sidelight on an entirely unrelated question, that when members of Congress traveled on Army transports they received the same consideration in the assignment to staterooms and places at table as generals, Senators being paralleled with majors and House members with brigadiers.

The commanding officer of the Southern post, seeing this statement, is said to have jumped to the conclusion that this established a military rank for congressmen, and so the salvo for Mrs. Owen. In view of the agitation that has descended upon official Washington, it is certain that no such error will be committed again. But congressional committees, when visiting posts officially, will continue to receive the salute accorded to a Vice-President. This has been customary for years.—*Indianapolis Star*, August 1, 1929.

### **New Maps of Fort Bragg, North Carolina, and Camp Knox, Kentucky, Completed**

The Chief of Engineers, Major-General Edgar Jadwin, has just completed publication of new fire control and training maps of Fort Bragg, North Carolina, and of Camp Knox, Kentucky. These maps are the result of surveys carried out by the 29th Engineers of Fort Humphreys, Virginia, during the summer and

THE FIELD ARTILLERY JOURNAL

fall of 1928, revising and bringing up to date the old maps of these areas surveyed during the World War. They conform with the standard requirements for Fire Control Maps, are on the scale of 1:20,000, and are published in four colors; black, for grid and works of man; brown, for contours; blue, for water; and green, for wooded areas.

The maps were published at the Engineer Reproduction Plant which is maintained for publishing maps for the Army. They cover important training areas not only for the Regular Army, but for Organized Reserves, R. O. T. C., C. M. T. C., and National Guard, and fill a great need for accurate, up-to-date maps of the areas which they cover.

**Status of the Field Artillery Officers' Reserve Corps**

The total number of Field Artillery Reserve Officers, as of June 30, 1929, is 11,289, of whom 2,006 hold commissions in the National Guard. The following table shows the distribution of Field Artillery Officers:

<i>Assignment Jurisdiction</i>	<i>Lt.</i>		<i>Majs.</i>	<i>Cpts.</i>	<i>1st Lts.</i>	<i>2d Lts.</i>	<i>Total</i>
	<i>Cols.</i>	<i>Cols.</i>					
CA Commander.....	68	110	360	947	1,543	4,911	7,939
Chief of F. A.....	6	10	39	67	54	33	209
The Adjutant General ...	2	1	5	1	.....	3	12
Dual Commissions.....	44	49	103	528	548	734	2,006
Restricted.....	3	9	38	129	217	727	1,123
Totals.....	123	179	545	1,672	2,362	6,408	11,289

**Addition of 155-mm. Howitzer Regiment to Field Artillery Brigade, Infantry Division**

The 155-mm. howitzer regiment, as at present organized, will be incorporated in the Field Artillery Brigade, Infantry Division, for all units of the Regular Army, National Guard and Organized Reserves.

Necessary steps will be taken to reassign existing or inactive units or to constitute new units, in order to carry out the foregoing.

The 155-mm. howitzer component of the Corps Artillery Brigade is reduced to two regiments.

(A.G. 320.2 (6-17-29). Circular No. 39, W.D., June 29, 1929.)

### Further Aspects of Mechanization

Brigadier-General H. Rowan-Robinson, C.M.G., D.S.O., p.s.c., has recently completed and published another book on mechanization. THE FIELD ARTILLERY JOURNAL, in this number, completes his book entitled "Some Aspects of Mechanization".

General Rowan-Robinson is an advocate of unadulterated mechanism; he looks well into the future and believes in starting now to train and build for the mechanized battles of the future. The following quotation is characteristic:

"There is now a tendency to substitute machines for men, which may have, for its ultimate effect, a reversion to the small professional armies of the past. How far this tendency may be expected to prevail over the forces which created the greatest armies is a question that finds an answer to some extent in a recent speech by General von Seeckt:

"Now to what military success did all . . . this titanic mobilization of armies lead? In spite of every effort the war did not end in the decisive annihilation of the enemy on the battlefield. Actually it petered out in the attrition of trench warfare. . . . Are the results of the war in just proportion to the sacrifices of national resources? When recourse must be made to arms, is it necessary every time for whole peoples to hurl themselves at each other's throats? The soldier must ask himself, too, whether these gigantic armies are still capable of being commanded in the sense of decisive strategy, and whether any future war between such masses must not again end in a stalemate. Perhaps the principle of the nation in arms . . . is today out of date, the *fureur du nombre* a thing of the past. The mass becomes immobile; it cannot maneuver, therefore it cannot conquer; it can only stifle. . . . The mistake lay in opposing an immobile, almost defenseless mass of humanity to ruthless machinery. The more we increase the masses of our fighting men the more certain becomes the triumph of the machine; for its reach exceeds that of the supplies of man-power. The triumph of the machine is not, however, over man, but over mass-humanity. The machine can only come to life in the hand of the man.'

"These are the conclusions of a commander well versed in the

war of masses. In their unanswerable truth, they go far to show that the day of the national army is past as surely as is that of the old standing army. And in the curious cycle of things a new standing army—small, professional, ironclad—may now be described on the near horizon, to whose evolution in this country we may now turn our attention."

"Further Aspects of Mechanization" contains chapters on the following subjects: "The Experimental Armoured Force in 1928"; "Future Policy"; "The Passing of Great Armies"; "Strategy and Tactics"; "The Building of Armoured Formations"; "Infantry and Mechanization"; "Artillery and Mechanization"; "Cavalry and Mechanization"; "Engineers and Mechanization"; "The Maintenance and Supply of an Armoured Force"; "Air Forces and Mechanization".

### **Russia Inaugurates Her 5-Year Plan with U. S. Farm Tractors**

Mr. C. Parker Holt, Vice-President of the Caterpillar Tractor Company, recently gave out a statement concerning the 1,300 Caterpillar Sixty tractors\* sold to Russia. The following are extracts from his statement:

"During the last decade a rapid evolution has taken place in the Soviet Union. One of the greatest business programs that the world has ever known is the so-called 5-year plan of the Soviet Union. This 5-year plan of development of national economy contemplates the development of all the resources of the largest country in the world and it plans to finance this program through the utilization of its own resources. The plan is so extensive that it is impossible to describe it in a few words other than to say that it provides in detail for the proper conduct of all the national industries and for the utilization of all of the proceeds of these industries in its self development.

"In June, 1928, there was formed the Zernotrest, or the Soviet Grain Trust. To the Grain Trust have been turned over a total of 4,125,000 acres, divided into some fifty farms, each farm varying in size from approximately 50,000 to 150,000 acres. The

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\*The Caterpillar Sixty Tractor is at present standard for our heavy field artillery.—  
EDITOR.

## FIELD ARTILLERY NOTES

Zernotrest is under the direction of the President and General Manager, Mr. M. Y. Kalmanovich, a native of the Yeniseisk district of Siberia, and a man of very marked executive ability.

"Organized as late as June, 1928, the Zernotrest actually organized itself and sowed a total of 392,000 acres of wheat for the agricultural year of 1928-29, the harvest of which is now (July) under way. During the agricultural year 1929-30 it is planned to plow and seed a total of 2,250,000 acres by tractors, particularly the 1300 Sixtys which will be delivered by the Caterpillar Tractor Company prior to the end of 1929. The total acreage to be planted and handled by the Soviet Grain Trust will be 10,000,000 acres by 1932 at which time it is expected that the Soviet Union will have an exportable surplus of wheat in the neighborhood of 10,000,000 bushels.

"It is most important that there be the greatest distinction between the State Grain Farms under the administration of the Soviet Grain Trust and the Cooperatives which are privately owned. A Cooperative is formed by the voluntary association of from ten to some hundreds of peasants who pool their small tracts of land and who then, by means of the machinery created by the government, are in a position to secure their supplies from the government on a credit basis. There were on April 1, 1928, some 93,400 of these Cooperatives in operation, and at the present writing it is estimated that there are in existence over 100,000 Cooperatives embracing some 12,000,000 individual peasants. These Cooperatives are further organized into groups which are members of the various central unions according to the principal products which each Cooperative produces.

"These Cooperatives are very large consumers of agricultural machinery, which they may secure through Selskosojus, the All-Russia Union of Agricultural Cooperative Societies for supplying peasants with means of production. Selskosojus maintains a large buying and selling organization in New York City, though they frequently function through the Amtorg Trading Corporation, also of New York. The recent purchase of 5,750 tractors from the International Harvester Company was concluded by Amtorg and Selskosojus, and the tractors were destined for use by these various Cooperatives.

"In thinking over the future of the U. S. S. R. one cannot but be impressed with the enormous consuming power of the Russian people. The great majority of the 160,000,000 people are accustomed to a comparatively low standard of living. Each year these people go upon a new plane and this rapid improvement in their standard of living should in the course of the next five, ten or twenty years develop a market for every kind of manufactured product in enormous quantities. Their country is today by far the richest in the world in natural resources and the intelligent development of these resources during the next decade will provide the Russian people with tremendous wealth with which to satisfy their desire for the better things in life, some of which will be manufactured by themselves, but many of which will be purchased abroad."

### **Army Rider Wins International Military Jumping Competition at Dublin, Ireland**

Major Harry D. Chamberlain, Captain of the United States Riding Team, won the International Military Jumping Competition, participated in by seven nations at Dublin, Ireland, on August 7, 1929. Mounted on *Dick Waring*, Major Chamberlain won first place for the United States, Sweden placed second, Switzerland took third, and fourth place went to Belgium.

### **A Field Day in the Polish Artillery**

On July 14 the Horse Artillery Group of the 2nd Cavalry Division of the Polish Army held its first annual competition for the yearly prize established by Lieutenant-Colonel Richard I. McKenney, formerly our Military Attaché to Poland.

The competition was held near Sniadowo. The prize of fifty dollars (445 Polish zloty) was divided among fifteen individuals; eight prizes for horsemanship and seven for gunnery. The first prize in each competition was 100 zloty. Only soldiers of the 1906 and 1907 classes who had excellent records were eligible to compete.

The horsemanship contest consisted of a test in management of the horse at command; followed by a cross-country ride of seven kilometers, with a time limit of twenty-eight minutes, and

## FIELD ARTILLERY NOTES

an obstacle ride three kilometers in length with six jumps. The gunnery contest was for speed and accuracy and was similar to the corresponding part of the gunners' examination in the United States, but included also laying of the piece while wearing the gas mask.

This was followed by an exhibition of cossack riding. The prize winners were all given certificates, which were presented by Mrs. Marya Durska Trzasko, while Major Yeager, our Military Attaché to Poland, presented the money prizes. After the exercises the officers of the Group entertained their guests at dinner where Colonel Durski Trzasko presided. The regimental toast was drunk and speeches were made by Colonel Trzasko and Major Yeager.



**HAZARD'S BATTERY GOING INTO ACTION AT FREDERICKSBURG, DECEMBER 13, 1862**

# FIELD ARTILLERY COMMISSIONED PERSONNEL (REGULAR ARMY)

CHANGES OF STATION (JUNE 1, 1929, TO AUGUST 1, 1929)

<p>Capt. R. C. Snyder to Ft. Slocum, N. Y.          1st Lt. S. A. Beckley to Yale (Student).          1st Lt. E. G. Meriwether to Purdue (Student).          1st Lt. R. V. D. Corput, Jr., to Signal Corps.          Capt. D. W. Hand to Ft. Ethan Allen, Vermont.          Capt. C. W. Gallaher to Mass. N.G.          1st Lt. R. S. McClenaghan to Governors Island, N. Y.          1st Lt. E. H Metzger to OR, 5th C.A.          Maj. H. H. Fuller to W.D. G.S.          1st Lt. J. A. Cella to Purdue (Student).          Capt. A. B. Wade to Fla. N.G.          Maj. W. A. Pendleton to Va. N.G.          1st Lt. L. W. Prentiss to Engr. School.          2nd Lt. J. L. Chamberlain to Ft. Sill.          2nd Lt. E. H. McLemore to A.C., Brooks Field, Tex.          1st Lt. H. M. Roper to C.Z.          Capt. D. Bell to Q.M.C.          Maj. L. J. Ahern to Governors Island, N.Y.          Capt. R. B. Willis to O.R., 3rd C.A.          Maj. F. Gallup to Ft. Bragg, N. C.          2nd Lt. B. A. Holtzworth to Ft. Bragg, N. C.</p>	<p>1st Lt. J. J. Binns to Ft. Sill.          1st Lt. R. F. Hallock to Ft. Sill.          1st Lt. C. B. Magruder to Ft. Sill.          2nd Lt. J. W. Clyburn to Ft. Sill.          Maj. J. E. Mort to Fla. N.G.          Lt. Col. C. F. Cox to Bureau of Insular Affairs, Washington.          Capt. A. F. Kibler to Office Chief of F.A.          1st Lt. B. M. James to Ft. Sill.          Capt. R. W. Hocker to Ft. Leavenworth (Student).          Lt. Col. P. D. Glassford to G.S., Washington.          Maj. Gen. J. Hagood to 7th C.A.          Col. J. F. McKinley to Asst. Adj. Gen. (rank Brig. Gen. 4 yrs, beginning July 17, 1929).          Capt. S. C. Hilton to 76th F.A.          Capt. L. J. Whitlock to N.Y. N.G.          Capt. L. E. Savage to Pa. N.G.          1st Lt. R. C. Benner to Edgewood Arsenal.          Capt. W. G. Dockum to Ft. Sill.          Maj. J. O. Daly to O.R., 7th C.A.          Capt. J. W. Loeff to O.R., 1st C.A.          Col. A. A. Starbird to home for retirement.</p>
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## TO PHILIPPINES

Capt. H. B. Allen	2nd Lt. F. H. Chaffee	2nd Lt. J. K. Poole
2nd Lt. J. R. Wheaton	2nd Lt. D. V. P. Armstrong	2nd Lt. G. W. Peake
Brig. Gen. C. E. Kilbourne	2nd Lt. P. S. Thompson	Lt. Col. F. W. Griffin

## TO HAWAII

1st Lt. H. F. Handy	2nd Lt. E. G. Ferrand	2nd Lt. J. R. Pitman
2nd Lt. W. E. Dean, Jr.	1st Lt. W. S. Roberson	1st Lt. H. G. Elliott
2nd Lt. H. S. Isaacson	2nd Lt. J. Ganahl, Jr.	2nd Lt. C. O. Wiselogel
2nd Lt. R. I. Pride	2nd Lt. P. A. Gavan	2nd Lt. M. D. Masters
2nd Lt. C. A. Billingsley	2nd Lt. F. A. Granholm	

## TO FORT SAM HOUSTON, TEX.

2nd Lt. R. E. Hattan	2nd Lt. S. H. Ayre	2nd Lt. M. W. Brewster
2nd Lt. W. P. Connally	2nd Lt. D. M. Perkins	Capt. Horace Harding



## FIELD ARTILLERY PERSONNEL

### TO 6TH F.A., FORT HOYLE, MD.

2nd Lt. R. D. Wentworth	2nd Lt. N. E. Poinier	2nd Lt. W. J. Latimer
2nd Lt. W. E. Kraus	2nd Lt. J. D. F. Phillips	2nd Lt. J. S. Nesbitt

### TO 16TH F.A., FORT BRAGG, N. C.

2nd Lt. H. Q. Huglin	2nd Lt. W. E. Hall	2nd Lt. J. L. Beynon
2nd Lt. R. R. Mace		

### TO 76TH F.A., MONTEREY, CAL.

2nd Lt. J. B. Evans	2nd Lt. C. E. Hughes	2nd Lt. D. R. French
2nd Lt. D. G. Dwyre		

### TO 10TH F.A., FORT LEWIS, WASH.

2nd Lt. D. N. Sundt	2nd Lt. H. S. Whiteley	2nd Lt. J. G. Harding
2nd Lt. W. T. Kim		

### TO 16TH F.A., FORT MYER, VA.

2nd Lt. T. J. Sands	2nd Lt. W. J. Thompson	2nd Lt. R. E. Chandler
2nd Lt. J. S. Walker	2nd Lt. J. P. Hannigan	

### TO BROOKS FIELD, TEX.

2nd Lt. D. F. Brown	2nd Lt. W. C. McDermid	2nd Lt. D. J. Keirn
2nd Lt. P. H. Draper	2nd Lt. C. H. Jark	2nd Lt. D. B. Schanep
2nd Lt. F. H. Smith	2nd Lt. J. E. Theimer	2nd Lt. C. S. P. Vanderblue
2nd Lt. L. A. Vickrey	2nd Lt. J. C. Horton	2nd Lt. E. S. Wetzell
2nd Lt. R. M. Losey	2nd Lt. R. M. Kraft	2nd Lt. F. M. Steadman
2nd Lt. J. J. O'Hara, Jr.	2nd Lt. S. A. Ofsthum	

### PROMOTIONS

R. H. Lewis to Lt. Col.	O. M. Moore to Maj.	R. H. Bacon to Capt.
H. F. Searight to Capt.	D. O. Hickey to Capt.	E. A. Erickson to Capt.
L. J. Tacy to 1st Lt.	W. W. Dixon to Capt.	E. L. Andrews to 1st Lt.
C. L. Dasher, Jr., to 1st Lt.	P. W. Brown to 1st Lt.	J. G. Anding to 1st Lt.
R. Talbot, Jr., to Lt. Col.	S. S. Koszewski to 1st Lt.	
N. Horowitz to Lt. Col.	V. F. Burger to 1st Lt.	

# POLO

## Harvard Wins Intercollegiates

After a strenuous indoor polo season in which the Varsity won the New England indoor circuit, The Harvard polo teams prepared, at the Myopia Hunt Club, Hamilton, Mass., for the outdoor Intercollegiates which were to take place in the end of June at Philadelphia.

Thanks to an early Spring and good fields at Myopia, the team, after several practice games, was able to go to the Harriman field, Central Valley, New York, where it defeated West Point by a score of 11-10 in an extra period game.

On its way to Philadelphia for the Intercollegiates, Harvard stopped off at Yale for a rather disastrous game and was beaten by a score of 10-3.

In the first round of the Intercollegiates, Army beat Princeton, Yale beat Pennsylvania Military College and Harvard got a bye on account of late examinations. Harvard played Princeton on June 22 defeating them 6-5 after a hard struggle. Had Borden, Princeton's captain, not been rushed so much and ridden off so much, the score would have been, and rightly, about 15-5 in Princeton's favor. Time after time Borden shot at goal from 60 to 80 yards and sometimes at greater distances, but Harvard had been well instructed about Mr. Borden's shooting and his accuracy.

Winning from Princeton on the 22nd threw Harvard against her old rival, Yale. The bets and money were all with Yale; Yale earlier in the season had defeated Princeton and on the 25th of May had defeated Harvard by a not too pleasant score.

Harvard had gone an extra period at Harriman's to defeat West Point by a score of 11-10, Princeton had easily defeated West Point and on the 22nd of June Harvard had had much difficulty with Princeton on a 6 to 5 scale, so there seemed to be nothing to it except another Yale Championship.

Forrester Clark had not been on the team when Yale had beaten Harvard in May, and had not gotten his second wind due to the fact that the day before the Princeton game he had rowed a hefty four mile race against Yale. However, a little

## Intercollegiate Polo Champions of 1929



THE HARVARD TEAM WITH INDOOR TROPHY

F. H. GALE, MANAGER

R. H. WALKER, JUNIOR VARSITY

CAPT. F. O. SHARP, F.A., COACH

H. N. NICHOLAS, JUNIOR VARSITY

E. J. GERRY, VARSITY

G. O. CLARK, 2ND, VARSITY

J. P. COTTON, JUNIOR VARSITY

F. A. CLARK, VARSITY

T. B. GLENN, JUNIOR VARSITY

## **Intercollegiate Polo Association Championship Trophy**



**PRESENTED BY MR. GOUVERNEUR MORRIS CARNOCHAN**

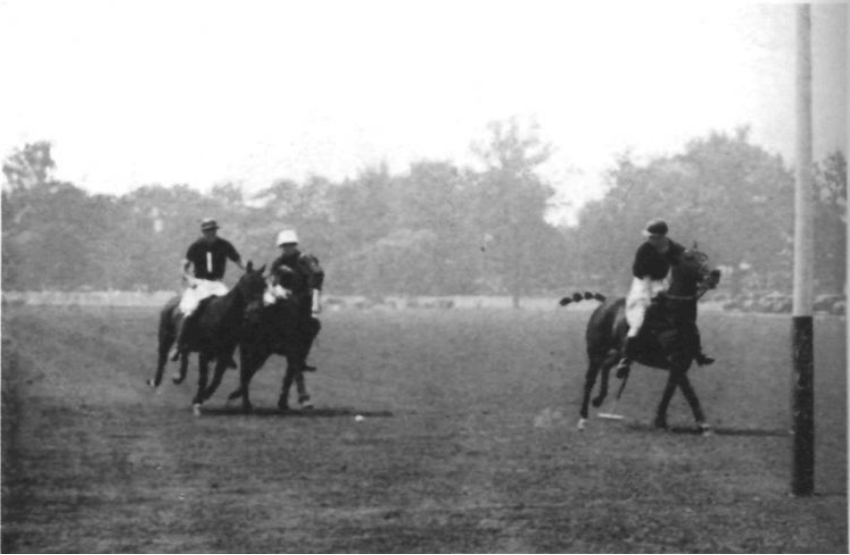
## Harvard vs. Yale



TOP: LEFT TO RIGHT—GERRY, HARVARD NO. 2; RATHBORNE, YALE NO. 4; MONDELL, HARVARD NO. 4;  
FORRESTER CLARK, HARVARD NO. 3, BACKING UP THE PLAY

BOTTOM: LEFT TO RIGHT—COTTON, HARVARD, GERRY, HARVARD, RATHBORNE, YALE

## Harvard, 6—Princeton, 5



UPPER: VERY FAST PLAY, HARVARD ATTACKING

LOWER: THE TWO TEAM CAPTAINS, CLARK OF HARVARD AND BORDEN OF PRINCETON, COTTON OF HARVARD IN FRONT

## POLO

rest and then two practice games during the week at Bryn Mawr turned all the dope upside down.

Harvard played team work throughout the game. Passing was well done. Passes were converted into counters. Men were ridden and Yale was hurried at every play.

There was no scoring for two periods, then in the third Yale tallied and broke the ice. Harvard retaliated and scored two. From then on there was no question. Harvard outmounted, outrode and outclassed Yale to the tune of 6-3.

Thus the first leg of the Intercollegiate trophy, presented by Mr. Gouvenour Morris Carnochan, Vice-President of the Indoor Intercollegiate Association, became the temporary property of his alma mater. The trophy has to be won three times to become the property of any college.



THE WASHINGTON ARTILLERY OF LOUISIANA ON MARYE'S HILL, FREDERICKSBURG, FIRING ON UNION ASSAULT TROOPS

## THE FIELD ARTILLERY JOURNAL



Courtesy Philadelphia Inquirer

### A GOAL FOR THE SIXTH

LEFT TO RIGHT—BENSON (SIXTEENTH), WILLIAMS (SIXTH), MARAIST (SIXTEENTH)

## The Sixth Defeats the Sixteenth

The 6th Field Artillery Polo Team, which last year won the Morrell Fund Cup, The President's Cup, and the Southeastern Intercircuit Championships at the Philadelphia Country Club, has been held together another year and has added to its previous victories. The team is composed of the following:

- No. 1—1st Lieut. Edward T. Williams
- No. 2—1st Lieut. Homer W. Kiefer
- No. 3—1st Lieut. C. N. McFarland
- No. 4—1st Lieut. T. F. Keefe

This year, after a strenuous preparatory period in which the 6th Field Artillery met and defeated such teams as the Maryland Polo Club, 110th Field Artillery and the 1st Division teams, the team won the Northern Half of the Southeastern Intercircuit Elimination by defeating the Rumson Country Club, the Bryn Mawr Polo Club and the Primrose Club of Rumson.