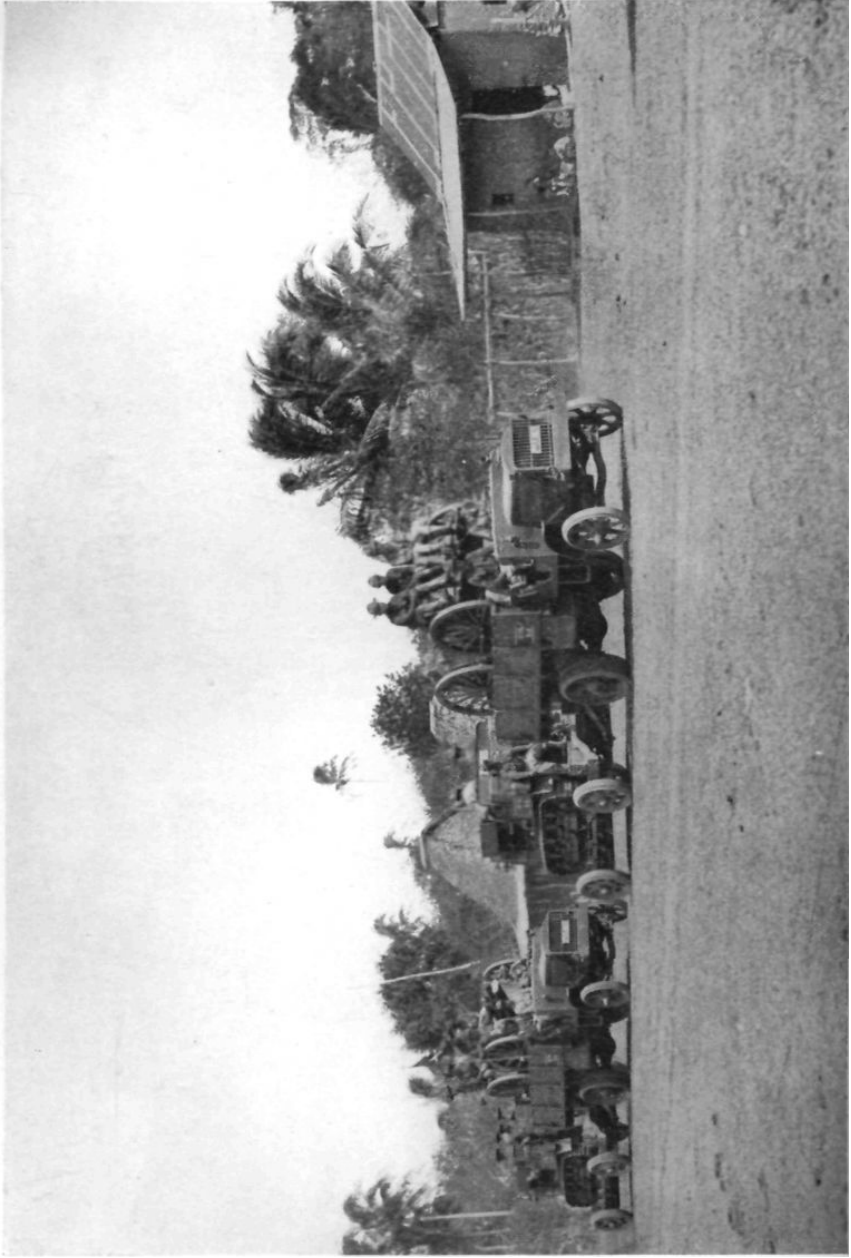


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AT THE MANEUVERS IN PANAMA

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## BUILDING A FIRING CHART IN A MOVING SITUATION

BY E. B. GJELSTEEN, FIRST LIEUTENANT, FIELD ARTILLERY

A FIRING chart, as defined by training regulations, is a fire control map or a gridded sheet on which are shown the elements used in the computation and preparation of the firing data. This discussion deals with the building of a firing chart in a moving situation when neither maps nor control points are available. Topographical methods of fire direction and fire control are so superior to other methods that every effort should be made to secure the advantages that topography affords.

It is in a moving situation without maps that the greatest difficulty in fire direction and fire control is experienced, especially when the battalion observation post and the observation posts of the batteries are at a considerable distance from each other, or the observation posts of the batteries and their gun positions are at a considerable distance from each other. When either one or both of the above conditions are found, firing charts should be constructed. First the building of coordinated battalion and battery firing charts and their use in fire direction will be discussed, and then the use of the firing chart for fire-control purposes will be discussed.

The coordinated battalion and battery firing charts are constructed by establishing a base (a line joining two stations from which angles are measured; the length of the base is measured with a range finder), and locating targets, prominent points within the enemy lines, our observation posts, and our gun positions by intersection. This data is then plotted to a scale of 1/20,000.

The data necessary for the construction of the firing charts are secured pointly by the battalion and battery reconnaissance officers. The only instruments necessary are an aiming circle and the battalion range finder.

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The battalion reconnaissance officer assembles the battery reconnaissance officers on a high point from which the ground held by the enemy can be seen. This is the first station of the base. (The two high points which establish the base should, if practicable, be observation posts within the battalion.) Arbitrary coordinates and an arbitrary elevation (in yards) are assigned this point by the battalion reconnaissance officer. The other station of the base is selected. This should also be a high point, and preferably more than 1,000 yards from the first station. The distance to the second station is measured by the battalion range finder. Y-azimuths and angles of site are measured to targets, prominent points in enemy lines, battalion reference point, our observation posts, and our gun positions. Points and targets in the enemy lines are each given a number. All the above data are recorded by each officer. A rough panoramic sketch will assist in the location of the points from the other station of the base, and from our observation posts. A panoramic sketch, for instance, records whether the target is on or near sky line, near a stream, in edge of woods, etc.

The detail then proceeds to the second station. From this station angles and angles of site to all points used at the first station are measured and recorded. The horizontal angles are measured, using the first station occupied as an origin.

The data secured from the two stations should now be plotted on a gridded sheet to a scale of 1/20,000. The first station is plotted and its assumed elevation noted. Y-azimuths from the first station are now laid off with a protractor, and rays drawn from the plotted position of the first station toward all the points. Mark each ray as it is drawn, as "C" O.P., Bn. O.P., 6, 8, etc. The numbers given to targets should, when possible, correspond to the battalion number given that target. The position of the second station is plotted by laying off on the ray from the first to the second station the range finder reading obtained between the two stations. Now from the second station lay off from the line joining the two stations the angles measured at the second station. Draw the rays from the plotted position of the second station, marking each ray as it is drawn. The intersection of the rays from the first and second stations give the location of the points desired. For instance, the intersection of the ray from the first station to point 6 and the

## BUILDING A FIRING CHART

ray from the second station to point 6 give the location of point 6. Unless the rays are marked when they are drawn, confusion may result by taking intersection of rays 5 and 6, instead of rays 6 and 6. As a target, observation post, or gun position is located, mark it. The elevations of all points in the enemy lines, our observation posts and our gun positions are calculated from the angles of site and distances from the first station. Since the angle of site was taken from both stations, we have a check. All elevations are figured in yards, which facilitates the calculation of angle of site for firing. All elevations should be entered on the chart. All data secured should be plotted by the battalion and all the batteries, except that the gun position need be plotted only by the batteries concerned.

From the above it is seen that intersection is the only principle of orientation involved. The accuracy of the intersections depend on the distance between the two stations occupied, and the angle which the line connecting the two stations (the base) makes with the front lines. The greater the distance between the two stations (up to that distance which gives right angles of intersection) and the smaller the angle between the line joining the two stations and the front lines the greater will be the angle of intersection and, therefore, the greater the accuracy of the location of points. The distance between the two stations should preferably be over 1,000 yards. However, when the distance between the stations is great—2,000 or 3,000 yards, for instance—difficulty of identifying points from the second station and from the observation posts is encountered, especially if the terrain occupied by the enemy has but few prominent features.

When the battalion and battery observation posts are in the same vicinity, as on the same hill, the firing chart for fire directional purposes is not worth the time and trouble to construct, as objectives can be pointed out to battery commanders by the battalion commander. But when all or part of the battery observation posts are at a considerable distance from the battalion observation post, coordinated battalion and battery firing charts are invaluable. Objectives already plotted can be easily designated to battery commanders by coordinates or by number. For objectives not plotted on the charts, the battalion reconnaissance officer first measures the Y-azimuth and the angle of site. A range finder

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reading is secured. (It was for this reason that the battalion range finder was used to secure the distance between the two stations which established our base.) The objective is now plotted by polar coordinates. The elevation is calculated from the distance and the angle of site. In the designation of this objective the battery commander is given the approximate coordinates, the elevation, and a description of the target. The battery commander plots the approximate coordinates given him and draws rays from this plotted position to the battalion observation post and to his own observation post. He measures the shift from the reference point and calculates the angle of site from his observation post. With this data the battery commander can place the cross-hairs of his instrument on or near the target, depending on the accuracy of the battalion range finder. In any case, the objective, if visible, should be identified by the battery commander. He then notes the exact angle from the reference point to the objective, sets off this angle on his chart, and draws a ray from the plotted position of his observation post. The intersection of this ray and the ray drawn from the approximate coordinates to the battalion observation post gives the true position of the objective. The battalion reconnaissance officer is then notified of the true coordinates of the objective, and same are plotted on the battalion chart and relayed to the other batteries. Thus the chart is elaborated as long as the battalion remains in the same position. This method of designating objectives to battery commanders is not only more rapid but is also more accurate than calculating a compass (Y-azimuth of target; in this case from the battery observation post) or a shift from the reference point that will place the cross-hairs of the battery commander's instrument on or near the target.

As in fire direction, fire control is not facilitated by this type of chart if the battery observation post and the gun position are close together. Deflections are easily obtained, and a range finder will secure accurate ranges, especially if a "K" is secured and used

$$\left( K = \frac{\text{HORIZONTAL GUN RANGE}}{\text{RANGE FINDER RANGE}} \right).$$
 But if the guns are at a considerable

distance from the observation post, if, in other words, we have a lateral set up, a map or some form of firing chart is essential if we are to place accurate fire on the objective quickly. The coordinated battalion and battery firing charts described above can be

## BUILDING A FIRING CHART

used for fire control. If no coordinated firing charts are made, each battery having a lateral set up makes its own chart. The chart is made in a similar manner to the system described above, except that coordinates need not be assumed, since a grid system is unnecessary. Angles at each station are measured, using the other station as an origin. With the above noted differences the construction is identical. In the coordinated battalion and battery charts, a target not previously located on the chart could be located by intersection, using the battalion observation post as one station and a battery observation post as the other station. In the individual battery chart, however, this system of locating targets not previously located on the chart is not practicable, since the battery cannot conveniently man two stations at the same time. The targets not previously located must therefore be located by polar coordinates, securing the distances with the range finder. From these facts it may readily be seen that coordinated battalion and battery firing charts are superior to the individual battery chart.

The firing chart, whether a coordinated or individual chart, has the same use for fire control purposes. As stated before, this chart has but little value in an axial set up. The discussion below of the use of the chart applies to a lateral set up. To use the chart, select a base point and register thereon. The initial data are secured from the chart in the same way as from a map. When the adjustment on the base point has been completed, record base deflection. (This is a temporary base deflection, not the true base deflection. It is that deflection which, under existing conditions, will cause the trajectory, not the plane of fire, to pass through the base point.) Secure a "K." This is done in the following manner: First subtract algebraically the angle of site from the adjusted elevation. With this figure as an argument, enter the appropriate firing table and secure the horizontal gun range. Then  $K = \text{Horizontal Gun Range} / \text{Chart Range}$ . The initial data for a new target plotted on the chart are calculated as follows:

1. With a protractor measure the shift from the base point. Correct for difference in drift. This gives the deflection shift from the base point.

2. With a plotting scale measure the chart range. Multiply this by the "K." This gives the horizontal gun range. From the firing tables secure the range setting or elevation for the projectile,

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charge, and fuze used. If the gunner's quadrant is used the angle of site must be added algebraically to the elevation to secure the initial elevation. If a range setting is used, the site is announced.

During the subsequent adjustment treat the above data as map data corrected.

To secure the greatest possible accuracy, the ratio between the range to the objective and the range to the base point should be between three-fourths ( $\frac{3}{4}$ ) and four-thirds ( $\frac{4}{3}$ ), and the deflection shift should be less than three hundred mils (300 mm.). This system is applicable beyond the above noted limits, but the accuracy of map data corrected should not be expected. The limits mentioned above should be kept in mind when selecting the base point. The most favorable position for a base point is in the center of the sector, both for range and deflection. As the weather conditions change, a new "K" must be obtained.

When the battalion observation post is at a considerable distance from the battery observations, fire direction without a map or chart is extremely difficult. The firing chart described above greatly simplifies fire direction. When the battery has a lateral set up, surprise effect cannot be secured with estimated data. With the chart, however, we can place our first round near the objective, and can secure a quick, and therefore effective, adjustment on the target. As the chart can be completed and put in operation in from one to two hours time, a chart can be constructed and used to advantage when the battalion remains in the same position for three or more hours. This will normally be the case, except in an extremely rapid moving situation such as a rear guard action, advance guard action, or artillery with a pursuing column.

The chart is valuable at all times, but it is especially valuable when the artillery supports an attack at dawn. Dawn is the infantry's favorite time for an attack and is also the artillery's most unfavorable time for the observation of fire. The light is poor, and the ground is often obscured by early morning mist. To support an attack at dawn, we can identify and locate on the chart the first few objectives. This can be done before dark of the day preceding the attack. A high burst ranging adjustment, conducted a few hours before dawn, will give us a "K." Knowing the "K," we can deliver accurate unobserved fire until the visibility allows observation of fire.



# THE TIME ELEMENT

BY FIRST LIEUTENANT EDWIN L. SIBERT, F.A., DEPARTMENT OF GUNNERY,  
THE FIELD ARTILLERY SCHOOL

"THE TIME ELEMENT." This hackneyed expression is to be dissected from a field artillery point of view, with special reference to divisional artillery.

The records from which this study was compiled were kept during Lieutenant Colonel W. P. Ennis's incumbency in the office of Assistant Commandant, The Field Artillery School. The major part of whatever credit may be due for the recent speeding up on the part of battery and student officer, must be given to him. This has been done without hurrying the student beyond his power to do accurate work, and the same is true of the batteries, who, under the direction of Lieutenant Colonel George P. Tyner, 1st F.A., the Commanding Officer, School Troops, have risen to meet the high standards of speed and accuracy demanded of them.

At the instigation of Major J. L. Devers, Director, Department of Gunnery, this article was prepared for publication with the hope that our branch of the service as a whole would be encouraged to emulate the standards set forth.

No comparative claim is made for any of these records. This article is intended to be an inspiration toward more speed rather than a challenge to controversy over past performances.

The Statistical Section, Department of Gunnery, has kept records of the majority of the firings for the Academic Division for nearly three years. These records cover the following subjects:

1. Time consumed by the officer conducting fire.

- (a) *Time to compute data.*

- (b) *Average sensing and command.*

- (c) *Total time for adjustment.*

By "time to compute data" is meant the elapsed time from identification of target by the officer conducting fire (hereafter referred to as BC) to his announcement of the first range. Except where "shifts" are specified, it is assumed that he must compute initially all the elements of the data. By "average sensing and command" is meant the average elapsed time between the appearance of the last burst of a salvo and the BC's announcement of

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the next range. By "total time for adjustment" is meant the elapsed time from identification of the target by the BC to his announcement of the range for fire for effect.

2. Time consumed by the firing battery (this includes time for transmission of data).

(a) *Time from announcement of first range at the OP to the first shot of the first salvo.*

(b) *Average time from the announcement of the range at the OP to the first shot of each salvo after the first.*

3. Miscellaneous Items: *Special fires, moving targets, exceptional records, air adjustments, etc.*

In the early spring of 1928, the 1st Bn., 1st F.A., armed with American 3-inch guns, somewhat piqued at the tall tales of the old timers, did some secret preparation with speed in view. When their team work was perfected, they stepped out with some surprising time records, notably Battery C, which was the first to shatter all available post records. The battery commander had a number of short cuts. The No. 1 cannoneers on the first and fourth pieces were the battery speed experts. Their coordination and dexterity was remarkable, and it was a pleasure to see them function. With the average time from announcement of range to the first shot of each salvo after the first—hovering around *five seconds*, there were no "cease firings" or after thoughts. If you, as BC, said 3,600, a salvo at 3,600 was on the way before you could take a deep breath.

In some of these batteries, the telephone operator at the OP stood nearly in front of the BC and held the telephone transmitter in such a position that the BC's voice was heard at the battery. The operator checked the message and spoke only when necessary to make corrections. He wore headset receivers. During some problems the executive used a duplicate headset, attached to the operator's phone by a long wire. This was found to be of some advantage, the battery telephone operator merely checking the message and repeating it, in a low voice, to the recorder. In other batteries the telephone operators announced commands directly to the gun squads. This last method leaves the executive free to supervise the gun squads. However, it is apparent that, for this method to work satisfactorily, the operator in question must be an excellent man. Suffice it to say—it does work at Fort Sill.

## THE TIME ELEMENT

Extract from the Records of the Battery Officers' Class Record Problems 1927-28. These are averages from all record problems fired at which official timers were present.

### 1. Time consumed by BC:

*Time to compute data (axial):*

(a) Without instruments (this means using calibrated hands, field glasses, BC ruler, etc.) Average, 58".

(b) With instruments (does not include prismatic compass). Average, 1'03".

*Time to compute data (lateral):*

(a) Without instruments (shifts only). Average 38".

(b) With instruments (except compass). Average, 1'01".

NOTE: Time records covering the use of the prismatic compass are not included as they give a false impression of the relative speed of this method. To get a comparison between the speed of the prismatic compass method and the other two methods, see the records of the Instructors, Department of Gunnery.

*Average sensing and command:*

(a) Precision axial. Average, 12.8".

(b) Percussion bracket axial. Average, 16.8".

(c) Time bracket axial. Average, 13.8".

(d) Precision lateral. Average, 27.6".

(e) Percussion bracket lateral. Average, 15.2".

(f) Time bracket lateral. Average, 15.2".

*Note:* These records include all the "Unsatisfactory" problems. A few very poor problems pull the average below the standard.

*Total time for adjustment; estimated range.*

(a) Precision axial. Average, 11' 14".

(b) Percussion bracket axial. Average, 8' 37".

(c) Time bracket axial. Average, 5' 02".

(d) Precision lateral. Average, 12' 17".

(e) Percussion bracket lateral. Average, 8' 38".

(f) Time bracket lateral. Average, 6' 07".

*Note:* The instruction in firing takes up the various methods of adjustment in the order named above, therefore the student naturally acquires more facility in the conduct of fire as he goes on from method to method.

### 2. Times on firing batteries. (These batteries were about 60

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per cent 3-inch and 40 per cent French 75-mm., all times averaged together. All firing conformed to very strict standards of accuracy.)

(a) Time from announcement of range by BC at OP to first shot of first salvo, firing shrapnel.

Period January 1 to June 1, 1928.

Number of problems 483. Average time 22.9".

(b) Average time from announcement of range by BC at OP to first shot of each salvo after the first, firing shrapnel. Same period as above.

Number of problems 483. Average time 12.2".

Due to the peace-time safety requirements, the same items, but with shell, were increased approximately 20 per cent. In actual field service, shell should be slightly faster than shrapnel.

### 3. Miscellaneous Times.

(a) *High burst ranging.* (Time from 1st command to announcement of range for fire for effect, this includes time for computation of this last item.) False Site Method.

Excellent 10' 00". Fair 25' 00".

(b) *Total Time of Problem, Airplane Adjustment.* (Prearranged problem. Map data uncorrected. Percussion bracket adjustment. Two way radio buzzer communication. SCR 134 in plane. SCR 109-A on ground. Time from "Battery Ready" to one fork bracket or mixed or bracking range with proper deflection and distribution.)

Excellent (three salvos) 2' 30".

Fair (five salvos) 6' 50".

(c) *Time to Prepare Special Fires.*

(1) Transfer of Fire K Method ..... 15 min.

(2) Transfer of Fire V-Vo Method .... 45 min.

(3) Normal Barrage ..... 45 min.

(4) Rolling Barrage ..... 2 hrs.

(5) Witness Target Rapid Method .... 15 min.

(6) Witness Target Deliberate Method 2 hrs.

(7) High Burst Ranging ..... 35 min.

(The field work of topographic locations, not included in any of these items. What is meant is time for computation after being furnished coordinates or overlays.)

On February 8, 1928, Battery C, 1st F.A., made its speed debut

## THE TIME ELEMENT

by firing so fast that the Department of Gunnery timer was able to record only the alternate problems. Eight problems recorded showed an average time from announcement of range at OP to first shot of first salvo of each problem of **9.2** seconds, and an average time from announcement of range at OP to first shot of each salvo after the first of **5.1** seconds.

On February 20, 1928, this same battery, firing for the Battery Officers' Class made an average of **14.6** seconds for the first item and **4.9** seconds for the second item. Twelve problems were fired. The records for this battery show several other days of firing with the first item under 15 seconds and the second item under 6 seconds. However, toward the end of spring, this battery, apparently unable to maintain this feverish speed indefinitely, settled down to a conservative average of about 20 seconds for the first item and 8 seconds for the second item. This speed might be taken as an immediate standard.

Battery B, 1st F.A., early in February began to make Battery C worry about its supremacy. On February 9th, they made an average for the first item of **9.4 seconds** and for the second item an average of **6.3 seconds**. Nine problems were fired. The next day, thoroughly aroused, they went out and in nine problems made the final record of **6.5 seconds** for the first item and **4.4 seconds** for the second. Though not actually involved in this neck and neck race, Battery "A," 1st F.A., during this period was scoring up averages of 15 seconds for the first item and 10 seconds for the second item. Ten and five seconds respectively was at this period held to be the desirable limit. Anything faster than this was considered freakish and likely to introduce inaccuracies. Let me emphasize, however, the fact that all of this firing was up to standard as far as accuracy was concerned.

It should be noted at this point that the 1st Bn., 1st F.A., fires nearly 60 per cent of the total ammunition fired by all three artillery battalions at this post; consequently they have the best opportunity to perfect themselves. Also they are a tractor drawn battalion and can naturally concentrate more on drill of the firing battery. However, Battery F, 1st F. A., a horse-drawn battery of French 75-mm. guns, put in a claim for attention by averaging in seven problems, on March 27, 1928, 24 seconds for the first item and 14.1 seconds for the second item. On April 23, nearly a month later, the next time a Department of Gunnery timer made a record

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of their firing, they had an average of 21 seconds for the first item and 10 seconds for the second item, which was about the top speed of the 1st Bn., 1st F. A., at this time, there having been, as noted before, a general consolidation at this level. The consensus of opinion locally seemed to be that the French handwheels and collimator sight were slower than the American handwheels and the American panoramic sight. There can be no doubt of this latter fact.

These records may not be the best made by any battery, but they are the best times of which records were made; and indicate what should be taken as a standard of proficiency in speed. Any battery that can, being in position prepared for action, lay and fire the initial shot in 20 seconds and the subsequent salvos in 10 seconds is proficient. Anything short of that indicates that there is room for improvement.

Some good time records made by officers conducting fire are listed below. They are taken from the records of the firings by the Instructors, Department of Gunnery, who naturally have the best opportunity to perfect themselves in the conduct of fire.

### *Time to compute data, axial observation:*

Without instruments. Average 14 probs., 47".

B.C. telescope or aiming circle. Average 46 probs., 53".

Prismatic compass. Average 4 probs., 44".

### *Time to compute data, lateral observation:*

Without instruments (shifts). Average 30 probs., 22".

B.C. telescope, etc. (shifts). Average 16 probs., 30".

There are no data on the prismatic compass for 1927-28. (However, it is not appreciably slower in a lateral set-up than in an axial one, as the angle  $i$  is usually fixed in the BC's mind by the time he steps up with his compass. Of course his accuracy is not nearly as good as in axial. The needle need not come to rest. With a little practice, the center of its swing can be estimated closely enough, considering the inaccuracy of the angle  $i$ .)

### *Average sensing and command:*

Precision axial. Average 11 probs., 8.4".

Percussion bracket axial. Average 13 probs., 8.5".

Time bracket axial. Average 15 probs., 9.5".

Precision lateral. Average 7 probs., 18.1".

## THE TIME ELEMENT

Percussion bracket lateral. Average 5 probs., 9.3".

Time bracket lateral. Average 54 probs., 9.0".

NOTE: In lateral observation, the distribution is not adjusted.

*Total time for adjustment; estimated data:*

Precision axial. Average 8 probs., 9' 06".

Percussion bracket axial. Average 15 probs., 4' 42".

Percussion bracket lateral. Average 6 probs., 5' 00".

Time bracket lateral. Average 43 probs., 4' 43".

All of the above times are from the official records 1927-28. Time bracket axial times were not better than for the Battery Officers' Class and are omitted. The only alibi available is that, as the Instructors assign each other problems with a vengeance, some of the targets are difficult above the average. Let us, however, accept five minutes as a reasonable limit.

## DISCUSSION

Allowing a time of flight of about ten seconds, an "average sensing and command" of about ten seconds, and an interval of ten seconds in which the battery lays, loads and fires, it is seen that for adjustment the rate should be very close to two rounds per minute when adjusting with one gun. When adjusting by salvos, add two seconds for each additional gun used. This, it is believed, is a logical standard.

It is also believed that the rapid computation of data in an average axial set up should take one minute; in a lateral set up slightly longer.

The battery, if in position, should get off the first shot in thirty seconds thereafter, except for laying by compass. Add a minute if the compass is used.

For the reconnaissance, selection and occupation of position and OP, no times can be laid down, except that normally the data should meet the battery when it arrives at the gun marker, and in a moving situation, the battery's progress from column to position should, in general, be uninterrupted.

Our records show that, when using any method except the compass, a battery should fire the first shot forty-five seconds after the command for going into action (i.e. "Action Right," etc.) Add a minute if aiming circle compass is used. (If the executive uses the prismatic compass, which method is rather inaccurate and

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unusual but not to be overlooked, the time will be about the same as for a common aiming point.) It is admitted that records of speed much better than this can be and have been made, but they are like the speed firing done by Batteries B and C, 1st F.A., early in February, 1928; in that the stage is set and all goes well, but the speed is so feverish that in the long run it is better to be consistent at more conservative level. Therefore, to get a complete picture of the entry of artillery into action as far as time is concerned, let us say that, excepting the compass, we will fire in less than a minute after going into action and will adjust thereafter at a rate of two rounds per gun per minute. Less than five minutes after the command for going into action, we should start fire for effect.

Thereafter, in shifting to new targets, thirty seconds will elapse between the time of identifying the new target and the opening of fire, and the adjustment proceeds as noted above.

From the 1915 statistical records kept by Captain L. J. McNair, now Lieutenant Colonel, we find that "it is reasonable to expect batteries to reach a degree of training such as to enable them . . . to deliver fire for effect (2 rounds at each range) at three ranges through a 200-yard bracket in 45 seconds when using 'Battery Two Rounds' and in a little less than one minute when using 'Battery One Round'; time being computed in both cases from the fall of the last shot of the last salvo for adjustment to the last shot of fire for effect."

If the target be a visible animate target of opportunity, it will probably have escaped by this time, or will have dispersed, taken shelter or in general will have been neutralized.

### RECAPITULATION

For the initial firing in an engagement let us lay down as reasonable these standards:

	<i>min.</i>	<i>secs.</i>
From the arrival of a battery in position to the opening of fire .....		45
Same, using compass .....	1	45
Completion of bracket adjustment, estimated data, shell or shrapnel, axial or lateral .....	5	
Fire for effect 24 rds. in a 200 yd. bracket .....	1	
Total time (without compass) from arrival of battery to end of effect approx .....	7	
Same, using compass .....	8	approx.

For subsequent missions on visible targets:

From identification of target to opening fire .....		30
To completion of bracket adjustment .....	5	
Fire for effect .....	1	
Total for mission .....	6	30



# SERVICE PRACTICE WITH 37-MM. SHELL

BY CAPTAIN H. W. BLAKELEY, F.A., DEPARTMENT OF GUNNERY, THE FIELD ARTILLERY SCHOOL

THE RECENT issue of 37-mm. tubes and ammunition to light batteries has raised a number of questions as to the employment of this ammunition in instruction in observation and conduct of fire. Experience at the Field Artillery School, Fort Sill, Oklahoma, indicates that, with axial observation, the 37-mm. ammunition can be used on dry, open ground up to about 5,000 yards. Firing should normally be, however, at targets at ranges of 1,500 to 3,000 yards. With lateral observation, the terrain must be favorable to get satisfactory results—i. e., fairly regular, open country.

It must be remembered that the object of firing with this ammunition is not effect on the target, but instruction in observation and conduct of fire. Procedure should, therefore, follow as closely as possible the procedure with service ammunition.

At the Field Artillery School the following method is used. A target is assigned and the range estimated or obtained by range finder, map or plotting. The data are prepared as though firing with service ammunition. The projectile may be announced as "Shell, 37-millimeter," or the executive may be notified that he will fire 37-mm. shell for all problems. In the latter case, the B.C. is required to announce the projectile and fuze he would use if firing service shell; for example: "Shell, Mark I, Fuze long." The range announced is secured by entering the firing table at the supposed gun-target range and securing the corresponding range setting; for example: Estimated range, 1,800 yards. For the French 75-mm. gun the corresponding range setting is 2,840. The range would be sent to the firing battery as "2,800."

A condensed firing table showing range settings for the American 3-inch gun and the French 75-mm. gun follows (page 252).

NOTE: This table is based on experiments conducted at the Field Artillery School and differs somewhat from tables previously published. The column headed "100" gives the change in elevation for 100 yards change in range.

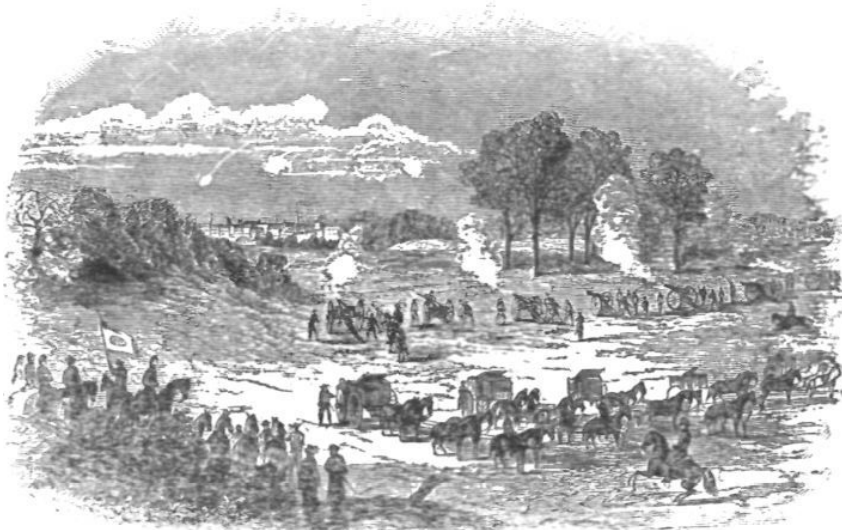
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## SHELL, 37-mm.

Range	Elev.	100	Fork	Ep.	3"	Setting	75-mm.			
500	:	11.7	:	3.8	2.6	17	:	720	:	685
600	:	15.6	:	3.9	2.7	:	:	875	:	850
700	:	19.7	:	4.1	2.8	:	:	1025	:	1020
800	:	24.0	:	4.3	3.0	:	:	1175	:	1180
900	:	28.5	:	4.5	3.2	:	:	1325	:	1350
1000	:	33.2	:	4.7	3.4	18	:	1475	:	1515
1100	:	38.1	:	4.9	3.6	:	:	1625	:	1675
1200	:	43.2	:	5.1	3.8	:	:	1775	:	1840
1300	:	48.5	:	5.3	4.0	:	:	1925	:	2005
1400	:	54.0	:	5.5	4.2	:	:	2075	:	2170
1500	:	59.7	:	5.7	4.4	19	:	2230	:	2335
1600	:	65.6	:	5.9	4.6	:	:	2380	:	2505
1700	:	71.7	:	6.1	4.8	:	:	2535	:	2670
1800	:	78.0	:	6.3	5.0	:	:	2690	:	2840
1900	:	84.6	:	6.6	5.2	:	:	2845	:	3005
2000	:	91.5	:	6.9	5.5	20	:	3005	:	3170
2100	:	98.6	:	7.1	5.8	:	:	3165	:	3335
2200	:	106.0	:	7.4	6.1	:	:	3330	:	3505
2300	:	113.7	:	7.7	6.5	:	:	3490	:	3670
2400	:	121.7	:	8.0	6.9	:	:	3650	:	3845
2500	:	130.0	:	8.3	7.3	22	:	3815	:	4015
2600	:	138.6	:	8.6	7.8	:	:	3980	:	4190
2700	:	147.5	:	8.9	8.3	:	:	4145	:	4360
2800	:	156.7	:	9.2	8.8	:	:	4315	:	4535
2900	:	166.2	:	9.5	9.3	:	:	4480	:	4705
3000	:	176.0	:	9.8	9.8	25	:	4650	:	4875
3100	:	186.1	:	10.1	10.4	:	:	4820	:	5045
3200	:	196.5	:	10.4	11.1	:	:	4990	:	5210
3300	:	207.2	:	10.7	11.8	:	:	5160	:	5375
3400	:	218.2	:	11.0	12.5	:	:	5325	:	
3500	:	229.6	:	11.4	13.2	29	:	5500	:	
3600	:	241.3	:	11.7	14.2	:	:	5670	:	
3700	:	253.3	:	12.0	15.2	:	:	5840	:	
3800	:	265.7	:	12.4	16.3	:	:	6005	:	
3900	:	278.5	:	12.8	17.4	:	:	6170	:	
4000	:	291.7	:	13.2	18.5	35	:	6335	:	

## SERVICE PRACTICE WITH 37-MM. SHELL

After the initial data have been announced, procedure should be exactly as though firing service ammunition at the range setting used. For example: If the first shot or salvo fired at range setting of 2,800 is sensed "short," the next range announced is 3,200 or 3,000, depending on how the initial range was determined. The fact that a change of 200 or 400 on the range setting does not give as great a change in yards on the ground may result in several shots or salvos in the same sense before a bracket is obtained, but there is no loss in instruction value. Similarly, if the target is, for example, infantry in the vicinity of a lone tree, the sheaf is converged on the tree during adjustment. The change to an open sheaf (75 to 80 yards between flank bursts) for effect is computed by dividing 27 (the number of yards desired between bursts) by 1/1000 of the range setting being used, and opening this amount on an interior piece, exactly as would be done if service ammunition were being used. With 37-mm. ammunition this will result, of course, in a sheaf narrower than 75 or 80 yards, but again there is no loss in instruction value.



**KILPATRICK SHELLING RICHMOND**

## ON THE BORDER WITH THE 82nd (HORSE?)

BY LIEUTS. O'KEEFE AND BARNES, 82ND F.A. BN.

THE ONLY "Horse Artillery" we have taken into position so far consisted of the Provisional Armored Railway Car Platoon. This is composed of two cars built the same size as ordinary box cars of half-inch steel. On top there is a box-like depression about 3 feet deep in which a British 75 is mounted. Besides this armament each car carried four automatic rifles, one machine gun and a crew of one officer and six men armed with pistols—we were "armed to the teeth" as it were. Inside, the cars were equipped in de luxe style. There were water coolers, lavatories and bunks. The only hardship we had to put up with was the lack of electrical facilities.

During the first week in March, rumors were constantly coming in that the rebels were marching on Juarez, that we were going to cross the Rio Grande, etc., etc. At two o'clock on March 7 our sergeant major broke up a session of the cooks and bakers' school with the news that the armored cars were to get ready to move at once. All the cavalry officers dashed off to their troops to make the preparations to get under way immediately in case they also received orders. We had the cars loaded and were ready to pull out within an hour. Then, much to our disgust, Major Sands, our battalion commander, arrived with the news that we had only gone through a "dummy run" to see how quickly we could get ready. On the following day, however, we saw the wisdom of his action, for an order came down from division headquarters that we were to load up and be ready to move in half an hour. Due to our practice the day before, we were able to be on the cars in even less time than that, and we were soon on our way to El Paso.

We went into action on a spur of track directly across the river from Juarez and proceeded to fight off photographers, urchins, etc., for the rest of the afternoon—quite a job, too. Certain cavalrymen suggested that we might show the proper spirit by sending our first shell through "Nick's" and blow up some of the "cold" checks he has. Juarez looked so peaceful that it seemed as if it would be just like striking your grandmother to send a shell over there. We could pick out machine guns which the Federals had perched on top of

## ON THE BORDER WITH 82ND (HORSE?)

buildings. The Mexicans are clever when it comes to selecting tactical positions. The night passed quietly with the exception that one of our cars jumped the track when the engine moved out to get water. With the aid of the S. P. we coaxed it back on the track again and were all set for whatever might arise during the coming day.

At six o'clock in the morning we were awakened by the sound of rifle and machine-gun fire. We dashed up on top of the cars to get an eyeful, only to discover that a fog hid the opposite bank from our view. At sunrise, however, the fog rose, and we found that we had box seats for the whole comedy. The Federals, with their usual sagacity, were defending the south bank of the Rio Grande, giving the rebels the entire town with scarcely a shot having been fired in its defense. The strategy of this position lay in the close proximity of the bridges, which offered a safe means of retreat into the United States, and also in the hope that the rebels in their attack would fire so many shots toward El Paso that our government would be forced to send over forces to drive them out. The Rebel commander understood the situation as it pertained to Uncle Sam and foxed the Federals by coming in on both flanks, thereby keeping most of the bullets in Mexican territory. The action was spasmodic, and during the lulls standard bearers would dash madly up and down the river bank, while detached horsemen or groups of cavalry would gallop aimlessly up and down. The Blue Cross had established their dressing stations on this side, so that as soon as a Federal was wounded he would come across the river to receive treatment. One soldier came across grinning like a Cheshire cat; his trigger finger had been hurt, so he figured he couldn't fire a rifle and therefore had a perfect right to seek safety. It was far from being a "determined resistance until three-fourths of the garrison were dead." In fact, I am only sure that one man died, and he was a Second Lieutenant who died of wounds in Wm. Beaumont Hospital (the second lieutenants get the worst deal in every army, anyway).

On the cars we devoted our time to observation and to getting the various ranges to Harry Mitchel's, Fort Hidalgo, the Brewery, etc. The refugees were constantly coming across the bridges. We even saw several women wading across, some carrying babies, others holding their dresses up. Most of the men were hoping that

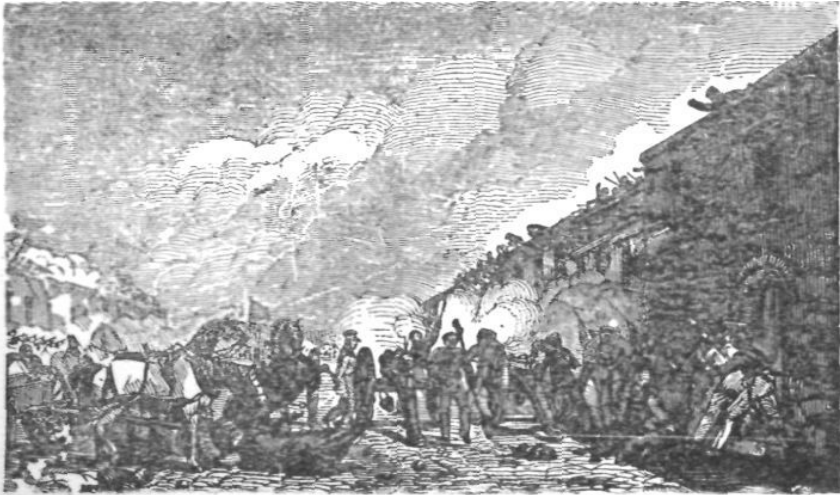
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we would get a chance to go across and show the Mexicans how they really should fight. General Moseley spent most of the morning on the other side of the river with his staff, and finally arranged the truce which ended with the internment of the Federal army at Fort Bliss. This "army" incidentally consisted of three generals, seven colonels, and eleven assorted officers, with an enlisted strength of three or four hundred, which included the men, their wives, children, dogs and chickens.

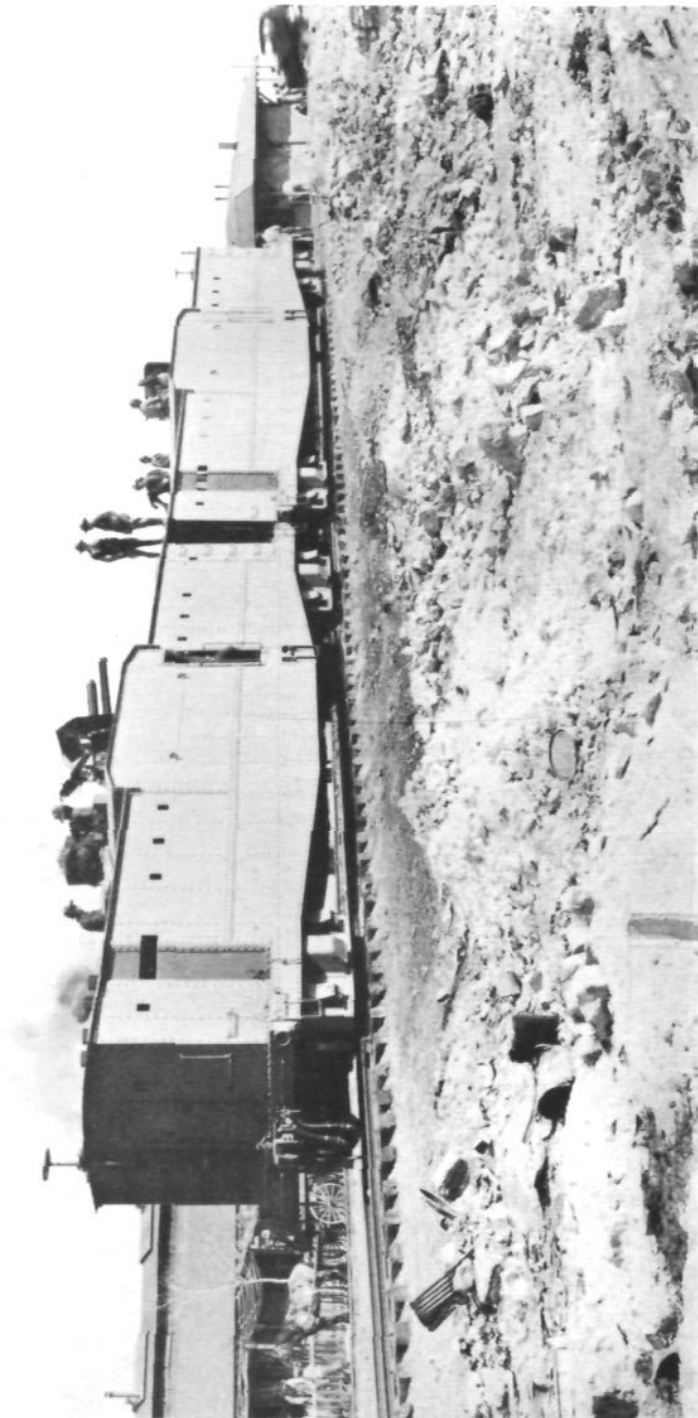
The battle being thus peacefully concluded, we returned to Fort Bliss, where we dropped back into the old routine again and were able to attend "beer call" at the regular time under the rebel régime.

Juarez remained quiet for a month, and then the news arrived that the Federals were advancing to recover the city. We received word at two o'clock, April 9, and by two-thirty we were loaded on the cars and on the way to the river again. We went into position and tried to find some way to amuse ourselves for the next twenty-four hours. The rebels disappointed us and evacuated the city, whereupon we returned to Fort Bliss.

No sooner had we unloaded than we received word that the battalion was moving out the next day for Hachita, New Mexico! That was fine—the "Horse Artillery" would go into action yet. This morning the fates again motorized our prospects. "B" Battery is staying behind, prepared to entrain in case of any emergency. Who said "Horse Artillery"?



U. S. ARTILLERY FIRING IN THE STREETS OF MONTEREY



THE PROVISIONAL ARMORED RAILWAY CAR PLATOON, 82D F. A. BN., 1ST CAV. DIV., COVERING INTERNATIONAL BRIDGE BETWEEN EL PASO, TEXAS, AND JUAREZ, MEXICO

## CLOUDCROFT

THE FIRST Cavalry Division Vacation Camp, situated on the crest of the famous pineclad Sacramento Mountains, at Cloudcroft, New Mexico, will open for its third season on June 1. This vacation spot, 9000 feet above sea level, has become justly famous as a summer resort throughout the southwest. Last summer, at the army camp alone, over fourteen posts and stations were represented by several



hundred officers and their families who spent from ten days to three months there.

The Camp was originated in 1927, under the leadership of Major Gen. Edwin B. Winans, who was then commanding the





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1st Cavalry Division. Brigadier General George Van Horn Moseley, who succeeded General Winans at Fort Bliss, Texas, has likewise been a strong supporter of the camp, and it has been greatly added to and improved under his vigorous guidance. The original purpose of the project, which has been rigidly adhered to, was to provide in the cool and invigorating mountain location, a well-ordered and conveniently equipped camp, where an officer or his family, particularly the latter, could go during the intense heat of summer and be comfortably taken care of at very reasonable rates, well within the means of everyone. In accordance with this basic policy, the rates have been kept unusually low; at the same time comforts and conveniences have constantly been added.

The site of the camp overlooks the summer cottages that constitute Cloudcroft, and at the same time is sheltered from both the gaze of the public and the elements of nature by a dense and beautiful forest of tall pines and fragrant balsams. The surrounding hills are carpeted with mosses, ferns, and wild flowers in profusion. From many points of vantage breath-taking views may be had of the foothills and valleys below Cloudcroft, reaching to the famous so-called "White Sands," the huge beds of snow-white gypsum lying near Alamogordo, New Mexico.

Cloudcroft has the distinction of having one of the highest golf courses in the world, an excellent nine-hole course in a beautiful setting of broad green turf fairways, bordered by giant pines. For those who desire other sports, bowling and tennis are available. Horses may be procured for rides over the many trails and paths that exist in the surrounding country which are likewise interesting to hikers. Good motor roads lead the fisherman to well-stocked trout streams within a radius of 20 miles. Other interesting motor trips through continuous panoramas of untold scenic beauty are readily accessible. One of the most interesting is that through the picturesque and historic Mescalero Indian Reservation, where each July several hundred Mescalero Apache Indians gather to hold their annual religious rites and dances.

The Camp now consists of over forty well-equipped cabins and buildings, scattered among the giant pines. All of the

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structures are finished on the outside with rough bark slabs giving the entire camp a rustic and unique appearance. The camp area and all buildings are electrically lighted throughout. A pressure water system, central water heating plant, conveniently constructed bathrooms with tub and shower baths, a permanent sewer system and well-trained camp orderlies who keep your fires supplied with fuel and completely equip your cabin before your arrival with furniture and bedding ready for you to step into a comfortable temporary summer home, make this truly a camp-de-luxe. In this high altitude insects of any kind are a rarity. Snakes have never been seen at Cloudcroft.

Meals are served at convenient hours in the long central dining room. Here guests with vacation-like sleepiness may obtain breakfast ordered to their individual tastes and wishes, as late as 9:00 o'clock. An exceptionally high standard for the mess has been established in 1927 and 1928, the reputation of which has spread far and wide. At one end of the dining room there is a cozy recreation room, with a huge fireplace.

Cloudcroft has in recent years earned the sobriquet of "Babies' Paradise." This is due to several contributing causes, the major one, of course, being the matchless climate, with its sunshine, coolness and freshness. Coupled to this is the "Baby Sanatorium," conducted by an organization of El Paso, Texas, doctors. Here hospital facilities for babies and trained nurses capable of preparing special diets and of giving all necessary treatment are available at all times. In addition to the local doctors, an army medical officer is maintained at the vacation camp at all times throughout the summer, so that expert medical attention is constantly available.

Realizing the asset she has in Cloudcroft, the State of New Mexico has in the past year spent large sums of money in improving the several highways leading to this resort. During the current month a new highway from La Luz to High Rolls, New Mexico, 8 miles from Cloudcroft, will be opened to the public. This new road, leading up into the Sacramento Mountains from the excellent National Old Trails Highway, is in itself a scenic trip hard to excel. With a gentle grade, wide, smooth roadway and well-banked curves, this road reduces

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the dangers of mountain driving to a minimum. During 1929, the remainder of the highway from High Rolls to Cloudcroft will be improved, widened and smoothed. The Southern Pacific branch line from Alamogordo, New Mexico, to Cloudcroft, connecting at Alamogordo with the Apache Flier, offers in itself an unequalled scenic trip. A railroad of engineering marvels, it winds and twists its way over "switchbacks," "S" bridges and lofty trestles. Since its inauguration nearly thirty years ago no fatal accident has occurred on this line. Last winter trips were made daily, despite heavy snows. During the summer season there are no snows and the roadbed is kept in perfect condition.

The Camp has been so managed for the first two years of its existence that the expense to guests has been kept sufficiently low to make it possible for everyone to take advantage of it. This has largely been made possible through the financing and supervision the Post Officers' Club of Fort Bliss has maintained. The club secretary is charged with the keeping of the camp records and is prepared to furnish information relative to the Camp. Whereas the Camp is sponsored by the 1st Cavalry Division and the Fort Bliss Officers' Club, a hearty welcome is extended, not only to officers of the 1st Cavalry Division, their friends and families, but also, up to the capacity of the Camp, to service people everywhere. Visitors of past years are looking forward eagerly to the opening of the 1929 season.



HAND-TO-HAND FOR RICKETT'S GUNS

# STATUS OF FIELD ARTILLERY COMMISSIONED PERSONNEL

(ON APRIL 1, 1929)

Duty in command of troops .....	745
O.C.F.A., F.A. Board, Liaison Officers .....	21
F.A.S., Staff and Faculty, F.A. Instrs., at other schools .....	43
School duty, branch .....	116
C&GSS, Staff and Faculty .....	8
C&GSS, Students .....	37
Army War College, Instructors .....	4
Army War College, Students .....	14
Naval War College, Student .....	1
Oriental Language, Students and Instructors .....	4
Quartermaster Subsistence School, Students .....	2
United States Military Academy .....	38
Reserve Officers' Training Corps .....	105
National Guard .....	78
Organized Reserves .....	95
General Staff .....	35
Military Attachés .....	9
Detailed to other arms .....	52
Aides-de-Camp .....	13
C.M.T.C. Officer, C.A. Headquarters .....	1
Assistant to G-2, 9th Corps Area .....	1
Disciplinary Barracks .....	4
Recruiting .....	7
Total in branch .....	1433



NAPOLEON'S COMBINED O. P. AND C. P. AT THE BATTLE OF THE PYRAMIDS

## FIELD ARTILLERY COMMISSIONED PERSONNEL

### FIELD ARTILLERY OFFICERS ON OTHER DUTIES

Office Chief of F.A. ....	11	C. A. Hqs. ....	0
Field Artillery Board .....	8	Organized Reserves .....	95
Liaison Officers .....	2	1st C.A. ....	11
F.A.S. Staff and Faculty .....	40	2nd C.A. ....	11
F.A. Instrs. at other Schools .....	3	3d C.A. ....	7
School Duty Branch .....	116	4th C.A. ....	12
F.A.S. Adv. C. ....	25	5th C.A. ....	11
F.A.S. Adv. Equi. ....	5	6th C.A. ....	8
F.A.S. Adv. Motors .....	4	7th C.A. ....	12
F.A.S. B.O.C. ....	69	8th C.A. ....	11
A.C. School .....	2	9th C.A. ....	12
Cav. School .....	1	National Guard .....	78
S.C. School .....	4	Militia Bureau .....	3
Yale Univ. ....	1	1st C.A. ....	6
U. of Pa. ....	2	2nd C.A. ....	8
Infantry School .....	3	3d C.A. ....	9
C.&G.S.S. Instructors .....	8	4th C.A. ....	8
C.&G.S.S. Students (2 year) .....	35	5th C.A. ....	6
C.&G.S.S. Students (1 year) .....	2	6th C.A. ....	9
A.W.C. Instructors .....	4	7th C.A. ....	8
A.W.C. Students .....	14	8th C.A. ....	10
Naval War College .....	1	9th C.A. ....	8
Oriental language students .....	3	C.A. Hqs. ....	3
Q.M. Subsistence School .....	2	General Staff, W.D. ....	13
U. S. M. A. ....	38	General Staff, Troops .....	22
R. O. T. C. ....	105	Military Attachés .....	9
Harvard .....	5	Detailed to other arms .....	52
Yale .....	3	Air Corps .....	25
Princeton .....	7	Finance .....	0
Cornell .....	5	C. W. S. ....	1
V. M. I. ....	3	Ordnance .....	9
Alabama .....	6	Q. M. C. ....	6
Culver .....	2	Signal Corps .....	3
Purdue .....	11	J. A. G. ....	2
Ohio .....	7	I. G. D. ....	6
U. of Chicago .....	3	Aides-de-Camp .....	13
U. of Ills. ....	6	C.M.T.C. Offr., C.A. Hqs. ....	1
Iowa .....	7	Asst. to G-2, 9th C.A. ....	1
Missouri .....	6	Disciplinary Barracks .....	4
Colorado .....	5	Recruiting .....	7
Oklahoma .....	8	Instr. Oriental Language .....	1
Texas .....	4	Total other duties .....	688
Stanford .....	4	Duty in command of troops .....	745
Utah .....	5	Other duties .....	688
Oregon .....	4	Total Branch .....	1433
Florida .....	4		

# THE CONDUCT OF WAR

BY MARSHAL FERDINAND FOCH

AUTHOR OF "THE PRINCIPLES OF WAR"

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

*(Second Installment)*

## CHAPTER II

### FORMATION OF A PLAN OF WAR

IN THE preceding chapter we have seen how Clausewitz and Moltke, in determining the direction for the German offensive, took into account our political situation as well as our national history. They undertook to defeat the principal French armies, take Paris and advance to the Loire, thus gaining the objective of the War. We have also had a glimpse at the preparations made in time of peace to assure sufficient power of penetration to this offensive; and we have viewed the outlines of a plan by means of which the Germans might have been thwarted by proper military employment of Gambetta's National Army.

Thus elaborated, the German plan consisted of the preparation and disposition during times of peace of the instrument which was to carry it out—the army, the necessary provisions for its maintenance, and the means of conducting it to the field of battle. The first points to be settled are therefore the organization, mobilization, transportation, concentration and rationing of troops.

This is made the business of the general staff during peace time and is summarized by Moltke as

"The mission of studying in its most minute details the assembly and means of transport in the event of war, the massing of troops, and the preparation in advance of the necessary plans of action." He continues, "Once an army is in movement, military considerations will be influenced by innumerable other considerations both political and geographical. But since each disposition can be discussed well in advance and a decision reached before troops are ready to commence the campaign and before the transportation service is organized, the desired result can be obtained."

## THE CONDUCT OF WAR

Therefore we see that dispositions relating to the transportation of troops are assigned a very important place in the plan of war. They mark, in comparison with the war of masses as waged in the beginning of the nineteenth century, a great modification, due to the employment of railroads.

Railways permit the rapid concentration on the frontier of millions of men, and make possible the immediate employment of all the resources furnished by mobilization; because of this, the first contacts with the enemy generally become the decisive actions of the campaign, and take on a gigantic importance peculiar to this epoch, while the other operations of the campaign assume proportions of the battles of 1805, 1800 and even 1796. The first operations have gained in importance, in rapidity, and in precipitation. They have consequently made necessary a careful mobilization, a concentration very thoroughly worked out in every detail in time of peace, a covering force functioning from the moment the political crisis arises; and finally a series of operations, the principles governing which are established by Napoleonic warfare, but whose details of execution must be worked out in accordance with circumstances.

Furthermore, when millions of men are massed in close proximity to the enemy and ready for immediate battle, the old formula "*disperse to live, unite to fight*" cannot be put into practice. Its application guarantees neither of these results. Armies march and live in concentrated masses and their supplies must be furnished from a base in the rear. The old system of mobile bases, which was superseded by the system of requisitions in force during the Revolution, becomes once more necessary. It springs up again as an outgrowth of the National Army.

Careful provision in time of peace must be made by special organizations in order to insure the functioning of the service of supply in war, and they must be incorporated in the plan of every campaign.

The exigencies and effect on operations of the service of supply are manifest. Since railways, at the commencement of operations, are necessary for the supply of the army, the latter cannot move too far away from them. Also it is evident

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that in case of a reverse the army must retreat towards the zone of the interior, where it can procure its supplies. This territory thus becomes a natural base of operations for the armies in the field, and its railways become obligatory lines of communication. Furthermore, in addition to the capital, which is the seat of the government and is easily separated from its armies, the value of other great centers of the nation is manifest; in this category are the seaports and the rich provinces where the army will find the means of maintaining itself and of protecting the government provided always that the government is willing to follow along with the army. So a national war, developing logically for the necessities that arise, reduces the role of the capital as an objective of operations and substitutes therefor objectives more truly national in character.

After studying in detail the plans for mobilization, dispositions for covering troops, transportation, concentration and supply, which have been thoroughly worked out beforehand over a long period of time, we are too often tempted to seek in a plan of war a complete program of operations permitting the attainment of the purpose of the war. With respect to this point no delusions should be made—Moltke himself writes as follows:

"When it comes to putting our strategy to the test in the use of forces in war, when we are concerned with the employment of the means of action, that is to say, with operations, our own dispositions soon collide with the dispositions which the enemy himself has determined to carry out. The latter can, it is true, be modified and changed if, in good time, we are prepared to take the initiative, but nevertheless combat remains the only means of rendering them ineffectual. The material and moral consequences of every important action are such that the original situation is often completely reversed, and what results is a new basis for new combinations. It is impossible to determine with any degree of accuracy the course of a plan of operations beyond the first encounter with the main body of the enemy. Only one lacking in all knowledge of military art would believe it possible to view all the developments



## THE CONDUCT OF WAR

of a campaign as the execution of a plan prepared in advance in every detail and faithfully carried out to the end. Assuredly a commander has always before his eyes the real purpose of the war and the end which he is pursuing; he will not lose sight of it no matter what alternatives confront him, but he can never foretell with certainty the devious ways by which he will attempt its attainments."

To sum up the preceding:

1st: It is possible to make preparations with some degree of certainty up to the first battle, or until contact with the main body of the enemy occurs, because until this moment both sides are free, and the situation of the two adversaries is unchanged; each is therefore master of his acts—neither is winner, neither is loser.

2nd: Preparation is of great importance in the following ways: by its influence on the result of the *decisive battle*; by its influence on the *premises* upon which are based the development of the plan of war after the first important battle. The development of a favorable plan is possible if the outcome of the first decisive battle has been favorable, impossible if the contrary is the case.

We cannot always assume that the first victory will settle everything or even that it will allow an opportunity for the correction of a faulty plan.

"It is only with great difficulty," says Moltke, "that the mistakes made in the initial concentration are corrected during the course of a campaign."

As we have seen above, Metz and even Sedan were merely tactical victories; and had the French fallen back on Paris and the Loire everything would have had to be done over again by Prussia.

3rd: It is impossible to make a plan of operations that will hold good beyond the first battle. At this point the respective situations of the two adversaries have become modified and must be studied again in view of the results of the battle.

The victor only is able to carry out his plans in spite of the efforts of the enemy; his dispositions rest upon a solid basis which the adversary does not possess.

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Supremacy will be gained by that side which is more prompt to take advantage of the situation. For this reason a very simple understanding of the rules of war leads two adversaries to seek a big battle, a decisive action.

In any case battle is sought by the side which possesses the most decision and has the most confidence in its own troops. Therefore the first objective of all armies is the main body of the enemy, because from this contact emerges victory or defeat, and a new basis becomes established upon which new combinations can be made. To quote Von der Goltz:

"Everything is not won at the first big battle.

"Even if defeat forces the loser to submit to the will of the winner, the will of the loser is still not thereby destroyed.

"Victories such as Sedan, where an entire army was dispersed in one battle, are comparatively rare. Generally the will of a defeated adversary continues to exercise considerable influence over the movements of a victor. In spite of his defeat at Woerth and the wretched condition of his army, MacMahon was still able, after receiving reinforcements at Châlons, to force the Prussians to abandon their march on Paris and retreat towards the frontier.

"Victory in itself, then, fails to give absolute certainty to the enterprises of a commander. He is forced to take into account the circumstances of the moment and the various adverse influences which may arise. The former will inevitably lead to new battles; the latter will change the military situation in much the same manner as a touch changes the images of a kaleidoscope. A good general will therefore change his arrangements daily or even hourly to conform to these new combinations."

To develop a strategic plan by progressing step by step from one event to another, constantly modifying operations in accordance with the demands of circumstances; to advance always in the predetermined direction, towards the objective selected as the final goal of all efforts, after an exhaustive study of the political and military situation; to preserve undimmed the vision of this goal no matter how difficult and

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tortuous the road to its attainment—these are indeed things which cannot be prepared in advance, particularly as regards the details of their execution.

A plan of war, therefore, very soon ceases to be a plan of operations in the field. This fully justifies the Emperor's saying that he never had a plan of operations. He was certainly very far from meaning that he did not know where he was going.

He had his plan of war and his final goal. He advanced, determining always the best means of reaching this goal in accordance with events as they occurred. His measures always comprised: (a) Dispositions considered carefully beforehand, and complete in all details of execution, which could be relied on to lead up the first battle without any great modification; (b) the consequent development of a guiding idea regarding the conduct of the war which would guarantee the attainment of the final goal, i. e., the overthrow or domination of a government or the occupation of territory after a series of operations launched in accordance with the demand of circumstances, and having as their primary motive the defeat of the enemy's army.

This is the only sort of program of war that should be incorporated in a plan.

Such was the plan of war which Moltke worked out in the winter of 1868-1869, in order to put it into execution in 1870.

## CHAPTER III

### PREPARATIONS IN TIME OF PEACE

#### CONCENTRATION

#### REUNION OF FORCES IN SPACE

Moltke's dispositions are contained in a memorandum which he submitted to the King of Prussia for his approval in the winter of 1868-69, and also in certain instructions addressed to the General Staff in Berlin during the Spring of 1870.

These first dispositions contemplate the operation which we improperly call "concentration," and which the German

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expression, "strategic deployment," is also far from describing correctly. In the language of Napoleon this operation is called the *reunion of the army*, and it involves the location of forces in both *space* and *time*.

*In space* because the first encounters—premises from which the whole plan of war are logically developed—will be planned to take place at some predetermined points and not at random. "It is only with the greatest difficulty that a mistake made during the initial concentration is corrected during the course of an entire campaign" (Moltke).

*In time* because the adversary who is the more prompt in his concentration approaches that much nearer to victory both because of the opportunity for initiative which is afforded him and because of the confusion which is bound to result in the operations of the enemy.

Thus, according to Von der Goltz:

"An advantage of three days in concentration would enable the French to invest Metz and Thionville without striking a blow, to advance without difficulty to the Saar, to cut the communications of Strasbourg and force the German Army to make its concentration on the same terrain as in 1870."

Returning to our consideration of Moltke's memorandum, we observe that he commenced by a careful evaluation of the forces of both opponents.

North Germany had thirteen army corps of which only ten could be used because she had to retain three at home to guard the coast and also to keep watch on her neighbors (political and geographical considerations such as these will always contribute to the complexity of the military situation at the commencement of operations). Altogether Prussia could count on 300,000 combatants.

France did not have more than 250,000 and the superiority of North Germany would have been still greater:

- (1) If South Germany could be influenced to join her.
- (2) If she could use her three additional army corps which were provisionally to be left at home.

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(3) If the French would weaken themselves by detaching from their 250,000 men an expeditionary force to operate alone.

This reasoning is in sharp contrast to that of the French and of theorists who sought victory by a ruse or diversion attempted at the risk of weakening their own forces.

Moltke, following the example of Napoleon, placed his reliance on mass. His armies, united and as strong as it was possible to make them, were all to be employed in the same direction, numerical superiority being a certain means of attaining the end sought, namely, the destruction of the enemy. On the other hand, any disembarkation of troops made by the French on the coasts of Germany could not by any means contribute to the destruction of the German army, and would be certain to render more easy the destruction of the French army.

After assuming this superiority of forces from the beginning—a superiority which could even be increased—Moltke's memorandum goes on to describe how it could best be utilized *in an attack*:

"It is most important that the great superiority of the forces possessed by Prussia should be used at the start."

How? Simply by attacking in order not to permit the enemy time to make good his numerical inferiority. The concentration will therefore contemplate attack; but while this attack is being prepared in one direction it is possible that Prussia may herself be the object of an attack by the enemy from some point or points unknown. What is the remedy?

1st: "With regard to an attack by the French along the coast," says Moltke, "sufficient forces to repulse it would be left in the interior."

2nd: With regard to the possibility of a French attack on South Germany, let us quote Moltke's own words again:

"As to operations against South Germany, conferences on this subject with the representatives of the South German provinces have already taken place at Berlin and it was agreed that in the event of a direct defense of the upper Rhine and the Black Forest becoming necessary, the

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distances involved would preclude Prussia's rendering any immediate assistance, and much greater security to Southern Germany would therefore result from uniting all her forces on the middle Rhine, whence they could initiate offensive operations, either from the right or left bank against the flank of an invading army. This would of necessity make the enemy either halt or retreat.

"It is worth while to note that in taking this stand the German Princes gave evidence of their devotion to the common cause and their confidence in superior command, for they did not hesitate to strip their own territory of all the active forces at their disposal in order to unite them immediately with the Prussian Army."

The experience of 1866, skillfully exploited by Moltke, had convinced them of the necessity of uniting under a single command.

Well may we exclaim that lessons of patriotism are often lessons of strategy! The Chief-of-Staff sought the protection of the threatened provinces by the use of massed forces which were ready for immediate attack elsewhere. Furthermore, he depended for this protection, first, on a carefully selected position, and afterwards on a flank attack.

He put to good use the teachings of Bonaparte, who said:

"To cover Genoa, Beaulieu should have acted *indirectly* by uniting all of his forces between Acqui and Cairo on the left flank of the assumed French march on Genoa by the Corniche road.

"After Montenotte the Piedmontese, instead of occupying Millesimo, should have remained at Deigo and united with the Austrians. In this manner they would have been able to cover Turin indirectly because they were on the flank of the road leading to that city and their union with the Austrians would have diminished the French chances of a victory."

The zone of assembly chosen by Moltke presented, besides, the advantage of placing Prussia, and therefore the line of communications, as much under cover as was possible.

From this it is clear what rôle the idea of defense or protection

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should play in modern warfare: The idea of defense or protection may be defined as the reunion of all available forces on the enemy's most favorable line of attack. The position selected should cover either directly or indirectly the more important points of the country, so that the enemy may not threaten these points without first inviting a conflict with our whole force.

The matter of protection of territory should be handled as in the case of South Germany in 1870, or Genoa and Turin in 1796. Immediate or direct protection, which so often is ineffectual, thus becomes unnecessary. History shows us that Brunswick, after the battle of Valmy, was master of the road to Paris. Yet in spite of this he was unable to make any advance on the capital, and after being repulsed in his attempt of September 20th, he was forced to retreat rapidly to escape destruction. Without *victory* nothing is accomplished. We should therefore cast aside secondary considerations and maintain at all costs a clear view of our objective and the means of attaining it, namely mass, and as strong a mass as possible. It was Napoleon who said, "There are many good generals in Europe but they see too many things. As for me, I see only one: the enemy's masses. These I seek to destroy, knowing that afterwards the accessories will fall of themselves."

Our war plans should never comprise a parcelling out of the defense of France into separate parts such as Paris, the coast, Cotentin, Province or other threatened frontiers. Security for all these points will result from the uniting of all forces in a central position whence they can take the offensive against any army of invasion. We can learn this from Moltke himself.\*

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\*The same idea should apply in regard to protecting local, maritime or continental interests. National defense—*Salus populi suprema lex*—should not take these interests into consideration except in so far as they affect the conduct of war as a whole. National defense should put all its efforts both by land and by sea towards one act, namely, the encounter with the adversary's main force. To do otherwise would simply be weakening our main effort in order to give secondary interests a momentary protection; it would only be preparing an ultimate ruin and secondary interests themselves would fall. As an example of this, local interests only, and they are no more important for one place than for another, would require the special protection of Marseille or Havre, of Toulouse or Chalons. On the other hand, at points where the unison of forces or the action of the mass is contemplated, protection should be efficacious, certain and well provided. This applies also to combined land and sea operations. In each of these cases one should consider whether national defense would not be better served by increasing offensive means and thus providing an indirect defense rather than by developing a defensive organization.

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3rd: With regard to the fact that the French were still able to violate the neutrality of Belgium, Luxembourg, or Switzerland, Moltke said, "If the French advance through Belgium they must of necessity weaken their army considerably by detachments left at Brussels and before Antwerp.

The enemy's advance beyond the Meuse could more easily be opposed from the Moselle than from Cologne, because he would thus be forced to change front to the south and fight a decisive battle with his communications in danger."

The French would therefore be exposed to a decisive battle against united forces and at the same time threatened by the further aggravation of a flank attack on his lines of communication. Could they avoid this battle? Answer:

"The distance between Brussels and Cologne being greater than that from Cologne to Mayence, Kaiserlautern or Treves we shall always be able to reach the lower Rhine considerably before him." The logic here is irrefutable.

The violation of Swiss neutrality was also fraught with danger and "would involve the French in the greatest difficulties because they would encounter an excellent and well organized militia." Therefore the French army could not advance as long as its flanks were threatened.

If the French reasoned correctly, they would not undertake to land troops on the German coast. Nor would they have gained anything by violating the neutrality of Belgium or Switzerland; but if, on the other hand, they had been so foolish as to attempt either of these combinations, this attack could best have been opposed by a single concentration without the use of detached forces.

As a matter of fact there was no variant; no South German, Swiss, Belgian or coastal expedition.

The answer to all these hypotheses was an offensive with united forces, commencing with a single concentration at a predetermined central point, and so organized as to permit all forces to unite as quickly as possible and then advance to the attack. This was the only means of meeting the danger of a French invasion through Switzerland, Belgium, or South Germany.

This concentration, once completed, was to develop into



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an offensive which could be directed against those points which were considered most dangerous. The concentration therefore possessed not only a front but also depth. In other words, it had lines and joints as we shall soon see.

From the past let us turn to the future. Let us, in other words, attempt to apply this principle of Moltke's to the concentration for the next war.

Will we observe two German offensives in process of preparation, one in Alsace-Lorraine, the other on the Lower Rhine? We would then be justified in believing that two attacks are to be launched, so separated in space as to be entirely distinct from each other. This is, however, unthinkable.

Again one may say that an attack on a single front, in order to escape the obstacles of our forts, could be delivered to better advantage from the Lower Rhine and through Belgium rather than across Alsace-Lorraine. This is not to be expected because the concentration must have as its first object the reunion of all forces with the least possible delay; it necessitates, moreover, the maximum usage of railways, and loading platforms, etc., etc. It must therefore incontestibly be effected in the region best provided with them. From this point of view the Lower Rhine is not to be compared with Alsace-Lorraine.

The concentration of the future is written on the terrain by the number and density of railway ramps and platforms. They are thick in Alsace-Lorraine. There are also other considerations which obtrude as we shall see.

At any rate, if the Germans, blind to their own interests or guided by considerations of which we are ignorant, determine to violate Belgium or Swiss neutrality, we are certainly able to sum up the advantages which would accrue to us from such a procedure:

1. Aside from the obstacles which these small nations themselves might be expected to interpose in their path, the German army must still be depleted by detachments left at Brussels or Antwerp.

2. This would offer us the opportunity to make a flank attack on them with united forces, provided that we have kept in mind, and developed: (a) The union of all forces in a single

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army unweakened by detachments sent on other missions; (b) the concentration of our forces in only one region and that the region best provided with railways and military loading ramps (means of completing the concentration in the least time); (c) the advantages of a deep concentration area of such a form as to permit its facing north, east, or south as necessity demands.

Confronted with this master principle, all tempting hypotheses about threatened frontiers disappear as soon as they arise. Furthermore, as in the case of South Germany in 1870, their defense would gain no immediate or considerable advantage; on the other hand, "the free disposition of *all* forces which would be held in reserve until ready to be launched into active operations" would solve all problems connected with defense.

Let us return to the zone of this single concentration which is capable of responding to all eventualities which may arise. This zone must be centrally located, and, as we have seen above, provided with railways in sufficient quantities to permit rapid entraining and movement in any direction desired.

This army, after concentration, would have as its first objective the main body of the enemy, and consequently the concentration should be faced towards its presumed zone of reunion, making use of the railways therein to accomplish this reunion with the least possible delay. This point is brought out very clearly in Moltke's memorandum, as follows:

"If the French wish to use their railways to the best advantage in speeding up the concentration of their army they must detrain at Metz and Strasbourg in two columns separated by the Vosges."

These two masses could only unite by marching while the concentration of the German forces in one body in the Palatinate would permit them to attack in turn each of the two armies of the French before their junction could be accomplished. If, on the other hand, Germany should be forced to take the defensive against two invading armies, "We hold," says Moltke, "the interior line of communications between the two groups." This combination involves the idea of

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strategic defense. However, when Moltke was led by circumstances to consider this question it is by a very different maneuver that he would meet the attack of the French. He seems never to have thought of an operation on interior lines, which, as a matter of fact, would have presented serious difficulties, considering the masses which he had to maneuver. Finally, it was by making full use of the time gained, by the promptness with which he obtained results, and by attacking that he counted on preventing the French from uniting their armies and thus gaining the initiative of the offensive. It was clear that they could only unite by advancing.

He said in fact:

"The union of all (German) forces in the Palatinate covers both the Lower and Upper Rhine and permits us to launch an offensive in the enemy's own territory, which, if undertaken in time, would render impossible a French invasion of Germany from any direction whatsoever."

To counter every move possible to the enemy by an offensive which employs *superior* and *united* forces against an enemy both inferior in point of numbers and *divided* by the terrain is indeed strategy of the first order.

It is to the element of *time* that Moltke trusted for the opportunity to launch this offensive—the outgrowth of his mobilization plan prepared in the most minute detail and accompanied by a schedule of transportation which allowed each corps to know in advance the day and hour of both its departure and arrival.

Thus we see Moltke set his whole army in movement, not in the manner of Napoleon by a swift reunion on the very eve of the campaign, but according to a plan which had been carefully worked out a long time in advance by his extraordinarily efficient general staff. Nevertheless, his results are far less certain than those of the Emperor, because they were limited by the amount of preparation which Moltke was able to direct.

Furthermore, no matter whether defensive or offensive operations are planned, a concentration must be made in a region where the troops can be fed. It must also take into account both the direction of the proposed attack and that of

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the possible line of retreat. The railways which make possible concentration can generally be relied upon to supply rations for the troops involved, provided always that, in case of defeat, the retreat is made on the most important part of the territory—in other words, provided the zone of concentration is in front of this region.

Thus in the case of France it would appear that concentration should take place at a point somewhere on the line Chateau Salins-Clermont Ferrand. This point should be determined later by the question of time.

This concentration should also cover the threatened frontiers of the provinces. Public opinion has today so much influence that the government cannot afford to leave these frontiers without defense. Besides, the need of their resources and territory would soon make itself felt and any terrain given up to the enemy in this manner would only have to be reconquered later on. However, protection does not mean occupation. This idea must be reconciled with the necessity of uniting all troops for a decisive action; accordingly we must maintain the principle of the unity of all forces, and at the same time guarantee safety to the threatened provinces either indirectly as Moltke protected South Germany in 1870, or by the use of covering troops as will be discussed later. In any case the satisfaction both of political obligations and of military necessity by one and the same arrangement of forces is the task of the general staff from the very commencement of hostilities.

*(To be continued)*

# DECOMPOSITION OF SMOKELESS POWDER

A DISCUSSION OF SYMPTOMS, CAUSES AND EFFECTS

BY C. G. STORM,\* BY COURTESY OF "ARMY ORDNANCE"

It HAS been very appropriately said that "There is no problem connected with modern explosives more important or more elusive than that of their stability." The problem is, however, of special importance only as regards explosives belonging to the class of nitric esters, the chief members of which are nitrocellulose and nitroglycerin. Black powder remains unchanged indefinitely if stored so as to avoid the absorption of moisture. Picric acid, TNT and other high explosive aromatic nitrocompounds have been found to undergo no change whatever on prolonged storage for many years. Nitric esters, however, including both nitrocellulose and nitroglycerin, are inherently subject to gradual decomposition, even under ordinary conditions of storage, and this tendency is increased by an increase in temperature or by the presence of moisture. This decomposition results in a splitting off of oxides of nitrogen, which in turn, combine with oxygen of the air and with moisture to form free nitric acid. The free acid reacts with the mass of explosive causing further evolution of oxides of nitrogen, with the result that decomposition progresses at an accelerated rate. The presence of various impurities in the raw materials used in manufacture, or of unstable nitration products which may be the result of incomplete nitration, also contribute toward this decomposition.

With this knowledge of the tendency of nitrocellulose to undergo decomposition of this nature, all possible precautions are taken in the manufacture of smokeless powder to guard against conditions which may be detrimental to the stability of powder. The cotton used in preparing the nitrocellulose is purchased under specifications which insure, so far as is commercially practicable, freedom from deleterious impurities. The nitrated product is subjected to a very thorough purification or stabilizing process in order to remove as completely as possible all traces of free acid or of unstable nitro-products. The solvent used in colloidizing the nitrocellulose

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is required to meet rigid specifications for purity, and great care is taken to prevent contamination of the product at all stages of manufacture.

As a further means of prolonging the stability life of smokeless powder, all powder made in this country during about the last fifteen years has contained an added stabilizer—diphenylamine—a substance which has a strong attraction for free nitric acid, and which therefore promptly combines with any trace of acidity existing in the powder or resulting from the early stages of decomposition. This removal of the traces of free nitric acid prevents the accelerated decomposition which would follow if the acidity were allowed to remain in the powder.

The diphenylamine is believed to be converted successively by the acid decomposition products to diphenyl nitrosamine, nitrodiphenyl nitrosamine, dinitrodiphenylamine, and trinitrodiphenylamine, several of these compounds having actually been isolated from deteriorated smokeless powders. When the diphenylamine has been "neutralized" by becoming nitrated by the decomposition products, the decomposition of the powder proceeds just as if no stabilizer had been present. It might, therefore, be suggested that the life of powder may be still further prolonged by increasing the content of diphenylamine. There are, however, serious objections to such a proposition. In the first place, the ballistics of the powder would be affected. Diphenylamine being substantially an inert substance, any increase in its content would require an increase in the weight of powder charge, with corresponding increase in density of loading in the powder chamber. There is considerable objection to this, particularly in guns having relatively small chambers. In addition to this objection, excessive amounts of diphenylamine (10 per cent, for example), have been shown actually to decrease the stability of powder, because of the basic nature of diphenylamine. The content of diphenylamine prescribed during the World War—0.5 per cent—has, however, since been increased to 1 per cent in all Army powders, and exhaustive tests have indicated that this increase will be beneficial to the stability of the powder.

Properly manufactured nitrocellulose powder carefully protected from outside influences and stored under normal conditions will remain stable for a long time. Prior to the introduction of a stabilizer, it was estimated that service powder should remain in

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good condition for approximately 15 to 20 years, and the actual stability life should be considerably increased by the effect of the stabilizer. At the present time there are still many charges of cannon powder in service which were manufactured from 15 to 20 years ago, and which contained no stabilizer, as well as powder in bulk storage in zinc-lined boxes (capacity up to 140 pounds), both with and without stabilizer, as much as 15 years old, which are known to be still in good condition as regards stability.

In addition to the care necessary in the manufacture of smokeless powder, it is essential that certain precautions be observed rigidly during the storage of the powder, in order that its stability may be properly preserved. In the final drying of powder, during manufacture, it is impracticable to remove all of the solvent (ether and alcohol) from the grains. The amount allowed to remain is definitely fixed for each particular size of granulation, powder of heavy web thickness for use in major caliber guns naturally retaining more solvent than the smaller grains used in field guns and small arms. Nitrocellulose powder is also appreciably hygroscopic. If exposed to damp atmosphere it tends to absorb moisture, which will, in turn, be gradually lost by exposure to dry air. It has therefore been the practice to condition powder at the time of packing, so that it contains a definite amount of moisture, in order that changes in moisture content during subsequent storage may be minimized. A fairly definite content of both solvent and moisture is therefore present in each granulation of powder at the time it is subjected to ballistic tests to establish the charge for the gun in which it is to be used. The powder should therefore be kept hermetically sealed to retain this original content of volatile material, as otherwise there will result a gradual and continual loss of the solvent and an increase or decrease in content of moisture, depending on the temperature and humidity of the atmosphere. Tightly sealed storage cases and well ventilated dry magazines which are not subject to wide variations in temperature are therefore essential to prevent changes in the powder which would alter the ballistics given by the established charge.

Such conditions of storage are also of major importance in preserving the stability of the powder. It is a well established fact that the tendency of all nitric esters to undergo accelerated decomposition is greater as the temperature is increased. Therefore, the

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lower the temperature of the storage magazines, the longer we may expect smokeless powder to remain stable. Moisture in smokeless powder also tends to promote decomposition, and the statement has frequently been made that heat and moisture are the greatest enemies of the stability of powder in storage. Many investigators have shown that moisture has a decidedly accelerating influence on the decomposition of nitrocellulose, because of the fact that this decomposition is largely hydrolytic in nature, being brought about by moisture under the influence of traces of acid liberated from the nitrocellulose. At any given temperature the velocity of decomposition is greater in a moist atmosphere than in the absence of water. For example, the writer has frequently observed that while a sample of nitrocellulose prepared in the usual manner for the 135° C. test by drying in an open tray at about 40° C., will evolve yellow fumes in 1 to 2 hours at 135°, a duplicate sample from which moisture has been removed as completely as possible by means of a vacuum drier will stand heating at 135° for 5 hours or more with no visible evolution of fumes. This difference in rate of decomposition is entirely due to the difference in moisture content of the nitrocellulose.

In tests conducted at Picatinny Arsenal, a sample of service pyro powder of good stability, which withstood constant heating at 65.5° C. for 400 days without any visible evolution of fumes, and which withstood 5 hours heating at 135° C. without explosion, was stored in an atmosphere saturated with moisture and maintained at a constant temperature of 50° C. It decomposed with evolution of fumes after 175 days of such storage, and a portion of the sample thus treated exploded in 10 minutes heating at 135° C. Similar tests on nonhygroscopic types of powder, developed since the war, showed that such powders are still in excellent condition as to stability after two years of storage in a saturated atmosphere at 50° C.

Vielle's investigations have shown that loss of stability of nitrocellulose powder is also coincident with loss of solvent from the powder, a fact which is now generally recognized. This may be explained in several ways. It has been suggested that loss of solvent from the hard, tough, powder grains may result in the production of microscopic cracks or pores, occasioned by the escape of the solvent vapors from the interior of the colloided mass. As this loss continues, the porosity of the grains, and consequently the readiness with which they can absorb moisture from the atmosphere, would



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increase, and decomposition under the influence of this moisture be thereby facilitated. There is good evidence that the solvent, particularly the alcohol, plays the part of a stabilizer in the powder, by combining chemically with traces of nitric acid resulting from the early stages of decomposition. This effect is apparent from the sweetish odor of ethyl nitrite often observed on opening a box of powder of perfectly good apparent stability. This ethyl nitrite could have resulted only from action of nitric acid on the solvent in the powder.

It is apparent from the above that the tendency of smokeless powder to undergo decomposition is diminished by storage at minimum temperatures under conditions which preclude absorption of atmospheric moisture and loss of the residual solvent in the powder. For this reason the standard magazines at Ordnance storage depots are well ventilated and designed to avoid excessive temperatures as far as possible. Likewise the standard packing containers for powder are individually tested with air pressure in order to insure tightness.

The decomposition of smokeless powder generates heat. When decomposition is brought about at a sufficiently rapid rate, as for example in the 135° C. stability test, by subjecting the powder to a high temperature, actual ignition or explosion of the powder may result. In such a case, the powder at the instant of its ignition is undoubtedly at some temperature much higher than the 135° C. to which the bath surrounding it is heated. If a small sample of nitrocellulose smokeless powder is heated gradually, so that the rise in temperature is only about 5° per minute, the powder ignites at a temperature of approximately 170°-180° C. In general it can be said that both stable and unstable powders ignite within this range of temperature. If ignition occurs when powder is exposed to lower temperatures, it is only reasonable to conclude that the evolution of heat within the powder, as a result of its decomposition, has raised the temperature of the powder much above that of the surrounding atmosphere. At least some portion of the mass of powder must have been raised to the ignition temperature of 170°-180° C.

Such evolution of heat is illustrated in the British "silvered vessel test" for stability of cordite smokeless powder. In this test, 50 grams of powder are placed in a closed glass vessel surrounded with

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a silvered vacuum jacket, to reduce loss of heat; a thermometer is inserted in the center of the powder, and the vessel placed in a bath at a constant temperature of 80° C. When the temperature of the powder itself reaches 82° C., the test is completed and the time required for this temperature rise is an index of the stability of the powder.

When decomposition occurs at a slow enough rate, or when the mass of powder is small, the heat generated by the decomposition will be dissipated at a sufficiently rapid rate to prevent ignition. The writer has seen many samples of unstable powder which have been kept in glass bottles undergo gradual decomposition up to the point where the grains had lost their original form and were no longer combustible, without a single instance of spontaneous ignition, except in cases where the temperature was quite abnormal, as for example in the surveillance test at 65.5° C. (150° F.).

An experiment with caliber .30 rifle ammunition containing powder which had been found to have badly deteriorated, furnishes further evidence of dissipation of heat of decomposition. An entire case of 2,000 rounds (representing about 15 pounds of powder), was placed in a constant temperature magazine at 50° C. (122° F.) with the bulb of a recording thermometer inserted in the box so that the actual temperature of the cartridges themselves could be noted. Within 30 days the temperature of the interior of the case had risen to 65° C. or 15° higher than that of the magazine; it then remained fairly constant at this point for 10 weeks, and on continued storage gradually dropped to the magazine temperature of 50° after about 5 months. This experiment is still in progress. It is to be completed by breaking down some of the ammunition and examining the powder. From previous experience it can be predicted that the powder will be found to have undergone decomposition to such an extent that it is no longer combustible. It is believed that spontaneous ignition of the powder did not result because of the rapid dispersion of the heat of decomposition through the metal of the brass cartridge cases containing the relatively small powder charges, the weight of each powder charge being only about 50 grains, while each cartridge case contains nearly 200 grains of brass.

A similar experiment is also at the present time in progress at Picatinny Arsenal with 75-mm. gun ammunition. Nine rounds

## DECOMPOSITION OF SMOKELESS POWDER

of this ammunition have been prepared containing badly deteriorated powder charges. These charges—about 1.5 pounds each—were specially prepared by sorting out the grains from a lot of unstable powder so as to obtain a mixture of equal amounts of badly spotted unstable grains and normal grains of acceptable stability. These nine rounds were packed in a standard ammunition box and stored at a constant temperature of 50° C. to ascertain whether decomposition of the powder will progress at a sufficiently rapid rate to cause spontaneous ignition. It is probable that the influence of the metal cartridge cases will serve to prevent ignition of the powder, as it did with the caliber .30 ammunition.

The decomposition of nitrocellulose smokeless powder is attended with physical changes in the appearance and physical properties of the grains. The reaction of the products of decomposition with the diphenylamine contained in the powder results in the formation of a yellow coloring matter which causes badly decomposed grains to assume an orange yellow color. Frequently grains are found in which decomposition appears to have started locally in small spots instead of affecting the entire mass of the grain. These spots are distinctly yellow and become brittle or frequently soft and mushy. As acidity is developed at these local centers of decomposition, the condition spreads gradually throughout the entire grain, until finally the grain becomes so friable that it can be crushed in the fingers and can be ignited only with difficulty.

Such spotted grains were first noted about five years ago in cannon powders of the smaller granulations of war-time manufacture (1917-18). These grains were found to be of very low stability, whereas the grains of normal appearance from the same box or charge passed all of the stability test requirements for new powder. It is possible that these local centers of decomposition are produced from impurities in the low grade of cotton linters and hull fiber which it was necessary to use during the war, or from tiny knotted masses of nitrated cotton fibers which were not torn apart in the pulping operation and were therefore not properly freed from acidity in the purification process. Their predominance in powders of smaller granulations is no doubt due to the fact that such powders contain less residual solvent than those of coarser granulation, and also to the fact that, owing to their greater exposed

## THE FIELD ARTILLERY JOURNAL

surface in a given weight, the smaller grained powders have normally a greater moisture content. Another significant fact is that practically all of the smaller grained powders made during the World War were dried by the "water-dry" process, which involves removal of the solvent by soaking the grains in water. This process was resorted to as an emergency measure to avoid the delay in production which would have resulted from the usual much slower air-drying method ordinarily used for all granulations and used during the war for the larger grained powders. Water-dried powders normally have a lower content of residual solvent than air-dried powders of similar granulation, and it is conceivable that the removal of the solvent by soaking in water may tend to leave the nitrocelluloid colloid more porous and hence more liable to absorb moisture during subsequent storage.

About three years ago a program of tests was initiated to obtain definite information as to the effect of continued storage of powder which contained these spotted grains of low stability. A lot of powder for the 75-mm. gun, which had been found to contain a small percentage of such grains was hand picked and boxes of 140 pounds of powder each containing definite proportions of spotted deteriorated grains mixed with normal grains were prepared and placed in small improvised shelter magazines at atmospheric temperature in three different locations so as to note the effect of variations in climate. The general conclusions from this program were as follows:

1. The percentage of bad grains gradually increased in every instance, the rate of increase being greater the warmer the climate, and the greater the original proportion of bad grains.

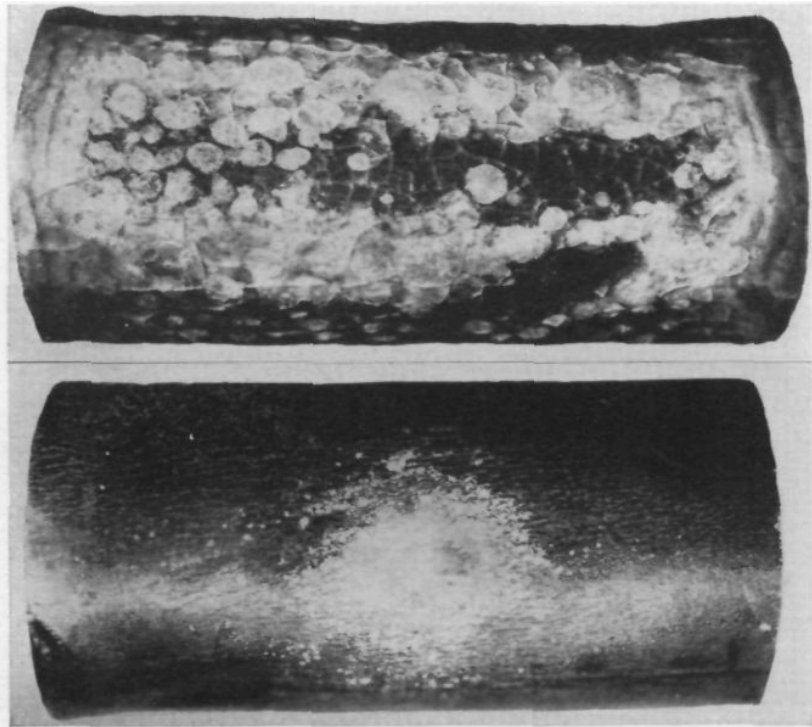
2. The progress of deterioration was most rapid at Charleston where the temperature averaged during the period of tests approximately 8 degrees higher than at Curtis Bay and 15 degrees higher than at Picatinny Arsenal. Furthermore, at each place the rate of deterioration was greater during summer than during winter months, and all of the ignitions at Charleston occurred during the period from July to September.

3. Three boxes which originally contained respectively 3 per cent, 10 per cent and 20 per cent of bad grains, spontaneously ignited during storage at Charleston, one about the end of the second year and the other two after about three years of storage. Information

## DECOMPOSITION OF SMOKELESS POWDER

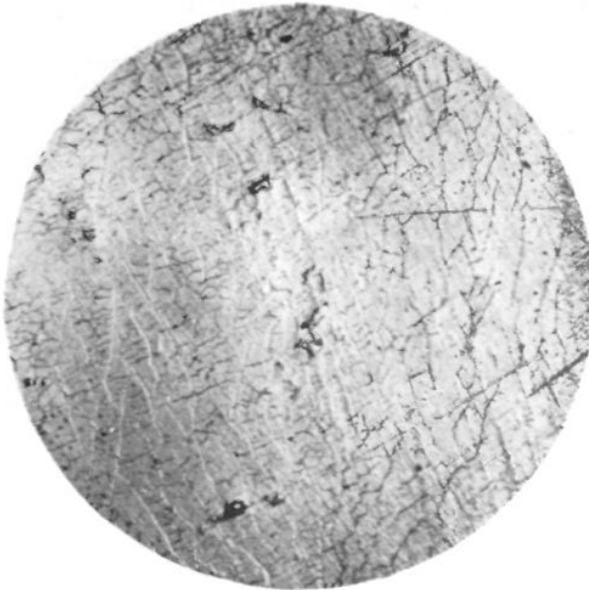
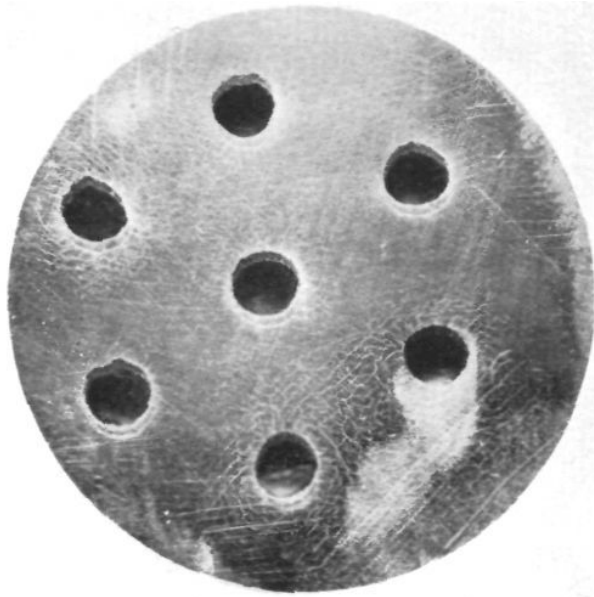
was not available as to the content of deteriorated grains at the time of ignition, since the periodical sorting of the powder had been discontinued prior to that time because of the possible danger involved in handling such badly deteriorated powder. It is estimated that in each instance the content of bad grains was approximately 50 per cent at the time of ignition.

It should not be assumed from these results that powder stored in boxes cannot ignite spontaneously as a result of decomposition until



**FIG. 1. TOP: SPOTTED DETERIORATION ON SURFACE OF GRAIN; BOTTOM: DETERIORATION FROM CENTER SPOT. CRACKED SURFACE**

one-half of the grains in the box have developed a condition of advanced instability. It must be remembered that the powder in these test boxes was emptied occasionally for periodic sorting, whereby opportunity was given for the escape of nitrous fumes, whose presence in contact with powder has been definitely shown to exert a catalysing effect in increasing its rate of decomposition.



**FIG. 2. TOP: SECTION OF GRAIN SHOWING CRACKS STARTING AT SURFACE OF PERFORATIONS; BOTTOM: SECTION OF GRAIN SHOWING CRACKS**

## DECOMPOSITION OF SMOKELESS POWDER

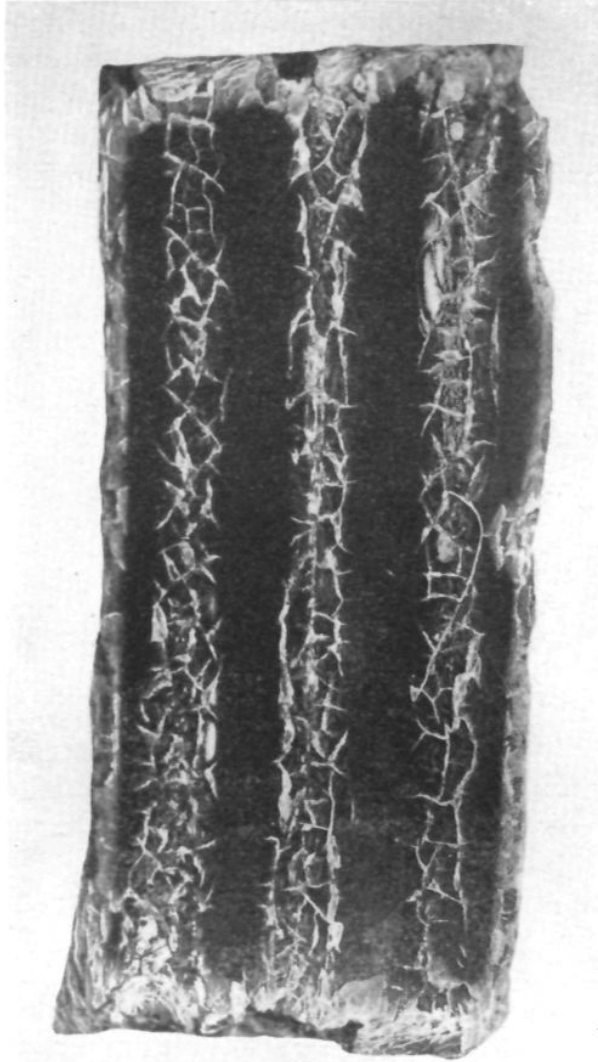


FIG. 3. LONGITUDINAL SECTION OF POWDER GRAIN SHOWN IN FIG. 1

Also, each of these boxes being stored separately, there was more opportunity for escape of heat generated by the decomposition, than would have been the case had the boxes constituted part of the piles within a storage magazine.

It is important, therefore, that the presence of individual grains

## THE FIELD ARTILLERY JOURNAL

of poor stability in stocks of smokeless powder be detected by some suitable system of surveillance before decomposition has progressed to the point where there is danger of spontaneous ignition.

Figure 1 shows evidences of advanced decomposition on the surface of individual grains—grain at top has greenish yellow spots and a badly cracked surface; grain at bottom a yellow spot showing local decomposition in a limited area and a badly

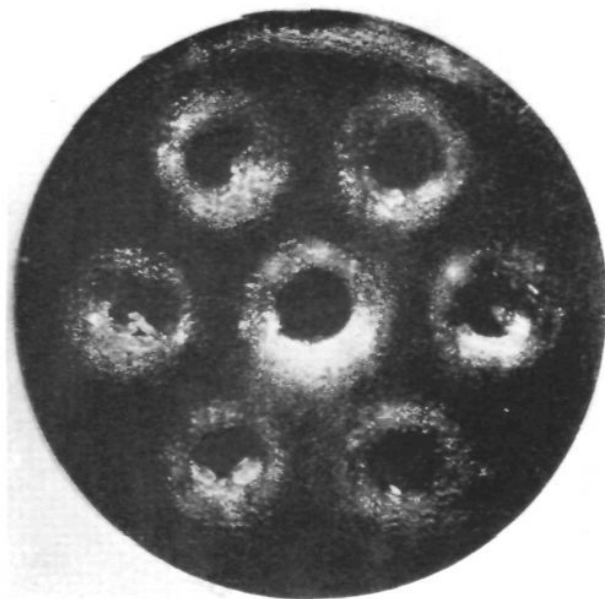


FIG. 4. TRANSVERSE SECTION OF GRAIN SHOWN IN FIG. 1

cracked condition of the entire surface of the grain. Figure 2, at top, represents a section of the grain, and shows these cracks extending from the surface of the perforations into the interior of the grain. Figure 2, at bottom, shows a part of the central section in which the cracks are more distinct because of greater magnification. Figures 3 and 4 represent respectively longitudinal and transverse sections of the same grain shown in Fig. 1. The progress of decomposition and of cracking from the peripheral surface of the perforations into the interior of the grain is distinctly shown in these photographs. There is no doubt that the cracking is the result of expansion caused by decomposition of the nitrocellulose.



## SERVICE IN NICARAGUA

WE ALL know that there are many uses for Field Artillery, but there are still more uses for Field Artillery-men.

Although no Field Artillery of our Army went to Nicaragua, still some of the officers of our branch were on duty there last year. Brigadier General Frank R. McCoy, Commander of the 1st Field Artillery Brigade at Fort Hoyle, was in charge of the electoral mission in Nicaragua, and among the officers he selected were two captains and a major of the Field Artillery. The work done by these officers was not of a military nature, but entirely political and diplomatic.

However, they got an opportunity to become acquainted with new terrain, guerilla warfare, Central American jungles, roads and inhabitants. After all, our military education teaches us about many things besides matériel and gunnery, and puts us in many places besides drill grounds and battlefields.

At the request of Nicaragua our government organized and conducted a fair election in that country so torn by revolutions. General



THE CATHEDRAL AT LEON (1746-1774)

## THE FIELD ARTILLERY JOURNAL

McCoy was put in charge and allowed to pick assistants from the Regular Army, Navy and Marines. The Artillery officers were assigned as chairmen of Provincial Boards and handled, in Spanish, registration, voting and election administration. Their lives were protected by the Marines whose duty it was to keep the country pacified so that a fair election could be held, which entailed considerable fighting. Our airplanes were a great assistance in operations against guerillas and bandits by bombing, transportation, reconnaissance and supply.

In order to give an idea of the conditions and operations in Nicaragua the following series of photographs is being published. They show the beach, country, transportation, native insurgents and points of historical interest.



THE ROOF OF THE CATHEDRAL AT LEON

SERVICE IN NICARAGUA



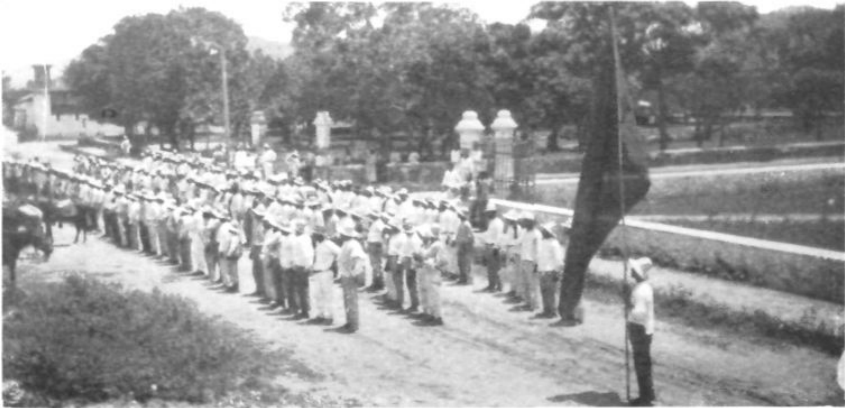
**TOP: NATIVE DWELLINGS IN THE UPPERLAND  
CENTER: NATIVE BARGES, LAKE MANAGUA  
BOTTOM: OX CARTS GOING OUT TO UNLOAD SAIL BOATS**

THE FIELD ARTILLERY JOURNAL



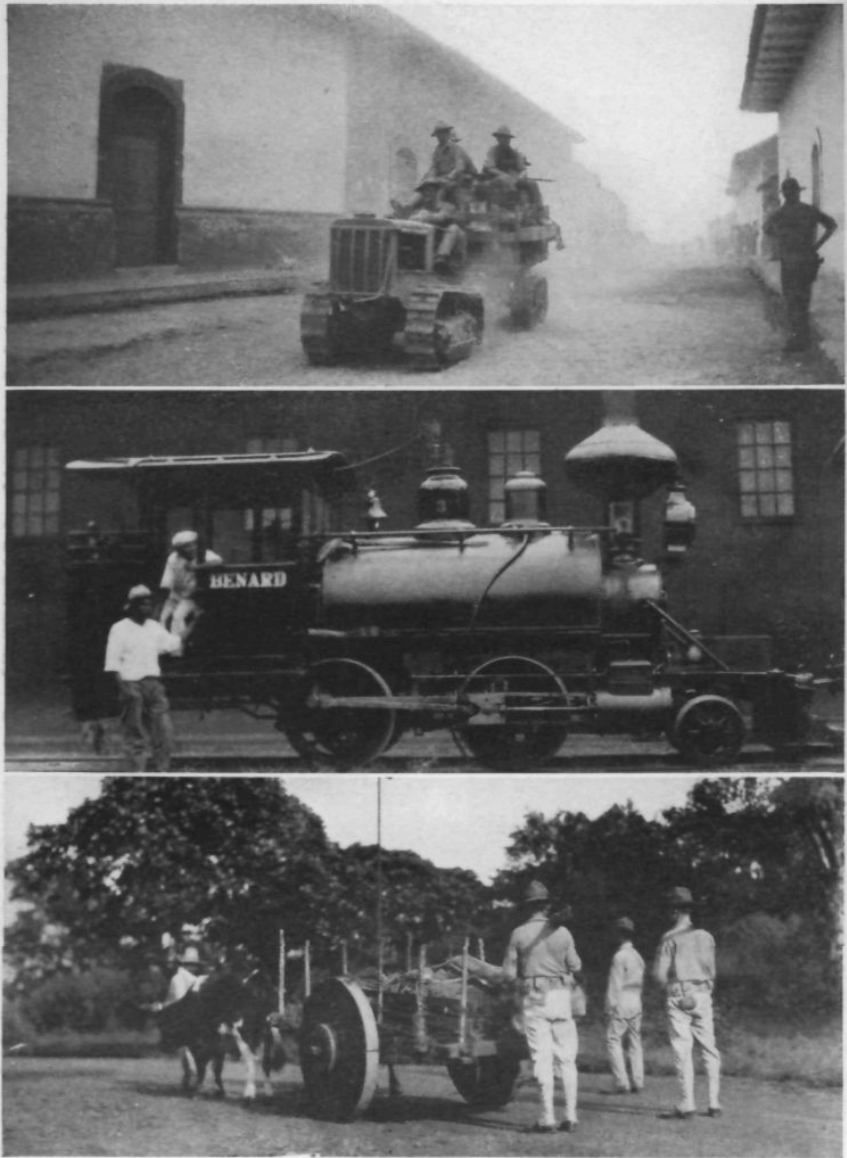
TOP: LAKE NICARAGUA, THROUGH WHICH THE CANAL WILL RUN  
CENTER: THE SHORE OF LAKE MANAGUA  
BOTTOM: NATIVE BOAT ON LAKE MANAGUA

## SERVICE IN NICARAGUA



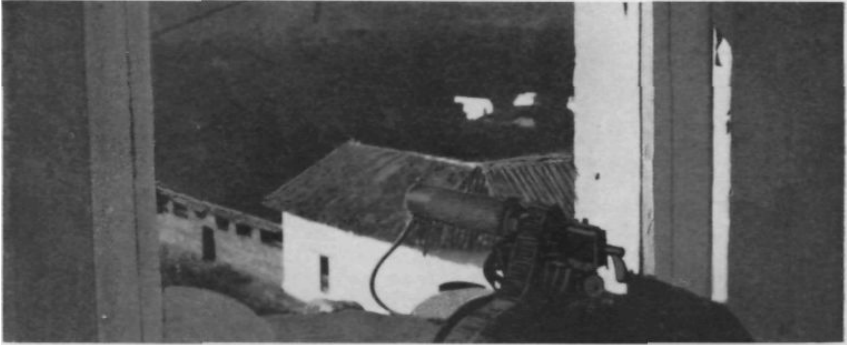
**TOP AND CENTER: BANDITS SURRENDERING AT OCOTAL IN ORDER TO RECEIVE AMNESTY AND VOTE. MOST OF THEM BROUGHT NO ARMS, HAVING HIDDEN THEM FOR FUTURE USE. THEY ARE FAIRLY WELL DRILLED AND DISCIPLINED  
BOTTOM: INCINERATION IN CHINANDEGA, NOT BY MARINES, BUT BY OPPOSING FORCES OF NICARAGUANS, BEFORE THE ARRIVAL OF OUR MARINES**

THE FIELD ARTILLERY JOURNAL



TOP: PART OF MARINE SUPPLY COLUMN REACHING OCOTAL CENTER AND BOTTOM: NICARAGUAN TRANSPORTATION

## SERVICE IN NICARAGUA



**TOP AND CENTER: MARINE QUARTERS AT OCOTAL WHERE ABOUT FORTY MARINES HELD OUT FOR TWO DAYS AGAINST 600 SANDINISTAS. THE ATTACK WAS FINALLY DRIVEN OFF BY AIRPLANES**

**BOTTOM: AT THE AMERICAN LEGATION; SEATED LEFT TO RIGHT: GEN. McCOY, U. S. MINISTER EBERHARDT, ADMIRAL SELLERS; STANDING: COL. BERKLEY, U.S.M.C., MR. MUNRO, GEN. BRADLE AND MAJ. SCHMIDT, BOTH U.S.M.C.**



# WAR BUGS

*BEING*

BY  
**CHARLES  
MACARTHUR**  
Formerly Private  
Second Class Battery  
F, 149th F. A. 42nd  
(Rainbow) Division,  
A. E. F.

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

BY COURTESY OF  
**LIBERTY MAGAZINE**

PICTURES BY  
**RAYMOND SISLEY**

### PART THREE

IT WAS a good war for a week. There we were, headed for a rest camp, just like the papers said. Maybe there was a Santy Claus. Maybe Pershing was on the square.

A day's hike landed us at Haudonville, a tank town in Lorraine—and hot on our heels came a courier with orders for service on another front. Smiling, the boys fell dead. They yelled their hearts out for an hour, and were soothed only by the feeling that we were such hellers in action that we couldn't possibly be spared.

When it was possible to move without steam tugs, we proceeded to Reherrey, the site of further glory. At the moment it was the quietest sector on the front: yet our newest loogie galloped up and down the column with hoarse whispers to put out cigarettes while we were still a good five miles away. It was a raw, wet night, the wind was in our faces, and we



## WAR BUGS

resorted to spraying our newest looie with tobacco juice at the approach of his horse's hoofs—profusely begging his pardon afterward. By dawn he looked like a gingerbread man.

We finally reached the conclusion that the German front in this particular sector was operated by one man—some old gentleman



Signal Corps Photo

*Back at the Eskalon of the 149th F. A.*

who had been incapacitated for service on an active front and was given the Reherrey branch to mind while the regular troops were gone. His daily program, as we figured it out, took in the following:

5 A. M. Blow first call. Run up and down the trenches and fire a few 77s.

5:15 A. M. Breakfast. Send up the captive balloons. Run down to the first line and fire a few machine guns. Take mandolin lesson.

5:30 A. M. Back to the hangar. Take the 1870 model Fokker out for a ride over the trenches. Send over propaganda balloons.

So on through the day. In the afternoon he had a little leisure and possibly slept. Dick Patton, on observation duty, claimed that he saw him rolling his croquet court, and he was often seen performing such husbandry as kicking cows home from pasture and spading up sugar beets.

## THE FIELD ARTILLERY JOURNAL

But at night he didn't have a minute to himself. Up and down the trenches he tore, firing star shells here, a rocket or two there, and stopping just long enough to zip over a belt or two of machine gun ammunition. The flares were so far apart that we began to wonder



Signal Corps Photo

*Raymond Sisley, the illustrator of War Bugs, making friends with his lead team*

how he got around, until one of the observers reported that he had a bicycle—which led to 8,000 variants of the old population joke.

Adolph (we called him Adolph) had one curse—and that curse was drink. There was no other explanation for all the German guns in the sector suddenly and mysteriously going off at 3 o'clock one morning; and we entertained ourselves for two days wondering what was going to happen to the old pollywog when the general found out what he had done.

A fat lot Adolph cared. Stewed as a goat, he sent up an observation balloon the next day—and let it go. Everybody in Reherrey took time out for target practice as it sailed by. Subsequent developments indicated that the field marshal fired the old gentleman, replacing him with the army.

Speculations concerning Adolph's life and fate served to pass away the time, but there was little comfort out of the one man German army notion when we began looking over our positions. They were ready made and stood out like sore

## WAR BUGS

thumbs. They had been standing since 1914. It was obvious that the Germans knew them better than we did; equally obvious that the first time we tried any monkey business, it was good-by all, and see you later. And since we intended to get fresh as soon as possible we were worried.

Chicken wire camouflage was stretched over the position five feet from the ground, making it impossible to stand erect. All of us were hunchbacks after the first week's sapping.

However and what the hell, if we had been allowed to fight the entire war at Reherrey there would be no gray hairs in the battery now. It was a jake front. In the morning we woke, shook off the rats, stuck our feet into a pair of wooden shoes, and took a look at the sky. If rain threatened, fires were built in the gun pits with bundles of T. N. T. craftily burgled from



*Pappy made the unhappy shavetail salute 150 times*

## THE FIELD ARTILLERY JOURNAL



*Topsy and a couple of pups got out in front of the fourth section gun*

Indiana's position over the hill. Eight or ten eggs were broken in a very dirty mess kit. *Ecco!* an omelet! One member of the gun crew *allayed* to the kitchen for bread and coffee, and in a few minutes we were punishing swell breakfasts, composed largely of our own private stock.

We never hiked the mile into Reherrey unless wheat cakes were on the morning menu.

Breakfast over, we grabbed an hour's beauty sleep before we were called out to the guns. The work of cleaning the pieces and fussing around the gun pits seldom took long, and the rest of the morning was spent in improving our minds with the best sellers of 1901—a present from one of the welfare organizations.

Punctually at 10 o'clock an old gentleman, generally supposed to be Adolph (functioning as spy), dashed up to the position on a bicycle and delivered the Paris editions of the *Chicago Tribune* and *London Daily Mail*, together with *La Vie Parisienne* and other hotsy-totsies. Having digested the world's news and expressed our own conclusions, we changed from wooden shoes to hobnails and ambled in for lunch. This was served at any hour between 10 in the morning and 2 in the afternoon, according to our Greek cook's artistic temperament and the Supply Company's distribution of wood.

For several days we had no wood at all. Boxes and wooden doors gave out, and there is some law about cutting down trees

## WAR BUGS

in France. One day we were confronted with the prospect of a meal of raw meat unless something inflammable could be salvaged before dinner time. In this extremity the Greek had a brilliant hunch.

The day before, in his explorations for firewood, he had wandered as far as the second line trench and had spent some time examining barbed wire entanglements. In our hour of need it occurred to him that the barbed wire was supported by stakes, that the stakes were of wood, and that wood burned easily. Q. E. D., Eureka, and what hath God wrought?

With great stealth and cunning, the Greek gathered a party of hungry soldiers and marched them up to the second line. In fifteen shining minutes we hacked away more barbed wire entanglements than a regiment of French engineers could replace in a month.

In the midst of this vandalism a French colonel appeared and screamed so loud that ten miles away they thought an armistice had been declared. Pale as death, he flung himself on the Greek. At first he merely called on God to witness what was happening, and then led up to more personal matters.

The Greek replied volubly in his native tongue, with terrifying swings of his hatchet and many a *pas compree*. He secretly hated the French for what he considered to be a mercenary attitude on the part of their women, and nearly chopped the colonel's head off in consequence.

"Coffee!" he screamed during his rare excursions into English. "This mens must have coffee! No fooling boys! Make a little fast!"

The Frenchman exploded in a few final remarks and rushed for eighty-nine generals. We tore in the other direction with three days' firewood, and ate—for a change. The best hazards on the western links were wrecked, and what of it?

Despairing of ever firing at anything real, standing gun drill was introduced, and we whiled away the afternoons demolishing imaginary cavalry as they romped over the hill; or played baseball. These contests were plainly visible to observers in German balloons, but they were trying to learn the game and we were not bothered.

## THE FIELD ARTILLERY JOURNAL

In the evening all those not needed at the guns gathered in Reherrey at one of the two cafes. There was an abundant supply of *vin rouge* and *vin "blink"* at varying prices: three, five, and ten francs a copy, to be exact. The first grade was diluted vinegar, the second fair Pinard, and the third plain bottled hell. On getting fried, the custom was to visit the Y. M. C. A. canteen, a second-hand stable operated by a human scantling with a bad temper. This bozo passed out paper and envelopes, but never had both at the same time; what's more, he didn't want any remarks about the shortage. On discovering that he was nervous, we razed him nearly to death.

Occasionally we fired a barrage for the doughboys, who got so they loved us. We were dead shots. Each gun crew was good for thirty-two shells a minute, and every barrage was on its way before the signal rocket went out. Real Statler service.

The telephone detail ran into a peck of trouble at Reherrey, due to the Frog farmers, who plowed up wires right and left, not caring a damn about the war, except for occasional bombardments. Several times we had to clear their cows out of the way before we could shoot, and once some hefty *Maud Mullers* bunched in front of the guns and began to cut hay—misconducting themselves so conspicuously that we wrote another song about it.

New horse lines were established in a wood near Merviller, equidistant from Baccarat and the battery position. Lieutenant Dolly Smith and Sergeant Karl Geisendorfer, both swell guys, were in charge. It was a hell hole at first: rain, mud, and work—work, mud, and rain.

The horses had to be groomed a dozen times a day, due to their rare horse sense in flopping in the mud every time a driver bent over to tie his shoe. Ammunition went to the front at all hours of the day and night. And we were cold, wet, and hungry all the time.

Dolly Smith kept us alive, somehow. He walked around as if it had been Paris, borrowing chews of tobacco, pausing to make a pass in a crap game, kidding some bellyaching driver, and scattering sunshine in general. When everything

## WAR BUGS

else failed he would tip off some gabby hero not to let it go any farther, but that our missing barrack bags were at Brest, and we would be with them *toots sweet*. We were all going back as instructors. But not a word. Ten minutes later we were too busy talking it over to howl.

With the approach of spring the sun began to go to work, and in two or three weeks our mud hole was a garden spot. The Y. M. C. A. sent us Jack Dana, another swell guy (really), and the band gave a concert once a week—chiefly as a means of getting *Sambre et Meuse* out of Sylvester's Francophile system.

We built stables which kept the horses clean and the stable orderlies fat, and settled down for the first 100 years.

Or, if one tired of home life, there was Baccarat, with dinner for eight francs and champagne for the plutocratic few. At the camp there was extra duty next morning for the same few. We even had milk with our oatmeal on this pearl among fronts. Ivy Van Landingham playing milkman every morning with a necklace of canteens that had held grape juice the night before.

Moreover, Colonel Reilly forgave Pappy Le Prohon for certain amorous adventures in Luneville and again placed him in charge of the *echelon*. Immediately Pappy surrounded himself with innumerable dog robbers and sergeant majors and reminded the dilatory of an officer's privilege of shooting to kill. There was one more matter he wished to bring up—i. e., that the breweries of France were not operated for the consumption of the battery exclusively.

"Leave some of it for ME!" he bawled bitterly. And we knew that Pappy's reinstatement was complete. Just to make sure that we didn't completely drain the adjacent territory, Pappy purchased four cases of excellent beverage on his own hook and barricaded himself behind them. While he slept Bud Boyles was busy with screwdriver and gunny sack—the most daring appropriation in the entire history of crime.

Pappy was one of those boys who would have shot at the drop of a pint. Probably the greatest moment of the war occurred when he reached for the sixth bottle out of a possible fifty—and found nothing there.

Immediately his lifelong contempt for the National Guard

## THE FIELD ARTILLERY JOURNAL

—engendered by twenty years in the regular army—disappeared, and, like the good sport he was, he announced that we were soldiers, by God, real soldiers, with guts, and that the next time it happened we would fry in hell, if he had to shoot everybody in the battery. He had too much honor to go noseing around after the culprits.

Pappy was busier than Foch. He was in every part of camp at the same time, using his game leg (full of Moro bullets) like a pogo stick. His guard mounts were notorious all over the sector for their conformity to regulations. Second looies trembled at his approach.

Above all things Pappy loved his horse, a black *Blitzen* named Prince, possessed of the devil and his angels. One day he was polishing Prince off, brushing his teeth and putting a little shoe dubbing on his hoofs, when along came a second lieutenant just assigned to the regiment.

The day was hot, and Pappy had removed his coat and with it all insignia of rank. The lieutenant was aching for trouble.

"Hey You!" he said (Hey You being the nickname given all soldiers by officers). "What's the matter with you? Is your right arm paralyzed or something? Or don't you recognize an officer when you see one?"

Pappy looked up from Prince's toilette to see what private was catching hell now. That was one thing about Pappy, he wanted to do all the hell raising himself. But when he saw the looie's finger pointing his way, he turned slowly blue. The lieutenant mistook his emotion for fright, and continued:

"Well, you big barrel head, why don't you salute?"

Pappy found his voice. At first it was a wild, unearthly howl, like that of a wounded lion. Gradually words could be distinguished—and what words!

He began with the very short ones, and worked up to bright blue epithets that were dazzling in their invention and application. The lieutenant began to cry. Pappy paused in his profane spirals and made the unhappy shavetail salute 150 times without stopping.

Days came and went. They do, sometimes. Top Sergeant Danny Elwell had a dispute with Lieutenant Stone touching



## WAR BUGS

on whether he (Elwell) or Lieutenant Stone was battery commander. On this point Lieutenant Stone decided in his own favor, reducing Elwell to the horse lines with orders to keep his trap shut. Karl Geisendorfer became first sergeant—and turned out to be a pip.

A few officers were returned to the States as instructors. We lost Lieutenant Dolly Smith—and that was pretty tough.

Dolly packed reluctantly, hanging around like *Sister Ann* for some courier to dash up and say it was all a horrible mistake. Instead the order was confirmed. Dolly shook hands all around and climbed into the supply wagon homeward bound. As he passed band headquarters, the boys came out and played *Some of These Days You'll Miss Me, Honey*. There were tears.

Two or three contemporary scandals:

Our lieutenants fell to quarreling, and were straightened out by Major Redden.

An uplifter employed by the Y. M. C. A. got up and said we had joined the army to escape the draft, and that secretly we were anxious to go home. Major Redden hauled him outside before any of the boys could get him, and gave him a sock on the nose. Porch Climber took a bath. Bob Groves and Art Barker had fisticuffs.

Just for the hell of it, one of the batteries shot up a German post of command. This was decidedly against the rules and the Germans were furious. In a fit of temper they blew up one of our billets. We came back by destroying two mess halls and a kitchen. One thing led to another, and before long a merry war was on. It was no longer safe for the Germans to hold basket picnics, nor for us to play baseball.

All this bad feeling culminated in another J Day, H Hour early in May. We worked up to the attack with three days' preliminary fire directed at the German wire. On the third day we laid a box barrage around a couple of regiments in the Bois des Chiens that was a honey. When the doughboys went over, several hundred Germans were in pieces, which greatly increased our growing prestige with Iowa and New York. Of course, the firing was done from the new positions. The old ones went to the bowwows in the first ten minutes of play.

## THE FIELD ARTILLERY JOURNAL

Topsy, our dog, and a couple of pups got in front of the fourth gun, and the crew had to cease fire while Tucker brought them back. It involved dodging a great many shells.

It had been an awful job moving the shells from the old homestead, and during the attack we were so tired that the cannoneers—those who weren't needed—crawled under the gun tubes and slept through it all. They woke up at each report until they were stone deaf, when they were able to get in a good four hours without interruption. Deafness was a blessing in the field artillery. It came in ten minutes' fire and lasted a week—excepting in a few cases when it was permanent.

Despite the violence of our attack, there was no reprisal to speak of; and we swung again into the old happy routine.

Summer was beginning. The fruit trees that speckled the little town began to bloom, lilacs and cornflowers and poppies appeared, and a series of perfect days. Even the little Greek became amiable and made long pilgrimages over the country for strange weeds and hard boiled eggs wherewith to deck the rations. On one of these occasions he encountered a fellow countryman, who lived and grew fat in our kitchen all because he could spick Grick.

The machine gunners established themselves in a shady grove near the guns and made life a hell for all the crows and innocent bystanders in the vicinity. Harry Hopper made a laboratory out of an abandoned trench and exploded all the shrapnel and high explosive he could steal, to the infinite distress of law abiding people who didn't want to go to the hospital that way.

Now and then we subscribed for a barrel of beer and installed it on the grass beside the kitchen. At first the French were asked over and invited to join in the ensuing close harmony. Our brave allies' repertoire consisted of Madelon, the Marseillaise, and a drinking song, at the end of which mess kit cups were drained at a swallow.

We specialized in various blues, which the Frogs admired because of their deep sentiments—explained in sign language. Here, too, we began the Boola-Boola Club, with Goofy Pierre as charter member. The sign of the order was made by placing

## WAR BUGS

the thumb to the temples and extending the fingers, which seems to mean something peculiarly disagreeable in France.

When the Frogs displayed reluctance to make the sign, we began kidding them a bit, interpolating disparaging and highly personal rhymes in our songs. Two or three words were a little too current to be misunderstood, and the Boola-Boola Club ended in a fist fight, as all our international societies seemed to do.

Toward the close of May the Germans began to get huffy. There was an artillery attack at some part of the line every night. They gave us everything they had, even projectors of mustard gas. Sensing a general attack, we dug like a house afire by day and carried thousands of shells by night.

Early on the morning of June 6 it came. Viewed in the light of later events, it was a brisk little skirmish. Then it was comparable with Verdun. The Heinies started in with a nasty gas attack at 1:30 in the morning, slamming over a mean barrage a minute later.

A new battery executive was at the guns. As the klaxons sounded up and down the line, he became a little skittish. So did we.

Fortunately for our nerves, a barrage was ordered, and we began socking them across from every gun. Then, when we weren't even looking—*Bam ! ! ! !*—right on the nose, not fifty feet from the first gun. That first shell was bad news, but the second was worse. It landed 100 feet behind the second gun, establishing a perfect bracket. We could but expect a fire-at-will, and harps and wings forevermore.

Our new executive did not wait for the general ascension. Down in the telephone sap he went, eight stairs at a time. Half the masonry followed from pure suction.

"The phone!" he yelled. "Get Lieutenant Stone—for God's sake!"

Need it be added that we were serving the guns rather nonchalantly? Lieutenant Stone, asleep in Reherrey, was reached.

"Howard!" screamed the battery executive. "Oh, Howard—my God!"

"What the hell's the matter with you?" asked Lieutenant

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Stone, naturally enough. Our executive cried that we were getting murdered, that was all; that the position was drenched with shells; that we were being blown to bits, and added: "What'll I do—what'll I do?"

Lieutenant Stone told him—rather tersely—and hopped over to the battery on the double. Meanwhile the Indiana heavies had silenced our little friends and nothing further disturbed our fire. There were some close shaves, and parts of the camouflage and sandbags were torn to pieces.

Another spell of peace and quiet. Walter Birkland, Roy Gullickson, and Doc Bristow picked up some strange green shell fragments that had dropped in during the battle, and there was an immediate epidemic of itch in the battery. Mustard gas. The three collectors were shot to the base hospital at Vittel, and several members of the battery attended sick call for a month.

A German airplane was shot down directly over the kitchen, bursting into flames as it fell. We could see the pilot distinctly. He tried gamely to control the machine and wrap a scarf around his face at the same time. His hands were still frozen to the joy stick when he crashed.

Later in the war they were dropping like flies; but nothing ever equaled the thrill this poor devil provided. Mess was abandoned—catch us doing that later on, for anything—and there was a run for souvenirs. The Frogs guarding the burning plane were shoved aside, and everything but the engine was plucked from the flames. Cush Pryor got the propeller, Ray Quisno a swell pair of field glasses, and Bill Ackerman what was left of the fabric.

The Dutchman was burned in style, with a cross and benefit of clergy.

Members of the Shipping Board and a couple of Congressmen came to see us. We were introduced by the colonel as the battery "having the least discipline and firing the most shells." We did a lot of show shooting. It was getting to be routine now. There was a wedding in town between bombardments. The couple, as far as anyone can learn, settled down and lived happily ever after.

Early in June rumors of a more active front were frequent.

## WAR BUGS

Again we were destined for the Marne, the Aisne, the States—or what have you? Toward the middle of June the rumors were more circumstantial. One day elements of the Seventy-seventh Division began moving in. We packed.

Lieutenant Stone made us throw away our wooden shoes and other backwoodsman paraphernalia. Ammunition was sorted all over again. We got the heebie jeebies and felt that it would be our luck to get killed in a quiet sector, with Chateau Thierry going on. Then, at midnight, June 19, in the nick of time, word came down.

All night long we marched in a driving rain, past the doughboys of the Seventy-seventh. The 165th (New York's old Sixty-ninth) had a swell time recognizing old friends *en passant*.

At noon the next day, after achieving almost fifty kilometers in twelve hours under full pack, we reached Dames aux Bois, and entrained—as we thought—for Chateau Thierry. By a lucky break we were diverted at Châlons in time to mix up in the greatest battle of the world, Bastille Day in the Champagne.

*(To be continued)*

# SOME ASPECTS OF MECHANIZATION

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

[This is the fourth 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 V

### TRAINING AND UMPIRING

THE TRAINING of mechanized forces presents many obvious difficulties. Manoeuvre-areas in Great Britain, such as Alder-shot and Salisbury Plain, admirably suited as they are to the exercise of *formations hippomobiles*, are clearly too restricted for the movements of highly mobile forces. They furnish indeed sufficient ground for drill-tactics and for a certain amount of stereotyped minor tactics, both of which are necessary and both of which were practised last summer. Much wider areas are, however, needed for studying and exploiting the capabilities of a force, two of whose most precious qualities are speed and range of action. And this is true whether that force be engaged with mechanized or unmechanized forces and whether acting independently or in company with unmechanized troops. When mechanization has been accepted by India and the Dominions, the necessary space will be available for every kind of operation; but, unfortunately, that day is far distant; and the forces operating in those countries will always be on the small side. Moreover, practice is required mainly in England where the bulk of the armoured forces will always be quartered. It is unlikely, therefore, that we shall find any really satisfactory solution.

Much can be learnt, however, from staff exercises, from war games arranged to finish with an actual clash of tanks in one of the big training areas, from the penetration of imaginary frontiers, from raids on definite points and from a study of foreign manoeuvres. The very closest touch will always have to be kept between the technical and the tactical side. The results of tests for speed, endurance of men and vehicles, P.O.L. consumption, and the average time needed for repairs, refilling and bridging for all

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types of vehicles, need to be tabulated and carefully kept up to date; and they should be applied stringently to every form of paper-exercise; for there is no subject that lends itself more readily to the fancy flights of imagination than the operations of motorized forces. With our ground-limitations we cannot expect perfection; but, if we consistently face realities, so far as we can grasp them, in all the exercises that we undertake, we shall not wander far astray. Among points that need practice and which can be practised with a near approximation to war conditions are embarkation and disembarkation. The two main tasks that will fall to the lot of our armoured expeditionary force will be—the reinforcement of any portion of our far-flung Empire; and operations in support of a Continental ally under the Locarno commitment. In both, embarkation and disembarkation may be conducted under peace conditions; but the operation of an opposed landing on a hostile shore may have to be undertaken in any campaign, and it is an operation that depends for success on a rapid and skilful execution only to be achieved by careful training and attention to detail.

\* \* \* \* \*

The value to be derived from training depends largely on a sound system of direction. Last year many observers reported ground-umpiring to be a practical impossibility; but they did not apparently suggest any alternative. "A mixture of smoke, dust and blasphemy" was the semi-official record of the attempt to adjudicate in a battle between opposing tank-forces. It seems, therefore, that umpiring will have to be conducted, to some extent at least, from the air.

There will be many difficulties in air-umpiring: the present type of plane does not afford satisfactory facilities for observation; reports may lack in connexion and continuity owing to the need for a periodic change of umpires due to petrol requirements of planes; new signals will be required, and there is already a multiplicity of signals on manoeuvres, and a limit to the number of combinations of lights and coloured bunting that can be effectively used. When wireless communication is perfect, many of these difficulties will vanish, but we are still far from that point. A lot of practice will be needed, especially in the actual control of a fight; and, certainly at first, matters will have to be made as simple as

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possible for the umpire. Unfortunately, it is hardly feasible to facilitate his work without rendering the task of fighting aeroplanes fallaciously simple.

A sound procedure may take years to evolve. A commencement can, however, be made on some such lines as the following. With large forces there will be at least four senior officers in the air—the force-commander, the artillery-commander, the officer conducting reconnaissance and the senior formation leader in the air force. One umpire can be attached to each, or perhaps to the first and third only, of these officers, and can learn, and watch the execution of, their orders. This air-umpiring will have to be combined with ground-umpiring. All umpires in the air will then communicate either with a single mobile ground-centre, controlled by the director and working between the opposing forces, or with three such centres, one working under the senior umpire on each side and one under the director—centres in either case being connected with the aerodromes and with ground-umpires attached to formations and units. Either the director himself or his chief assistant will be constantly in the air, for it is in the air that most of the decisions will be given. Umpiring is yet another problem that must be submitted to a process of trial and error extended over a long period. The recognition that ground-umpiring by itself is not feasible is the first step in the process. One great advantage we shall derive from air-umpiring will be the valuable practice in air-work it will furnish to embryo commanders.

\* \* \* \* \*

Discipline is a branch of training wholly different from those considered above. It is only mentioned here because an impression appears to be prevalent that the discipline required in a mechanized forces differs from that required in ordinary forces. This is a mistake. Discipline is a constant, with slight variations due to racial proclivities, and is independent of the source of motion of an army. It is the habit of obedience engrained in the human mind, by one or other of several processes, so strongly as to overcome the fear of death. As each new weapon or new vehicle demands an extension of individuality or mental alertness on the part of the soldier, the same cry is raised, "Discipline can be relaxed or eliminated; intelligence must be cultivated and enhanced." Yet as each new war arrives, however abnormal the conditions, the first requirement



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of a commander from his troops is that they shall be disciplined in the sense given above. He knows that without true discipline there will be a reduction in the collective mobility and collective power of his army. Ten per cent. of the average soldiery will brave any hazard. The remainder require either a stimulant or a support. It is not natural for a man to march stoutly forward when every step makes death more probable. When movements were made shoulder to shoulder or knee to knee under close control, it was much easier to be brave than when advancing in extended lines under a widely delegated command. A greater, not a lesser, support to courage was needed in the latter case. The necessary support may be found in exalted patriotism, in a high *morale* or in inspiring leadership; but any or all of these factors may be absent. Hence discipline must always be there to furnish the necessary sustenance. How many stragglers, for example, did the Queen's Regiment or the Brigade of Guards count in the retreat from Mons?

So the man in the tank will have to be fortified. He will see tanks disabled and a target for all and sundry; he will see tanks blowing up and tanks in flames. His orders are to go ahead. His side is outnumbered and out-flanked. Will his natural courage carry him on? Will not the habit of obedience stronger than the fear of death be needed as much as ever? And the unit of combat being, not a man with a rifle, but a man driving a vehicle carrying guns and machine guns, is not the importance of that habit enhanced?

Surely, too, the occupants of the one-man tank or the two-man tank, when far away on reconnaissance or protective duties, will need the same discipline that shone so brightly in the ranks of the cavalry in that same episode—the retreat from Mons.

The quality of mental alertness will, indeed, as stated by the C.I.G.S., in his address to the Armoured Brigade, have to be stimulated. For there will be need, both in tank-actions and in tank-reconnaissance, for quick action and intelligent co-operation towards the desired end on the part of all ranks in circumstances that will not often lend themselves to clear thinking.

The two qualities of discipline and mental alertness are by no means incompatible; but they should not be confused, nor should an attempt be made to inculcate them by the same process.

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### CHAPTER VI

#### TANKS AND AIRCRAFT

*Tanks v. Aerodromes.*—The introduction of petrol-driven armies will have a profound effect on the operations of aircraft. In the Great War aerodromes were conveniently and safely situated behind almost impregnable lines—lines that had no flanks. They could then only be attacked by their own kind, except on the rare occasions that an enemy effected penetration by a complete surprise, as at Cambria and Caporetto. The tendency towards smaller armies will, however, revive flanks and flanking operations; and the speed and range of mechanical vehicles will then offer a continual menace to aerodromes. The latter can protect themselves in one of two ways; either by taking station far to the rear, or by a permanent guard. The first method reduces flying range over enemy territory. The second method immobilizes large numbers of troops and transport; for the guard must be strong enough to ward off tank attack and suitably disposed to keep enemy dragon-guns out of range of the aerodrome, and it must be prepared to travel in lorries when the aerodrome moves. Both methods have, therefore, great drawbacks. The first will probably have to be accepted; for aerodromes require, for the economic utilization of hangars, work shops and storerooms, a long spell in one place, and that will never be possible in the future, either in advance or retreat, if they are kept in forward areas. Generally speaking, therefore, we may say that the introduction of mechanization will, by forcing a retired position on aerodromes, lessen the value of friendly aircraft slightly and the danger of hostile aircraft considerably. These effects can be reduced somewhat by an increase in the mobility of aerodromes, that is to say in the rate of their establishment and displacement.

The efficacy of tanks against aerodromes is of special interest to Great Britain. The existence in the south of great ports, great distributing centres and industrial areas, offers a Continental enemy an opportunity of executing air-raids that would endanger the very life of the country. As, however, our present commitment in Europe implies the possession of a Continental ally, and

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therefore of a footing on the Continent, we need not tamely submit to the menace. For we can, on the outbreak of war, despatch our mechanized expeditionary force to act on the northern flank of that ally and sweep the enemy coasts of aerodromes.

*Co-operation with Aircraft.*—So great is the difference in speed between the aeroplane and the foot-soldier that it is almost as easy for aircraft to co-operate with a moving army of the present type as with a stationary garrison. When, however, the basic speed advances from 2½ m.p.h. to 10 m.p.h. and the daily "Marschleistung" reaches 100 miles in place of 15 miles, co-operation will become more difficult and its need greater. In fact, mechanization, as it nears completion, will tend to make army and air force more than ever one composite body, so hard will it become to separate the command and the functions of the one from those of the other. Reconnaissance is a case in point. The armoured car, when engaged on this duty, dare not exploit its speed unless the aeroplane has declared the country ahead to be free of the enemy. Nor can the report of the aeroplane be fully accepted until the country has been explored by the armoured car. The work of the two vehicles is, in fact, reciprocally complementary; and a commander chosen from either army or air force must conduct the reconnaissance in direct control of formations belonging to both services. It might be said that these truths also apply to the existing combinations of aeroplanes with cavalry; and so they do to some extent. It is all a matter of degree, and the touchstone is speed. The more nearly the pace of the ground-unit approaches that of the air-unit and the wider its range of activity, the closer must be the co-operation between the two.

In battle, the action of the aeroplanes with regard to friendly tanks will be mainly protective. Each commander will seek to keep his main body compact both for manoeuvring and hitting purposes. In this state, however, it is a target for hostile aeroplanes in numbers beyond the shielding powers of escorting A.A. guns. Hence the engagement of enemy aeroplanes, until the achievement of local air-superiority, will be the first task of our aircraft, their second being the attack of mass-targets. A third might be the creation of a smoke curtain under the orders of the commander; and reconnaissance and report will of course continue

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whatever other action they may be taking. Spotting for artillery may be found necessary as massed formations approach the battlefield, but it is a task that will lie rather in the province of the C.R.A. than of the air-force observer; for the former will normally himself direct the concentrated fire of the whole of his guns as from a hose. Once battle is joined aeroplanes will be unable to distinguish friend from foe in the forward area and will have to direct their efforts against reserve-formations and transport. In the pursuit their main value will lie rather in indicating the direction of the enemy retirement than in the attack of enemy tanks; for the latter will disperse in retreat if the ground permits, and the engagement of individual vehicles is not remunerative from the point of view of the aeroplane.

*Anti-Aircraft Defence.*—Arrangements for A.A. defence and the training of the personnel attached to it have made great strides since the war. The organization of the line of communication in this respect is thoroughly sound and should prove effective provided a sufficiency of guns and searchlights be allotted to it. The protection of marching troops, too, has been carefully studied and is as complete as can reasonably be expected. No real security from the attack of aircraft can, however, be afforded to flesh and blood marching along roads, passing through defiles, and bivouacking in groups at night. Even if A.A. guns are present in sufficient numbers to force aircraft to a height at which bombing becomes no longer remunerative, there are activities they could not prevent, such as the spraying of gas on the road ahead of a column. The days of unarmoured troops are, however, numbered. As the C.I.G.S. said in a recent speech: "The human race will not again stand the losses of the last war"—losses largely due to lack of armour.

The problem ahead of us now is the protection from air-attack of armoured forces. It is, of course, in many ways a much simpler affair than the former problem, for the A.F.V. provides in itself a number of guards—armour against splinter and bullet, speed, cross-country movement, gas-protection and power of producing smoke. Moreover, recent experiments show that the machine-guns ordinarily carried are very effective against low-flying planes. So much for individual protection. For general protection on the

## SOME ASPECTS OF MECHANIZATION

march, the increase in speed, both individual and collective, in the army of the future will demand a change in the system at present in vogue. Roughly speaking, with existing equipments A.A. units can piquet columns moving at 2½ m.p.h. with only a quarter of their weapons out of action. But, if pace be increased to 10 m.p.h., which may prove to be the basic speed of columns of A.F.V.s, these A.A. guns would never be in action at all.\* The problem is further complicated by the necessity for giving armour to all vehicles in a mechanized force, by the great increase in the daily march, by the system of grouping A.F.V.s according to speed and by the consequent need of advancing by bounds. It would still appear sound to deal with the problem by piquetting methods. The question then arises as to whether to piquet for the whole column or to piquet by speed-groups.

In the former case, A.A. guns mounted on the fastest vehicles in the force would have to move ahead of the column, piquet it throughout its length, then overhaul it again and repeat the process. But this would impose a great strain on both the personnel and machines employed. It would, moreover, only be possible to use a very light A.A. gun; for, in every A.F.V., a compromise has to be effected between mobility, power and protection; and where the first of these is of a high order, one or both of the other qualities must be sacrificed. Our A.A. vehicle will, therefore, if we give it any protection at all, be only able to carry a gun of small shell-power, say a 1-pounder—a great contrast with the present A.A. gun which fires a 16-lb. shell. Yet another objection to this method is that piquets would be so scattered as to require escort by other vehicles.

There are no such drawbacks in piquetting by speed-groups. A.A. gun carriers need only be the fastest in their respective groups and need not, therefore, make any great sacrifice of power to mobility. The armoured car could be equipped with a heavy machine-gun, and, if the latter were supplied with the elongated bullet, it could engage planes up to 6,000 feet. Tankettes might be armed with the Vickers gun, also firing a special bullet. And tanks should be given the heaviest weapon—possibly a 6-pounder—they can be designed to take without handicap in other directions. That is, the

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\*See Lecture by Captain K. M. Loch, M.C., R.A., *R.A. Journal*, January, 1928.

vehicles which travel in the closest order and offer the easiest target will obtain the best protection.

It might, perhaps, be urged that each A.F.V. should have its own complete A.A. protection. This is a matter for the designer. Naturally, if, for each kind of vehicle, a mounting can be produced which, without sacrifice either of efficiency in the engagement of other targets or of the mobility of the car, or of armour, is equal to the attack of aircraft at all reasonable heights, then it would certainly be desirable to make all A.F.V.s self-protective. "Jack-of-all-trade" weapons are, however, but seldom a success and we may, therefore, for the purpose of our argument, take it that special vehicles carrying special weapons will have to be allotted to the attack of aircraft. The actual proportion between them and ordinary A.F.V.s will have to be settled by experience.

It is uncertain whether or not searchlight lorries will be required to accompany a column. In principle, battle-vehicles, that is ground battle-vehicles, should be kept to a maximum and other types to the minimum consistent with safety. In all probability it will be found that, though, for protection at night, searchlights may be required in the case of armies, it will be better to trust, in the case of small forces, to cunning and concealment.

For special operations, such as the passage of a river or of a difficult defile, it might be found advisable to reinforce the A.A. weapons of the mechanized forces by some of the mobile 3-inch guns normally allotted to the line of communications. There would be no great danger in such action, provided the transfer were carried out quickly and secretly; for the particular operation would in all probability distract the attention of hostile aircraft from our rear services.

This completes the picture of the probable action of tanks and aircraft in company and in opposition. It is, of course, in the absence of relevant experience, only a superficial survey of the subject; but the following points appear to be established:

That the advent of the fully mechanized army will force a higher mobility upon the ground services of the air-force, and will handicap the activities of the latter to some extent.

That the co-operation of air with ground forces will be even more important in the future than in the present, and that it will

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be evinced in battle by a concentrated attack on enemy planes with a view to shielding the heavy tank formations.

That mechanized forces are not nearly so vulnerable to air-attack as ordinary forces. In fact, so great are the advantages inherent in the former—of armour, of the possibility of concealment and of a steady platform—that the airman will be inclined to shun such a prickly opponent and seek easier victories elsewhere. Such a conclusion furnishes a strong argument for the early and complete mechanization of our army.

That A.A. protection should be compassed by piquetting as at present, and that it should be carried out separately in each speed-group.



NAPOLEON'S ARTILLERY CROSSING THE GREAT ST. BERNARD

## A BIT OF SCANDAL

IN A SENSE, it might be called quite a scandal. It occurred in military circles, and there have even been vague whisperings to the effect that a court-martial is in order. It may even have some connection with the political scandals in Oklahoma. At least, the perpetrator of the joke came from that State no later than January.

Worst of all, the perpetrator is thoroughly feminine, has a reputation for beauty, and had previously shown herself seemingly a stickler for propriety. Seemingly, we said. Some now think the worst.

It seems that back in January there came to the Armory of Mounted Commands for the 103rd Field Artillery a fine detail of remounts, straight from the open prairies of Oklahoma. They were clear-eyed, firm-stepping, sleek-coated horses, all of them. There wasn't one in the bunch that seemed to shelter a hint of meanness, or at least 'tis so reported.

Least of all did suspicion attach to a fine chestnut mare that was as winsome in her way as any maiden who was ever Queen of the May. But this mare, whose name is considerably withheld from publication, had no thoughts of being Queen of the May. May First is a month too late.

Came April First, otherwise known as All Fools' Day.

This fine mare became a mother. Her newborn son was an upstanding fellow, rather wobbly in the legs, but with as sleek a chestnut coat as his mother's, even though he did have a white belly.

But he was soon a joke for all of that, an April Fool for all the National Guard of Rhode Island to be chagrined about.

He had long ears. His form was slightly less horsey than is the thing in correct military circles. Expert horsemen, after consultation, realized the grim truth—he was, and is, a mule, though by necessity an army mule.

Stable Sergeant Murphy named the youthful mule "Spud," but it will be many a day before the young mule's mother will live down the tale that is told around the armory.

'Tis not everyone who can make April Fools of the National Guard and still hold high their heads, but she that presented the militia with an army mule on April First seems not even abashed.—  
*Providence Journal.*



# NATIONAL GUARD NOTES

## Horses for National Guard

THE FOLLOWING letter, dated March 7, 1929, from the Chief Militia Bureau to the Adjutant General of states having mounted organizations, contains information which it is believed will be of interest to all officers of horse-drawn field artillery units of the National Guard:

"1. The maximum number of horses that may be maintained in the National Guard, as authorized by the Secretary of War and for which funds have been appropriated for the fiscal years 1929 and 1930, is 10,420. This number is approximately 85 per cent of the maximum allowance established by law for the mounted units of the National Guard now organized. Pending the revision of N.G.R. 79, which will provide for a more equitable distribution and a more efficient use of the horses authorized for maintenance, the allowances for each state as established on October 1, 1926, will remain in effect, subject to such modifications as have been previously made. In order to meet the situations arising in a State due to changes in organization or other causes, the State authorities may submit recommendations for a redistribution of the horses within the State.

"2. Until further notice, and in order to remain within the authorized allowance of 10,420, State or organization-owned horses can be accepted for maintenance only on the condition that a like number of unserviceable federally owned horses be eliminated by survey or by the withdrawal of Federal recognition from unserviceable or unsuitable State or organization-owned horses. Therefore, in requesting Federal recognition of State or organization-owned horses, a statement of the horses federally owned, State or organization owned that are to be eliminated must accompany the request.

"3. During the fiscal year 1929 approximately 1,200 horses have been purchased and approximately 965 federally owned horses have been eliminated through survey and 100 State or organization-owned horses have been eliminated through withdrawal of recognition. During the fiscal year 1930 at least 500

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additional horses will be purchased and will be utilized for the purpose of replacing a like number of remaining unserviceable horses now in the hands of the National Guard. You will be advised later of the procedure to be adopted in accomplishing the foregoing."

On April 1, 1929, 75 per cent of the 12,000 horses mentioned in the above letter had been delivered to organizations, and it is expected that the remainder will be purchased and delivered prior to June 1, 1929.

### **Examination for Gunners in the National Guard**

BY HENRY BURR PARKER, MAJOR, F.A., D.O.L.

TO WHAT extent can the new T. R. 430-175 (Examination for Gunners) be injected into a National Guard battery's training schedule to secure the maximum of qualification without slighting other essential battery training?

This question was asked at an officers' conference where dissatisfaction was expressed at the lack of qualified gunners in the regiment. Bear in mind that the National Guard is entitled to armory drill pay for only forty-eight drill assemblies of one and one-half hours each year. Even more effort must be made in the National Guard to render instruction interesting, to provide variety, and to develop initiative, than is made in the regular establishment. As always, and more so, any tendency to "get into a rut" must be avoided. Why more? Attendance depends largely upon these things and, without attendance, no progressive training can be accomplished. This training is particularly important because the National Guard is, practically speaking at least, the larger part of our first line of National defense. Also all National Guard training, of whatever nature, must be highly organized in order to secure the maximum results from the very limited time provided.

#### THE SOURCE

Perusal of the new regulations relative to this subject shows certain definite, exclusive information necessary for the basic qualification as 2nd Class Gunner. All other information not called for

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here is extraneous and is not required. It is non-essential, at least in so far as basic qualification is involved. Those men qualified have a general knowledge, and they have the ability to do certain important, specific operations which are not imparted in the usual battery training. Particularly in the National Guard, a schedule which offers the instruction required for the basic qualification will accomplish more than any schedule not containing such an objective. This for the simple reasons: first, they learn some certain, important things well; and second, there is incentive, the reward of individual merit, the badge of qualification. Incidentally, it is believed that time spent on these qualifications will improve the capacity for "Team play" in a gun crew.

### AN IDEA

Brought out by the line of reasoning above is an idea, i.e., that much of the material necessary for a battery training schedule is contained in T.R. 430-175. This is particularly true of the 2nd Class gunner subjects. When this thought of using the material contained therein, in a training schedule, came up, many obstacles presented themselves. The drivers and the battery detail had to be trained; guard duty, recruit training, preliminary and record pistol training must continue; the Articles of War must be read; Riot Duty must be included; a thousand and one objections were offered. All in all, it seemed proved that gunners could not be qualified and other essential battery training continued in the time allotted. One battalion commander believed in the plan developed from this idea, however. The regimental commander was sufficiently convinced to permit a fair trial, in all firing batteries, for the plan described below.

### THE PLAN

All firing battery training was assumed capable of division into two kinds (*a*) massed instruction, and (*b*) grouped instruction.

(*a*) Massed instruction includes training put over best with the entire personnel assembled, or by large groups, the subject matter of which, due to time or inherent peculiarities, can not be taken up individually with the men, viz., Battery Inspection, Riot Duty, Equitation, Calisthenics, The Articles of War, etc.

(*b*) Grouped instruction includes those other subjects which

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are assimilated best through individual performance, or by personal man-to-man explanations, viz., pistol training, recruit training, various 2nd Class gunner subjects, etc.

The purpose of this article is to dwell and to enlarge particularly upon the method of instruction adopted under (*b*) above.

The list of subjects under 2nd Class gunner qualifications was carefully studied. As a result, it was divided into five groups, according to the subject matter of the questions.

1st Group: Posts of the Cannoneers, Carriages limbered, unlimbered and mounted. Duties of the Cannoneers, Service of the Piece, Prepare for Action, and March Order.

2nd Group: Questions pertaining to operation and location of parts.

3rd Group: Questions pertaining to dismounting and assembling.

4th Group: Questions on lubrication and cleaning.

5th Group: Questions on ammunition and fuzes.

The original scheme included rotation of the personnel through these five groups each drill assembly. Each group had then approximately ten minutes with each instructor. However, practical test of this plan soon proved conclusively that ten minutes was not sufficient time for each group. At a conference it was decided to have three sets of two groups one drill assembly and two sets of the other three groups, the following drill assembly. Thus the instruction continued in small rotating squads, with the same subject matter at the same time. It had the added advantage of working more group instructors, with smaller squads, and gave each squad more time with the subjects.

The schedule was worked out in detail for one month in advance and posted. Instructors were detailed for each group from among the officers and noncommissioned officers for a period of two drill assemblies, (first and third, second and fourth).

A typical drill schedule for one night is given below. Roughly the division of one and one-half hours is, first, twenty minutes for massed instruction, i.e., battery inspection, calisthenics, dismounted drill, etc., second, forty minutes of grouped instruction, gunners examination subjects as outlined above (for part) or equitation (for part), thirty minutes of massed instruction, i.e., standing gun

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drill, service of the piece, detail instruction, and equitation (for part). Also, detail instruction may, independently, be either massed or grouped, depending upon the nature of the subject matter.

### MASSED INSTRUCTION

<i>Date.</i>	<i>Hours.</i>	<i>Subject.</i>	<i>Units.</i>	<i>Texts.</i>	<i>Instr.</i>
Jan. 9	7:30 to 7:40	Insp. Dism'td.	Entire Btry.	T.R. ....	All officers
(1st Drill)	7:40 to 7:50	Calisthenics, or disciplinary drill.	Same.	page.....	Lt. X.
	7:50 to 9:00	Equitation.	50% btry.	T.R. ....	Lt. T.
				pages .....	

### GROUPED INSTRUCTION

7:50 to 8:30	1st Group Cards.	All personnel,	T.R. ....	1st Groups.
Personnel to shift after 20 min.	(Cannoneers, Posts and Duties).	less equitation.		Lt. Z. Sgt. "M."
		Three sets, two Groups.	Exam for Gunners, 2nd Class	Corp. "A."
	2nd Group Cards.	Same.		2nd Groups.
	(Operation and Nomenclature).			1st Sgt. "N." Sgt. "R." Pvt. 1-cl. "D."

### MASSED INSTRUCTION

8:30 to 9:00	Service of the piece	Reg. Sections.	T.R. ....	Lt. "X."
		All personnel, less Eq. and Detail.	pages .....	(Executive)
8:30 to 9:00	Btry. Net, Splices, transmission of messages. Drill in transmitting Art. terms. Training Recorders. Black board problems, firing data computation. Use of Aiming Circle. (a) Laying by Mag. Compass.	Detail, Instrument Section.	T.R. ....	Lt. "Z."
			pages .....	Lt. "S." Sgt. "T."

Cards are prepared for each question of each group, the question on one side, and on the reverse, the answer in the exact verbiage desired, with the reference authority from which secured. Each group instructor was furnished, at least one week in advance, with a set of cards for his group. His duty consisted in so familiarizing himself with this subject matter beforehand, that reference to the cards during drill for answers would be unnecessary.

As to the form of these cards, it is believed that the answers can be greatly consolidated over the text. For example, there are three kinds of projectiles used with the 75-mm. gun (Shrapnel, H. E. Shell, and Chemical Shell, i.e., Gas and Smoke). Then name them, number them, and give their distinguishing marks. The same applies to any operation. How many things to be done? What are they? This presents the information more concisely and definitely. Another example, requiring performance, can be explained on the

## THE FIELD ARTILLERY JOURNAL

cards: Disassemble the breech block. On the card reversed; there are  $n$  operations. Then name and number them.

The examination of 2nd Class gunners is left much to the discretion of the battery commander by paragraph 7, Section I, T.R. 430-175. To personally examine for 2nd Class gunners some sixty men successively, would require more than all a battery commander's time for a year. That is, it would have to be done outside drill hours. But also this method is not made satisfactory by the regulation. The difficulty of examinations has been met in some organizations by a "Progress Chart for Gunners' Examination." This chart is similar in operation to all other very common progress charts. The information on this chart is based on the observations of the officers. It is posted to date after each drill and is kept displayed for the encouragement of the men. An example of such a chart accompanies this article.

After the plan was functioning successfully, one organization tried an innovation. The battery commander detailed an officer to prepare himself to explain and demonstrate briefly the purpose and operation of the battery pump and the screw filler. His subject was incorporated into the drill schedule, and it was given ten minutes with each group in the rotating scheme. The writer will venture an opinion that there are many organizations in which knowledge of the appearance of these articles, and their use, is limited to a very select few of the personnel. There is, positively, one National Guard organization in which, through this group scheme, 90 per cent of the organization have had now ten minutes of practically individual instruction in these essential tools. These men have learned of this equipment "the what, the where, the why and the how," and they will not search as one did before this instruction for a pump with which to "blow up the tires." This innovation is cited merely to show how other important subjects can be combined into the group scheme of instruction without seriously disrupting the schedule.

### THE RESULTS

In the organizations where the writer observed, certain results followed adoption of the plan.

(a) *Increased individual interest in training.*—The cause of this, it is believed, was several fold. Variety was introduced into

## NATIONAL GUARD NOTES

every drill, and several times during every drill. The personnel began to realize that if they came to drill something different from the work of last week or the week before might be learned. What would it be this time? Also, the men had opportunity to compare themselves in knowledge with others, thus introducing the elements of personal pride and competition. Also, officers and noncommissioned officers were confronted with the necessity for learning their "stuff." They could not stall along in this atmosphere. The method permitted the battery commander to devote more time to supervision, and by so doing he could observe what his men knew and how they imparted it.

(b) *Initiative was fostered.*—Those men picked as instructors began to show results from their interest. With increased knowledge, some degree of increased responsibility was evidenced. A better discipline developed in the groups. This was due, in some measure at least, to a growing respect for the knowledge displayed by the group instructors. But it is also believed that the system and method used produced this result as much if not more than the instructors' increased knowledge and confidence.

(c) *Qualifications.*—Before the system had been in vogue for three months the first gunners examination chart had posted several 2nd Class Gunners. It is estimated that by Federal Inspection, in April, 1929, each organization will have over 50 per cent thus qualified.

### A SUMMARY

The scheme described herein for training and qualifying 2nd Class gunners includes:

(a) A division of all battery instruction into two kinds, massed and grouped.

(b) A systematic organization of the battery time schedule to facilitate and coordinate these two kinds of instruction.

(c) A card system covering completely all 2nd Class gunner subjects by questions and answers.

(d) A progress chart for gunner's examination.

### CONCLUSION

For the plan outlined in this article, no originality is claimed. The basic idea of the group system has been observed in the Regular Army organizations, particularly in preparation for the old

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gunner's examination. It is believed, however, that in this plan is at least the germ of an idea that is particularly adaptable to National Guard training. The scheme used to carry this out may be greatly at variance with the one herein described. Possibly only a phase or element of it will be used.

The writer has often deplored the fact that there is too little exchange of ideas on methods of training. Much is written on what will be taught, but texts are scarce on the best method, or any method, of putting this mass of information "over." Some instructor or some unit commander may find here material to give new incentive to training that has become "cut and dried."

In the preparation of this plan, and for cooperation in the details of its execution, the writer desires to acknowledge the assistance of Colonel Otto E. Sandman, 143rd Field Artillery, California National Guard, and Major Ralph E. Merritt, commanding the 2nd Battalion, 143rd Field Artillery.



NAPOLEON GETTING HIS ARTILLERY UP THE LANDGRAFENBERG



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THE EDITOR, The Field Artillery Journal,  
1624 H St. NW.,  
Washington, D. C.

SIR:

On the occasion of the death of Colonel Edward Terence Donnelly, Field Artillery, retired, I would like to express my personal appreciation of the qualities of this officer. I am asking you to publish this letter in the JOURNAL merely because I am persuaded of the universality of the sentiments which I hold.

Colonel Donnelly was my first Captain, and I never knew a better officer nor a finer man. I am sure that almost all of the officers of the Field Artillery as it existed before the World War knew him and felt as I did. I did not serve with him during the war but on many occasions happened to meet subordinates in the brigade which he commanded in France. Without exception, I found that among them he inspired similar respect and affection.

Those most intimately connected with Colonel Donnelly must feel keenly his loss, but I am sure that in the Field Artillery and in the Army as a whole the dominant emotion on the occasion of his passing will be a sense of gratitude at the privilege of association with such a character.

J. N. GREELY,  
*Major, Field Artillery (G.S.)*

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# FOREIGN MILITARY JOURNALS: A CURRENT RÉSUMÉ

**Revue d'Artillerie, January, 1929**

In his article, "Anti-Tank Weapons," Major Morel presents a study of the various types of weapons now in use or under test and seeks to determine the requirements for effective combat against modern tanks. The present types comprise machine guns of calibers from 13 to 25 mm. and cannon of calibers from 37 to 47 mm., as shown in the following table:

CHARACTERISTICS OF THE PRINCIPAL ANTI-TANK WEAPONS

Weapon	Caliber	Weight of Projectile	Muzzle Velocity	Weight of Piece	Weight of Mount	Remarks
	mm	gr	m	kg	kg	
Machine guns of about 13 mm. caliber.						
Browning.....	12,7	53	762	38.50	34	
Tuf (Tank und Flieger).....	13	51	735	44	50	
Hotchkiss.....	13,2	52	800	32	130	
Breda.....	14	60	1,000	35	65	
Farquhar.....	12,7	37,3	850		17	
Fiat.....	12,5	40	940		120	
Machine guns of about 20 mm. caliber.						
Oerlikon.....	20	142	860	60	110	Described in FA Journal Nov.-Dec. 28
Becker.....	20	145	520	40		
Madsen.....	20	{ 140 165	{ 750 675	} 55	40	
Fiat-Revelli.....	25,4	200	440	40		
H. I. H. A. T. ....	20	{ 142 128	{ 580 600	} 39	95	Manufactured in Holland
Cannon of about 40 mm. caliber						
				Weight in battery kg.		
Bofors L 37.....	37	{ 600 800	610 485	228		Breaks up into loads of about 75 lbs.
Bofors L 33.....	47	1.500	560	310		
Vickers Mod. 1915.....	40	907	601	279		Breaks up into loads of about 75 lbs.
American Mod. 1925.....	37	567	610	137		
Beardmore.....	40	910	579	189		Breaks up into loads of about 75 lbs.
Armstrong.....	37	680	427	89 (approx.)		Breaks up into loads of 40 lbs.
Vickers.....	37	680		241		Max. range 4200 m. Breaks up into loads of about 80 lbs.
Skoda.....	37	825	460	200 (approx.)		
Poczisk.....	47	1.500	465			

FIG. 1

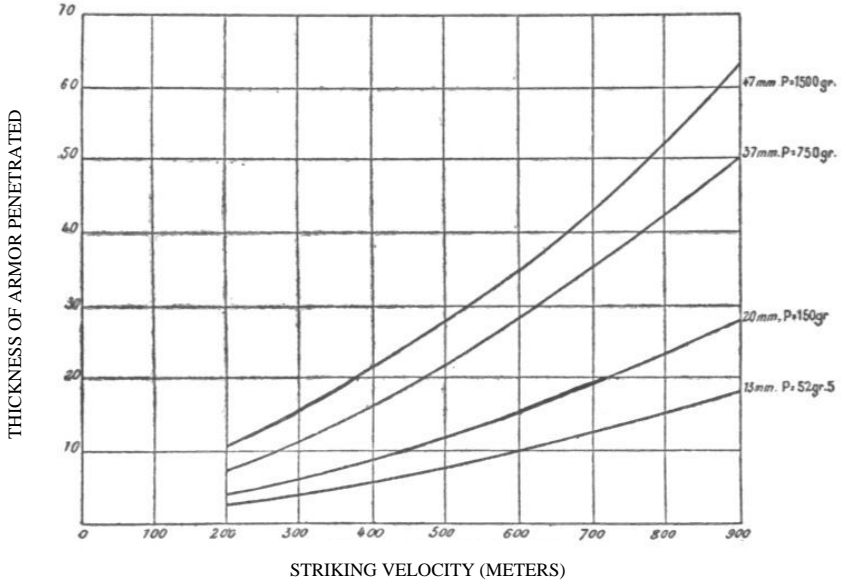
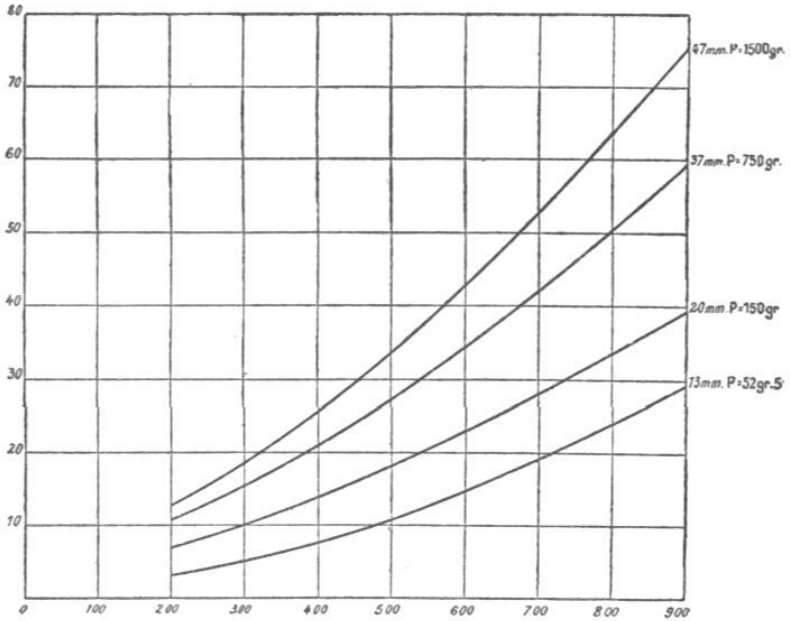


FIG. 2



PENETRATING POWER OF PROJECTILES

Fig. 1: Angle of incidence=60°

Fig. 2: Angle of incidence=90°

P=weight of projectile; 1 lb=450 gr. (approx.)

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Armor-piercing projectiles, with or without tracer and with explosive or incendiary charges, are provided for practically all the weapons listed. The penetrating power of the various projectiles is shown graphically in Figures 1 and 2, Figure 2 showing an angle of incidence of 90° and Figure 1 showing an angle of incidence of 60°. The angle of incidence of 60° used in Figure 1 is chosen as being the limiting angle within which the projectiles will not ricochet. In combat, impacts of oblique angles will be the rule, normal impacts occurring very rarely.

In order to determine the characteristics of a suitable anti-tank weapon, the following requirements must be considered:

Thickness of armor to be penetrated;

Normal combat ranges;

Explosive effect of the projectile within the tank.

The table below, extracted from a comprehensive work on tanks published at Munich in 1927 (*Taschenbuch der Tanks* by F. Heigl), gives the characteristics of the various modern types of tank.

Nation	Type of Tank	Max. Speed (km-hr)	Weight (tons)	Thickness of Armor (mm)		
				Front	Side	Rear
England .....	Experimental type 1925-26	40 to 50	2	10	10	10
	RR Vickers 1926	30	12.5	14 to 15	10	10
	Vickers 1925 (heavy)	30	35 to 45	22 to 25	10	10
Spain.....	Trubia 1925	20	7 to 8	16 to 20	10	10
United States .....	Medium tank 1921-22	25	25	25	20	10
	Christie amphibian 1923	30	6.8	6	6	6
France.....	Light tank 1924-27	12	6.5	22	16	8
	Auto-tractor 1923	40	2.1	8	6	6
	2 C 1922	8	68	45	22	22
Italy .....	Fiat type 3000, 1919	20	5	16	16	16
	Fiat type 2000, 1918	7.5	40	20	20	20
Russia.....	Type 1925, heavy	11	80	40	20	20
Sweden.....	Model 1921	20	9.5	15	15	15
Czechoslovakia ..	K. H. 50 1924	12	6.8	13	13	13

There are many different opinions as to the trend of future developments in tank construction, but, considering the general tendency toward higher speeds, it appears reasonable to believe that the average thickness of armor will not exceed 30 mm. (1.2 inches).

The ranges at which tanks will be engaged will depend mainly on the tank tactics in vogue. Without doubt, the entry of tanks into action will be concealed in every way possible (semi-darkness, fog, or smoke), and every effort will be made to maintain a condition of low visibility during the progress of the attack. Hence,

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the defending side will have to combat tanks mainly within its own lines and, in general, at very short ranges, about 300 meters.

For effective use against tanks, a projectile must possess the following characteristics:

(a) With an angle of incidence of  $60^\circ$ , it should be able to penetrate 30 mm. of armor at 300 meters.

(b) It should be provided with a tracer visible to 1,000 meters.

(c) For shell, the charge of high explosive, incendiary compound, or gas should be sufficiently powerful to put a tank out of action by the explosion of a single round inside.

(d) The fuse used should be of the delay action type and so constructed as to be safe in the case of rounds which do not strike the tank.

An examination of the various weapons in service or under test shows that none of them possess the penetrating power required. In this regard, the practical difficulties encountered in the construction and maintenance of rapid-fire weapons with muzzle velocities greater than 850 meters a second eliminate calibers of less than 30 mm. At present, also, a caliber of 37 mm. is the least that will give us a shell of sufficiently powerful explosive effect.

For effective use, weapons of 30 mm. caliber must be of the machine gun type and weapons of 37 mm. or more must be cannon. Of the two, the cannon appears to be the better weapon. With a semi-automatic breech mechanism, it can fire almost as rapidly as the machine gun under service conditions and it has a more effective projectile. The practical rate of fire of the 30 mm. machine gun will be about 80 rounds per minute, while that of the semiautomatic gun will be about 50 rounds.

To sum up, the most desirable anti-tank weapon appears to be a semi-automatic gun of 37 mm. caliber, firing a 1.65-pound shell with a muzzle velocity of 750 meters per second; or one of 47 mm. caliber, firing a 3.3-pound shell with a muzzle velocity of 650 meters.

The type of mount to be provided will depend upon the manner in which the weapon is to be used tactically. Two methods of use are generally proposed. In one, the guns are placed on self-propelled mounts and held in reserve, ready to act as occasion demands. In the other, they are distributed along the front like machine guns, as part of the normal infantry organization. The latter method would require a split trail mount weighing 900 to 1,100 pounds.

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Their experience in combat against tanks during the war led the Germans to give each infantry regiment one battery of six 77's as part of the infantry organization.\* This number of guns appears to be a minimum which will in all likelihood have to be increased.

Special types of weapon for fire against a single class of objectives are, of course, open to the objection of wastefulness in men and matériel. To meet this objection, certain establishments have brought out an infantry cannon of double caliber providing a carriage on which may be mounted either a small-calibered tube firing an armor-piercing projectile with high velocity, or a larger-calibered howitzer tube for use against personnel.

### February, 1929

Lieutenant Colonel Benoit's article, "**A Method for Calculating Initial Corrections,**" is an amplification of his interesting article on the same subject which was summarized in the FIELD ARTILLERY JOURNAL for May-June, 1928. The author adds tables of logarithmic distances for making a slide rule to serve the purpose of the charts given in the preceding number.

The charts are readily constructed, can be pasted in the range tables, and appear to be more suitable for rapid use than the slide rule recommended by the author in this article.

Other articles of interest appearing in the January and February numbers are: "The Wars of the First Empire"; "Cannae and Von Kluck's March on Paris"; and "Notes of an Artilleryman, 1914-18." These are continued articles and will be summarized on their completion.

### Revue Militaire Francaise, January, 1929

"**The Rupture of the Salonica Front in 1918**" is an article by General Kalafatovitch, who describes this important phase of the war on the Eastern front.

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\*The 77 mm. infantry gun, Model I. G. 18, prohibited by the Treaty of Versailles, has the following characteristics:

Height of breech above ground .....	28 inches
Diameter of wheels .....	36 inches
Weight in battery .....	1430 lbs.

The trail is hinged and folds back along the tube in the traveling position.

The piece is provided with a limber carrying 21 rounds and is drawn by two horses.

The battery comprises six pieces and six caissons. It carries a total of 414 rounds of ammunition.

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The Allies first conceived the plan of an offensive on the Balkan front in the early summer of 1918. At this time the Germans were engaged on the Western front in a last effort to crush the Allies before the arrival of American reinforcements; and for this purpose the Germans had withdrawn as many troops as they could spare from the Balkans. In July, General Franchet d'Espérey arrived on the Salonica front to take command, and after a hurried visit to the Serbian headquarters he issued preliminary instructions.

The general plan was as follows: The Germans and Bulgarians held a line extending from Lake Ochrida to the Aegean Sea. This line had its flanks resting on insurmountable obstacles and was organized along its entire front for trench warfare. General Franchet d'Espérey and the Serbian staff decided on a frontal attack, and chose, as point of rupture, a 30-kilometer sector in front of the Serbians in the most mountainous part of the front. The Germans and Bulgarians considered this part of the front practically impassable. Consequently, it was defended by a weak holding force and one infantry regiment as reserve.

The force chosen to effect this rupture consisted of six divisions of Serbian infantry, one division of Serbian cavalry, two divisions of French infantry, with heavy artillery and aviation. The Serbian Army accepted with enthusiasm this mission as an opportunity to liberate its native soil.

Against this force the Germans and Bulgarians had only two divisions and practically no reserves. It is an almost unbelievable fact that along a 300-kilometer front the German and Bulgarian high command had not a single division in reserve. The only reserves were isolated regiments of infantry, twelve in all.

The contrast between the two forces is striking. Although the forces were equal in numerical strength along the entire 300-kilometer front, the Allies had constantly held six divisions of infantry in strategic reserve. On the other hand, the Germans and Bulgarians, who awaited an attack and who should have arranged for strong reserves, had all their divisions in the front line, with only isolated regiments in reserve. Under such conditions the German-Bulgarian high command had prepared its own defeat, having provided for no means of intervening in the battle.

In the battle which followed, the Bulgarian troops stubbornly opposed an overwhelmingly superior force, but had to retire at the

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last moment. General Ludendorff made a very inexact statement in his memoirs in which he remarked that the Bulgarians were demoralized, and, purchased by Allied gold, they retired almost without having fired a shot. In answer to this statement General Kalafatovitch writes: "If anyone was to blame, it was not at all the Bulgarian troops, but rather the German high command, which had neglected the fundamental principles of war by not providing strong reserves as a means of intervening in the battle."

**"Exelman's Division on August 28, 1914,"** by Captain Minaret, is a discussion of an alleged tactical error on the part of a French division commander during the general retreat to the Marne.

General Exelman's division was a part of the 5th Army, whose mission was well defined: to disengage itself from the enemy, fall back hurriedly to the line Origny-Moy, and on the next day to launch a counter attack in support of the British to the west.

General Exelman withdrew his division from the general retreat to engage an enemy force which he thought was endangering the left flank of the 5th Army. The army commander had already left a force to protect his flank, and General Exelman has been criticised for not conforming to the general plan.

Captain Minaret, however, is inclined to side with General Exelman, thinking that he was correct in acting as he did. He cites this as an example where unforeseen local conditions may justify a subordinate commander in disregarding a general plan.

Captain Loup in **"The Population of Morocco"** points out the falsity of the general impression that the Arab stock predominates in Morocco. Morocco is essentially a "Berber" country. It was inhabited by the Berbers long before the Christian era; and the earliest historian, Herodotus, mentions the warlike qualities of the Berbers. He describes them as "ardent in the attack, discouraged by defeat but stubborn in renewing the fight." These same qualities are characteristic of the Riffs today. In the Punic Wars, the Berbers took an active part as mercenaries of Carthage. Although Rome conquered and destroyed Carthage, it never subjugated the Berber tribes.

Intermingled with this native Aryan race we find the Arabs invaders and conquerors. The Arabs are the newcomers, as they have lived in Morocco only fifteen centuries.



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Moreover, in Morocco are found Moors and Negroes. The Moors are of mixed blood, the descendants of Mohammedans, who, after an occupation of 800 years, were driven from Spain during the reign of Ferdinand and Isabel. They still appear to be homesick for the plains of Andalusia, as they will not quit the northern coast which overlooks Spain.

The Jews live in communities. They came by groups during the centuries from the Near East and more recently from Poland. Before the arrival of the French they led a very miserable and precarious existence. They were not allowed to ride on horses, to wear the native headdress, or to pass in front of the mosques without removing their shoes.

The Negroes were originally brought as captives from Senegal or Soudan and are soldiers or slaves. In general the slaves are treated very humanely. Frequently, when a slave is given his liberty, he voluntarily continues in the service of his master.

Captain Loup reminds the French that they must realize in their dealings with the Moroccans that the predominating stock is Mediterranean and Aryan rather than Asiatic.

Lieutenant Colonel Doumenc describes the "**Automobile Show of 1928.**" Among other things he notes the increasing sale of private cars. There is now one car to every forty inhabitants in France, as compared to one car to every four people in the United States. There is a movement toward standardization or, "to use a less frightful term," a movement toward stabilization in automobile production. An air-cooled motor drew considerable interest at the show. Its many advantages over a water-cooled motor are apparent for use in battle and for use in desert transport.

The trucks and omnibuses are becoming larger and faster each year and are seriously competing with the railroads in France as in the United States.

### February

Lieutenant Colonel Grassett continues "**Montdidier**" in the February number, where he describes the disposition of forces before H-hour, and the action immediately following H-hour. The Allied attack came as a complete surprise to the Germans. On the evening of the attack German planes had reported a slight movement of tanks and artillery in the British sector but none in the

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French sector, in spite of the movement of a mass of artillery and tanks over congested roads. To these reports the German high command paid very little attention.

French artillery fire opened at 4:20 a.m. from pieces of all caliber massed almost hub to hub. The rain of shells paralyzed all German movement and from H-hour practically all German telephone lines were out. This can be attributed partly to the fact that the lines were insufficiently buried. All C.Ps. were isolated from the front lines.

In "**In a Tragic Hour in the Career of Napoleon**" General Camon relates the events leading up to the detention of Napoleon at Antibes from August 6 to 20, 1794.

Carnot, who was then the delegate of the committee of public safety for military operations, was opposed to an offensive against the King of Sardinia. Robespierre, however, wanted to set up a republic in Sardinia as well as in other neighboring kingdoms as a sure means of preserving the French Republic.

Bonaparte, then in command of the Army of Italy, was naturally in favor of an offensive, and he proposed to the Committee of Safety an offensive plan which would place the Army of Italy and the Army of the Alps under one leader for an invasion of Piedmont. Carnot was opposed to this plan. However, the government representatives who were with the Army of Italy sent one of their members to Paris to submit Napoleon's plan to the Committee of Safety.

In the plan Napoleon showed how faulty was Carnot's two-army, defensive plan. "The Piedmont frontier forms a semicircle, and the two armies of the Alps and Italy occupy the circumference. The King of Sardinia is on the diameter of the circle on a smooth, fertile plain, where he can maneuver his troops with ease from one end of the diameter to the other. The defensive system is then advantageous to the King of Sardinia. We should unite the two armies at one point of an offensive."

The Committee, in spite of Carnot, agreed to this plan. However, the discussion incident to the decision led to the downfall of Robespierre on the 9th of Thermidor. The next day, Carnot, in the name of the Committee of Safety, ordered the Army of Italy to cease its offensive preparations and by the same courier ordered the arrest of Napoleon as an accomplice of Robespierre.

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**"The Colonial Vocation of France,"** by Captain Marchand, is a study of the history of French colonial expansion. He complains that France has been either indifferent to the security of its colonies or has been so involved in continental warfare that it has been unable to devote its full power to the protection of its colonies.

An example of this indifference and neglect is found in the events leading up to the loss of Canada as a colony. The French were greatly outnumbered by the British colonists to the south of Canada, and France could send no assistance as it was involved in the Seven Years' War in Europe. To a frantic appeal from Duplex in 1751 for more troops, the French minister, Berryer, replied, "When the home is on fire one cannot be concerned with the stables." Nothing could better illustrate the indifference and helplessness of France at that period.



REPULSE OF MEXICAN CAVALRY AT BUENA VISTA

## FIELD ARTILLERY NOTES

### Phillips Pack Saddle Adopted as Standard

The Phillips pack saddle, heavy cargo type, has been adopted by the War Department as to type and approved as standard for manufacture and issue. The basis of issue will be the same as for the present Aparejo pack saddle.

The effect of this action will be the discontinuance of the manufacture of the Aparejo and the abandonment of its use in the service after the exhaustion of the present stocks.

This pack saddle has undergone a successful extended service test by the Howitzer Company, 29th Infantry, Battery B, 4th Field Artillery, and the 13th Engineers. It was recommended for adoption by the Infantry Board, the Pack Artillery Board, and the Board of Engineer Equipment.

### Allocation of Students in Reserve Officers' Training Corps for School Year 1929-1930

During the school year 1929-1930 the War Department contemplates an enrollment of a total of 127,141 students in the senior and junior units of the Reserve Officers' Training Corps throughout the country. In the senior units, which have basic and advanced courses, no limitation will be placed on the enrollment of basic students. A total of 14,226 students has been allowed for the advanced course. In the junior units there will be no limitation on the enrollment in units of schools which are essentially military in character. For those junior units which are not in this category 35,400 students have been authorized.

The initial enrollment for the school year for the advanced course and the junior units in schools which are not essentially military in character has been allocated to Corps Areas as follows:

<i>Corps Area</i>	<i>Advanced</i>	<i>Junior</i>
First—Boston, Massachusetts.....	1100	830
Second—Governors Island, New York .....	1005	...
Third—Baltimore, Maryland .....	1940	...
Fourth—Fort McPherson, Georgia .....	2496	6453
Fifth—Fort Hayes, Columbus, Ohio.....	1567	2640
Sixth—Chicago, Illinois.....	1163	8812
Seventh—Omaha, Nebraska .....	2187	4517
Eighth—Fort Sam Houston, Texas .....	1316	3053
Ninth—Presidio of San Francisco, California .....	1402	8104
Hawaii—Fort Shafter .....	50	991

## CURRENT FIELD ARTILLERY NOTES

### **Soldiers' Medal Citation**

"Charles P. Fowler, Army Serial No. R-2377176, corporal, Battery B, 17th Field Artillery, United States Army. For heroism when a truck caught fire under the canopy of the 17th Field Artillery Filling Station, Fort Bragg, North Carolina, on December 22, 1928. The truck was in flames and gasoline under and around it was blazing, thereby endangering valuable government property stored in the immediate vicinity. Corporal Fowler, disregarding his own personal safety, organized a group of men and fearlessly led them to the fire. Under his direction this group pushed the truck from the station and aided in completely extinguishing the flames. The heroism displayed by Corporal Fowler reflects great credit upon himself and the military service."

Present station: Corporal, Battery A, 17th Field Artillery, Fort Bragg, North Carolina.

Residence at enlistment: Holland, New York.

Birthplace: Holland, New York.

### **New Use for Army Identification Tags**

The Quartermaster General of the Army, Major General B. F. Cheatham, has received an application from the superintendent of one of the largest hospitals in an eastern city for a number of the army identification tags which are worn by every officer and soldier in the field. The hospital proposes to use the tags to assure against interchange of babies born in the hospital.

The superintendent further requested in any event to be furnished with a sample identification tag in order that the hospital might have duplicates manufactured if purchases could not be made from the army supply.

### **New Caterpillar on Market**

The Caterpillar Tractor Company has announced the "Caterpillar" Fifteen as ready for delivery. From the engineering standpoint, the Fifteen is a duplicate of the Ten, which has just gone into production and is being bought faster than a double shift of skilled workers can turn them out for farmers throughout the world. Just a little bigger than the Ten, it is a replica of it except in size and power. This company now makes tractors in the following sizes: Tens, Fifteens and Twentys, and the bigger Thirties and Sixties. The price of the Fifteen is \$1,500 f. o. b. Peoria.

### **Army Riding Team To Compete at Warsaw, Poland, Cologne, Germany, and Dublin, Ireland**

The Secretary of War has accepted the invitation of the Government of Poland for the participation of the Army riding team in the International Jumping Competition which will be held from June 1 to 12 in conjunction with a horse show given in Warsaw, Poland, under the patronage of the President of the Polish Republic. He has also accepted an invitation from the Cologne, Germany, Riding, Hunting and Driving Club for the participation of a team in the program of the International Concours Hippique, which will be held in Cologne from the 16th to the 24th of June, 1929.

Upon completion of the competitions in the Concours Hippique, the team will proceed to Dublin, Ireland, where it will participate in the International Military Jumping Competition to be held in conjunction with the Dublin Horse Show on August 6, 7, 8 and 9.

The members of the team are as follows: Major Harry D. Chamberlin, 9th Cavalry; Captain William S. Bradford, 9th Cavalry; First Lieutenant Edwin Y. Argo, 1st Field Artillery.

### **New Army Song Book**

More than 300 American Army Songs, including Field Artillery, West Point, Cavalry, etc., songs, have been published under the title of "Sound Off!" by Cosmopolitan Book Corporation. The songs have been selected by Lieutenant Edward Arthur Dolph from his private collection, which is probably the largest in existence. All periods in American military history are represented: the Revolutionary War, War of 1812, Mexican War, Civil War, Indian fighting, Spanish-American War, and World War. With words and music are the stories of the origin and authentic illustrations. The music is arranged by Philip Egner. Illustrations are by Lawrence Schick.

### **Lawton, Oklahoma, To Receive 9.2 Howitzer**

Under authority of an Act of Congress approved May 22, 1896, which authorizes the Secretary of War to loan or donate to municipal corporations condemned ordnance, guns and cannon balls, which may not be needed in the service of the War Department, the Secretary of War has donated a 9.2 howitzer to the city of Lawton, Oklahoma.

All howitzers of this caliber have been declared obsolete, and

## CURRENT FIELD ARTILLERY NOTES

four of them were retained at Fort Sill, Oklahoma, until the ammunition for them on hand at that post had been expended. At the time these howitzers were declared obsolete there were fifty-one on hand, practically all of which have been donated to municipalities under the provisions of the above-mentioned act of Congress.

### **Surplus Cotton Breeches and Coats To Be Sold**

The Assistant Secretary of War has approved the sale by the Surplus Property Division of the Office of The Quartermaster General of the entire quantity of 1,300,000 pairs of surplus cotton breeches, together with all the Army's surplus cotton coats. The Breecot Company of New York City, represented by Silverman Brothers, are the purchasers.

Efforts have been made to dispose of this enormous quantity of garments for a number of years past. So far as the War Department records show, this is a record sale for such a class of garments. It will result in an ultimate return to the Treasury of close to a million dollars in cash.

These garments have been on hand since the close of the World War and are in excess of the needs of the Army for a number of years to come.

### **Number of Horses for National Guard Increased**

Due to the prospective organization during the fiscal years of 1929 and 1930 of 24 additional mounted units as provided in the program for the development of the National Guard, the Secretary of War has authorized an increase in the number of horses for the National Guard. This increase will raise the number of horses allocated to the National Guard from 10,420 in 1929 to 10,692 in 1930 and 10,950 in 1931.

These 24 mounted units are as follows:

- 1 Brigade Headquarters Battery, Field Artillery.
- 3 Headquarters Batteries, Field Artillery.
- 6 Battalion Headquarters and Combat Trains, Field Artillery.
- 9 Batteries, Field Artillery.
- 1 Headquarters Troop, Cavalry.
- 1 Service Troop, Cavalry.
- 1 Headquarters Detachment Squadron, Cavalry.
- 2 Troops, Cavalry.

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Of the above units, the following have been authorized for organization and will be federally recognized during the second half of the fiscal year 1929:

- 4 Headquarters Batteries, Field Artillery.
- 5 Batteries, Field Artillery.
- 1 Headquarters Troop, Cavalry.
- 2 Troops, Cavalry.

### **Second Division Reunion**

The Second Division Association will hold its 11th Annual Reunion in Boston, Mass., May 31 and June 1. The officials of the Association are: Major General Preston Brown, President; Captain John W. Thomason, Jr., Vice-President; Captain C. O. Mattfeldt, Secretary; Captain George V. Gordon, Treasurer. The Boston Reunion will unquestionably be one of the most successful reunions the division has ever conducted. Major General John A. Lejeune, Major General James G. Harbord, Major General Wendell C. Neville, Major General Charles H. Bridges, former Assistant Secretary of War, Colonel Hanford McNider, and many other prominent generals and colonels of the division will be present. Many members of the Association will bring their families for this occasion.

### **New Landing Field for Camp Knox, Kentucky**

Upon the recommendation of Major General Dennis Nolan, Commanding the Fifth Corps Area, the Secretary of War has authorized the expenditure of \$4,000 for the preparation of a new landing field at Camp Knox, Kentucky, for the use of the National Guard, Reserve Officers' Training Corps and Organized Reserve units in connection with their summer training camps.

In his recommendation, General Nolan stated that the contour and condition of the present field, Godman Field, is such that it is dangerous to attempt to operate service type aircraft with the personnel of the above units from this field. For this reason during the past summer training season, Godman Field was used only as an emergency landing field for service type ships which were necessarily based at and operated from Bowman Field, Louisville, Kentucky. This method proved unsatisfactory as it



## CURRENT FIELD ARTILLERY NOTES

was impossible to maintain proper liaison with ground troops in their various tactical problems.

The War Department has also directed the Commanding General, Fourth Corps Area, Major General R. P. Davis, to make available one troop of the 6th Cavalry, Fort Oglethorpe, Georgia, near Chattanooga, Tennessee, for summer training at Camp Knox, Kentucky, which is under the jurisdiction of the Commanding General, Fifth Corps Area, Major General Dennis Nolan.

### **15th Ordnance Company to be Transferred to Fort Hoyle, Maryland**

The Secretary of War has directed that the 15th Ordnance Company now at Frankford Arsenal, Bridesburg, Pennsylvania, be transferred to Fort Hoyle, Maryland, for permanent station.

This company and its shop equipment are needed at Fort Hoyle for the proper maintenance of the matériel of the 6th Field Artillery at that post, one battalion of which remained motorized after the disbandment of the mechanized force at Fort Leonard Wood. In addition to the 5th Field Artillery, the 1st Ammunition Train, which is also motorized, is stationed at Fort Hoyle.

### **Special Course for Field Officers to be Repeated at Chemical Warfare School**

The Secretary of War has directed that the special course of four weeks at the Chemical Warfare School, Edgewood Arsenal, Maryland, which was held in the summer of 1928, be repeated during the summer of 1929. This course is for field officers and senior captains. It is for the purpose of training these officers in the tactics and technique of chemical warfare and in the protective measures to be employed against gases to the extent necessary for the efficient performance of their training duties. The course will begin July 8 and August 2.

The class will consist of fifty officers allotted to the different branches of the service as follows:

Infantry .....	16	Air Corps .....	2
Cavalry .....	8	Signal Corps.....	1
Field Artillery .....	8	Quartermaster Corps.....	2
Coast Artillery.....	8	Ordnance .....	1
Corps of Engineers.....	2	Medical Department .....	2

# POLO

## What We Can Learn from Argentine Polo Ponies

(The following extracts from "A Study of Argentine Polo Ponies" by Emil Engle are published through the courtesy of *Polo Magazine* in the belief that they are of interest and value to mounted officers in general, and to polo players in particular.)

THERE are three outstanding facts relative to Argentine polo ponies that are worthy of mention:

First, they are bred from galloping types.

Second, they are raised in an alfalfa country.

Third, they are trained on a long and loose rein.

Thoroughbreds are galloping types. By galloping type is meant that conformation of the skeleton which gives the animal the mechanical ability to take a long stride. Galloping types differ from the trotting and draft types by their longer and somewhat more vertical humerus (point of shoulder to elbow), longer and more sloping scapula (point of shoulder to withers), longer withers measured from front to rear, longer haunch measured from hip to point of croup, and straight dropped hind legs.

Trotting and draft types when crossed with thoroughbreds often produce animals that have the nervous energy to gallop fast but without the conformation of the galloper in haunches or shoulders. This compels the animal to go higher and longer in the air in his desire to run fast. On the other hand, the galloping type, having a greater ability to reach forward and to stretch to the rear, can gallop fast without going so much into the air.

The galloping types give you the feeling of running level and close to the ground, which they actually do; while the other types give a more up-and-down feeling. This point is very important in selecting polo ponies, as handiness at top speed comes very much easier to the galloping type than the other, as this type always has a foot on the ground as it were and can respond instantly to the wishes of the rider, while the higher galloping horse must wait longer to complete the period of suspension. It is obvious that the animal cannot change its direction while in the air. Galloping types for the same reason are easier to hit from.

Some polo pony breeders in the United States have been breeding

## POLO

thoroughbred sires with nondescript mares of trotting, light harness, draft and general utility types with the hope of producing polo ponies. The result is that their get is not meeting the demands of championship polo, and our championship players in the matches played with the Argentine were compelled to use imported ponies in far greater number than home-bred ponies.

To the polo players on the Atlantic seaboard alfalfa is cow feed. Their grooms do not like it, as they do not know how to feed it. They feed it like timothy, giving the horse just as heavy a feed of oats as customary. Here is where they make the mistake. Alfalfa has a higher nutritive ratio (ratio of crude protein and carbohydrates) than oats, it is richer in lime, sodium, iron, sulphur, magnesia and potassium than any of the other feeding stuffs, and it comes nearer being the ideal feed than any other one feeding stuff.

In feeding it, however, we should cut down on oats, for if we feed as many quarts of oats as when feeding timothy we are going to overload the system with protein far in excess of the needs of even the young growing animal. Now, excess protein cannot be stored in the body like fat and must be eliminated, which puts a strain on the kidneys. Grain can be almost entirely cut out when alfalfa is fed and the horse is not doing much work. During the winter the writer has found that when feeding alfalfa he has been able to cut the grain down until only one to three pounds is fed each horse per day. I further believe that all grain could be cut out entirely when good alfalfa is fed and the horses stay in better flesh and health than when straight timothy and oats are fed with their very low mineral content.

Argentine ponies are trained on a long and loose rein, using mild curb bits. In stopping them, jerking them back on their haunches is avoided. Most of them move with their necks extended at all the gaits and are calm and easy to handle.

All horses in making a supreme muscular effort stretch out their necks. The race horse at the finish of the race, when the jockey has ceased holding him. The jumping horse as he approaches his jump fights the heavy hand of his rider to get this extension. Horses in climbing steep ascents or in going through sand or heavy plowed land or in mud stretch their necks out. Bucking horses stretch them out, placing the head almost between their front legs in order to get the maximum flexion of the loins in arching the back. Unbroken

## THE FIELD ARTILLERY JOURNAL

horses when cornered in corrals always stretch out their necks in making quick stops and turns.

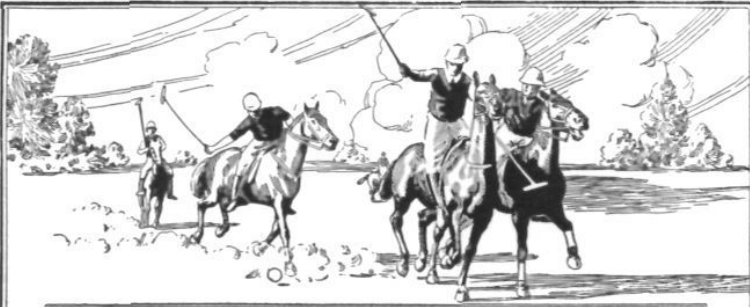
With all these cases before us, it is evident that this extension must favor perfect and vigorous muscular effort on the part of the horse and if we wish to maintain this perfect muscular co-ordination in horses we must avoid from the first to the last doing anything that interferes with this stretching out or extension of the neck.

It does not take the inexperienced rider long to learn that if he holds the head of his horse up, the horse cannot buck, and that an impetuous animal will be less inclined to run away. He has not been associated with horses long enough to know that when this practice is continued over a period of time the smooth way of moving is lost and the attitude and muscular contour of the animal is changed. In fact so imperceptible are these changes the rider does not associate them with his action of the hand in riding; and as this distortion of the neck, by its very interference with the correct muscular coordination of the horse, gives the rider a feeling of control he is inclined to continue the practice believing that it is correct.

The stretching or extending of the neck fearlessly against the bit by the horse is the basis of all correct training. The legs of the rider stimulate a vigorous muscular effort on the part of the horse which causes the animal to stretch his neck and go fearlessly up to the bit.

Now the hand, by its delicacy in acting only on the jaw, and by its care in avoiding a pull backward that distorts the neck of the horse, brings about a condition in the muscular contractions of the horse called collection, which causes the animal to shorten his gait and gives the rider a feeling of lightness and control over his mount quite different from the feeling obtained by holding his head up. The stops and turns now feel smooth and easy and the animal can do it so much more quickly.

If the backward action of the hand in meeting this stretching out of the neck goes beyond the jaw we get a feeling of pulling or a taking hold of the bit, which should be corrected not by pulling harder as is so often done but by giving rein. When the horse calmly champs the bit, when he fearlessly stretches his neck into it, collection follows. The champing of the bit must come from the muscular action of the neck of the horse going into the bit



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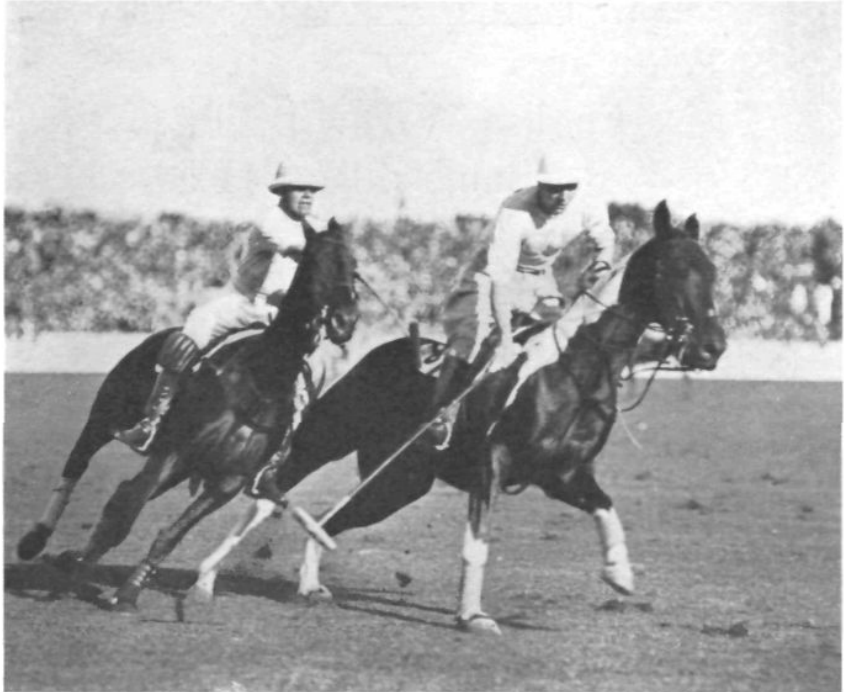
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**CHICAGO**

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**MEURISSE**



**ILLUSTRATING ARGENTINE PONIES GOING SMOOTH AND FAST ON LOOSE REINS**

Upper left: Hitchcock; upper right: Miles; Lower: Kenny trying to hook Hitchcock

'I'D WALK A MILE FOR A CAMEL"



—*but a*  
"MISS"  
*is as*  
*Good*  
*as a*  
MILE



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## THE FIELD ARTILLERY JOURNAL

and not by the action of the hand of the rider working backward against the jaw of the horse.

All these things will generally come to pass if we ride with a long, loose rein such as done in the Argentine and in our own country by cow men when working cattle. Great patience and care is necessary, however, in handling in the above mentioned manner hot headed horses who inherit a desire to run. These when properly and patiently trained make the best polo ponies. They are always spoiled by the "horse wrangler."

It has been my personal experience that many horses that are considered too hot for polo calm down when handled on a long, loose rein. The quality in any animal of resisting and fighting something that is injurious or interferes with some natural function to my way of thinking is a good quality and not a bad one. Some horses that are discarded as dangerous runaways turn into the very best sort of polo ponies when distortion is removed.



**MILES**



**NELSON**

The long smooth stride of the Argentine galloping type



# B & O workers decide which is best cigarette

*115 men in the MT. CLARE shops, at Baltimore, test the four leading cigarettes*

"Why should I change?" says the average smoker, when someone suggests another cigarette. "I'm used to my brand . . . and it's a good smoke."

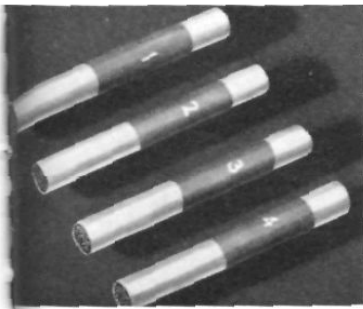
*Of course* it's good. Not even Old Man Habit can hold a smoker to a poor smoke. But being used to an *old* thing often keeps a man from getting acquainted with a *better* one.

That's the reason for these "concealed name" cigarette tests. To give a man a chance to find out, on the level, which cigarette his taste really *does* like best.

Look what happened at the Mt. Clare shops of the B & O in Baltimore, the other day. Most of the fellows had been smoking that old favorite (let's call it Brand Y) for years.

But when Chairman of Machinists, James E. Poulton, handed out the 4 leading cigarettes with paper "masks" over the names, 57 out of 115 picked OLD GOLD as the best cigarette. *It was a walkaway for OLD GOLDS!*

That only proves," said one of the chief mechanics, "that a fellow misses a lot . . . if he gets too set in his ways."



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**"NOT A COUGH IN A CARLOAD"**

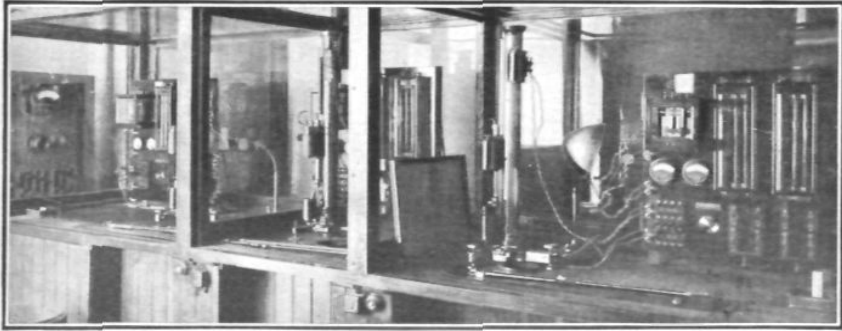
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# FIELD ARTILLERY COMMISSIONED PERSONNEL

CHANGES OF STATIONS (JANUARY 1, 1929, TO APRIL 1, 1929)

1st Lt. C. K. McAlister to 10th F. A.  
Maj. J. M. Jenkins, Jr., to O.R. duty, 7th C.A.  
Lt. L. E. W. Lepper to Q.M.C.  
Lt. S. B. Bonner to 11th F.A. Brig.  
Capt. S. G. Fairchilds to O.R., 7th C.A.  
Capt. L. L. Partlow to 11th F.A. Brig.  
Capt. H. C. Harrison, Jr., to 11th F.A. Brig.  
Capt. H. C. Demuth to 24th F.A.  
Capt. S. White to 5th F. A.  
Capt. P. C. Boylan to R.O.T.C., U. of Utah.  
Col. C. M. Bundel to 2nd Div. Art.  
2nd Lt. R. T. Finn to 11th F.A. Brig.  
Col. G. G. Gatley to F.A., 2nd Div.  
Col. O. L. Spaulding, Jr., to G.S., 1st C.A.  
Maj. S. D. Downs, Jr., G.S., 2nd C.A.  
Lt. Col. W. H. Burt, G.S., Ft. Lewis, Wash.  
1st Lt. R. O. Montgomery to 17th F.A.  
1st Lt. H. L. Berry to 5th F.A.  
Capt. J. F. Brittingham to 1st F.A.  
Capt. J. H. Carricker to 1st F.A.  
Capt. E. B. Edwards to 1st F.A.  
Capt. E. R. Roberts to 1st F.A.  
1st Lt. S. M. Bevans to 1st F.A.  
1st Lt. E.C. Burkart to 1st F. A.  
1st Lt. G. E. Burritt to 1st F.A.  
1st Lt. J. L. Hardin to 1st F.A.  
1st Lt. H. W. Holt to 1st F.A.  
1st Lt. L. Mathewson to 1st F.A.  
1st Lt. A. L. Shreve to 1st F.A.  
1st Lt. G. V. Keyser to 18th F.A.  
1st Lt. R. F. McEldowney to 18th F.A.  
1st Lt. W. R. Pierce to 18th F.A.  
Capt. J. M. Devine to 3rd Amm. Tr.  
Capt. J. G. Watkins to 1st F. A.  
1st Lt. W. R. Hensey, Jr. to Arty., 2nd Div.  
Capt. H. F. Long to 10th F.A.  
Capt. R. J. Sothern to 7th F.A.  
1st Lt. C. C. Blanchard to F.A.S. Det.  
Capt. J. R. Young to O.R., 7th C.A.  
Capt. T. Winlock to O.R., 6th C.A.  
2nd Lt. W. A. Walker to Q.M.C.  
Maj. S. L. Kiser to N.G., 7th C. A.  
1st Lt. R. L. Dalferes to 18th F.A.  
Maj. S. L. Irwin to Inst. F.A. Sch.  
Capt. W. A. Campbell, Inst. F.A. Sch.  
1st Lt. E. W. Searby to Inst. F. A. Sch.  
1st Lt. E. L. Sibert. to Inst. F.A. Sch.  
Capt. W. H. Colbern to Inst. F.A. Sch.  
2nd Lt. E. Parmely, 3rd, Inst. F.A. Sch.  
Capt. W. C. Green to 17th F.A.  
Col. A. J. Greer to O.R., 9th C. A.  
Col. R. H. McMaster to 10th F. A.  
Capt. E.S. Ott to R.O.T.C. Ala. Poly. Inst.  
Capt G. B. Shea to 16th F.A.  
1st Lt. F. Doran to 18th F.A.  
Capt. R. C. Mallonee to 6th F. A.  
Capt. J. S. Mallory to 5th F.A.  
2nd Lt. C. W. Land to 11th F.A. Brig.  
1st Lt. W. H. Jaegger to 18th F.A.  
Lt. W. L. Kay, Jr., to 1st F.A.  
1st Lt. J. P. Kennedy, Jr., to 11th F.A. Brig.  
1st Lt. R. P. Turner to 11th F.A. Brig.  
Capt. J. M. Reynolds to O.R., 8th C.A.  
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Capt. Z. E. Lawhon to Art., 2nd Div.  
Lt. Col. F. C. Doyle to O.R., 4th C.A.  
Capt. N. E. McCluer to 2nd Div. Art.  
1st Lt. E. A. Erikson to 10th F.A.  
Maj. J. L. Devers to Off. Chief of F.A.  
Maj. I. T. Wyche to Instr. C. Ar. Sch.  
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2nd Lt. C. P. Summerall, Jr., to 16th F. A.  
Col. Manus McCloskey to O.R., 6th C.A.  
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Lt. Col. W. H. Peek to O.R., 2nd C.A.  
Maj. C. E. Ide to N.G., 9th C.A.  
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1st Lt. E. V. Williamson to O.R., 6th C.A.  
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Capt. H. Harding to 2nd Div. Art.  
Maj. D. A. Connor to 17th F.A.  
Capt. J. H. Fye to 6th F.A.  
1st Lt. O. R. Marriott to 4th F.A.  
Maj. R. H. Lewis to G. S., Ft. Sam Houston.  
2nd Lt. J. L. Chamberlain, Jr., to 6th F.A.  
Capt. R. H. Lewis to 10th F.A.  
1st Lt. R. D. Powell to 18th F.A.  
Capt. D. L. Ruffner to 5th F.A.  
Maj. E. R. Van Deusen to 5th F.A.  
1st Lt. R. H. Bacon to 18th F.A.  
2nd Lt. H. C. Larder, Jr., to 2nd Div. Art.

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Velocity — SPEED — is measured by the chronograph—a marvelously precise instrument. (Illustrated above.) The shells loaded with the powder are fired in a standard shotgun. Stretched across its muzzle is a fine copper wire connected with the chronograph. The target is also connected by another electrical circuit to the chronograph. The time elapsing between the breaking of the wire at the muzzle of the gun by the shot, and the breaking of the circuit by the shot striking the target is registered precisely on the chronograph. This time is then translated into terms of velocity.

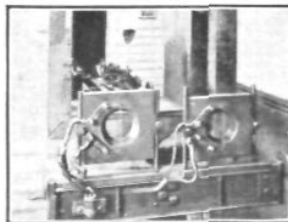
Every lot of smokeless shot gun powder must develop the same velocity as

preceding lots, thus ensuring that every shell loaded with this batch of powder will give uniform execution.

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 Maj. D. J. Page to O.R., 8th C.A.  
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 1st Lt. T. North to 5th F.A.  
 Maj. J. E. Lewis to A.C. Sch. (Langley).  
 Lt. Col. F. W. Griffin to O.R., 6th C.A.  
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 Capt. L. M. Kilgariff to 5th F.A.  
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 1st Lt. C. R. Carlson to O.R., 6th C.A.  
 1st Lt. W. A. Anos to O.R., 1st C.A.  
 Capt. V. L. Knadler to O.R., 1st C.A.  
 Capt. W. F. Kernan to O.R., 1st C.A.  
 Lt. Col. J. H. Barnard to 2nd Div. Art.  
 2nd Lt. W. G. Proctor to 2nd Div. Art.  
 Capt. S. J. Cutler to O.R., 8th C.A.  
 1st Lt. C. D. Calley to O.R., 8th C.A.  
 Capt. C. W. Glover to 16th F.A.  
 Capt. D. S. Rumbough to 83rd F.A.  
 Capt. F. C. Mellon to N.G., 4th C.A.  
 Capt. J. C. Dolan to O.R., 8th C.A.  
 Capt. D. M. Hoaglan to R.O.T.C., Iowa U.  
 Capt. D. Loring, Jr., to O.R., 9th C.A.  
 Maj. R. M. Milam to 18th F.A.  
 Capt. J. C. Hughes to 76th F.A.  
 Capt. R. C. Moore to 10th F.A.  
 Capt. R. L. Burnell to 10th F.A.  
 Capt. A. M. Harper to 2nd Div. Art.  
 Capt. W. H. Leitch to 2nd Div. Art.  
 1st Lt. W. H. Hill to 2nd Div. Art.
- Col. P. S. Golderman to O.R., 9th C.A.  
 Capt. J. J. Bethurum to 11th F.A. Brig.  
 Capt. D. D. Trenholm to 11th F.A. Brig.  
 1st Lt. W. H. DeLange to 11th F.A. Brig.  
 1st Lt. W. H. Barksdale to 11th F.A. Brig.  
 1st Lt. W. J. Klepinger to 2nd Div. Art.  
 1st Lt. W. E. Shallene to 2nd Div. Art.  
 2nd Lt. N. C. Cureton, Jr., to 2nd Div. Art.  
 Maj. C. M. Tuteur to 3rd F.A. Brig.  
 Capt. C. A. Beaucond to 82nd F.A.  
 Capt. R. W. Hocker to 10th F.A.  
 Capt. W. B. McCollum to 10th F.A.  
 Capt. T. C. McCormick to 3rd F.A.  
 Capt. O. M. Marshburn to 3rd F.A.  
 Capt. A. C. Stanford to 10th F.A.  
 1st Lt. J. E. Adkins, Jr., to 76th F.A.  
 1st Lt. H. E. Baker to 7th F.A.  
 1st Lt. H. D. Baker to 83rd F.A.  
 1st Lt. P. R. Covey to 76th F.A.  
 1st Lt. S. Edwards to 17th F.A.  
 1st Lt. R. L. Gervais to 4th F.A.  
 1st Lt. W. R. Grove, Jr., to 7th F.A.  
 1st Lt. G. W. Hartnell to 3rd F.A.  
 1st Lt. E. T. Hayes to 3rd F.A.  
 1st Lt. O. W. Martin to 7th F.A.  
 1st Lt. R. H. Slider to 18th F.A.  
 1st Lt. W. C. Stout to 7th F.A.  
 1st Lt. H. J. Thornton to 18th F.A.  
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 Maj. T. T. Handy to G. S., Panama.  
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 1st Lt. H. M. Schwarze to O.R., 8th C.A.  
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 1st Lt. T. V. Hedekin to 11th F.A. Brig.  
 Capt. L. H. Slocum to 11th F.A. Brig.  
 Capt. W. R. Frost to 11th F.A. Brig.  
 1st Lt. B. V. Johnson to 24th F.A.  
 Capt. J. M. Garrett, Jr., to 24th F.A.  
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