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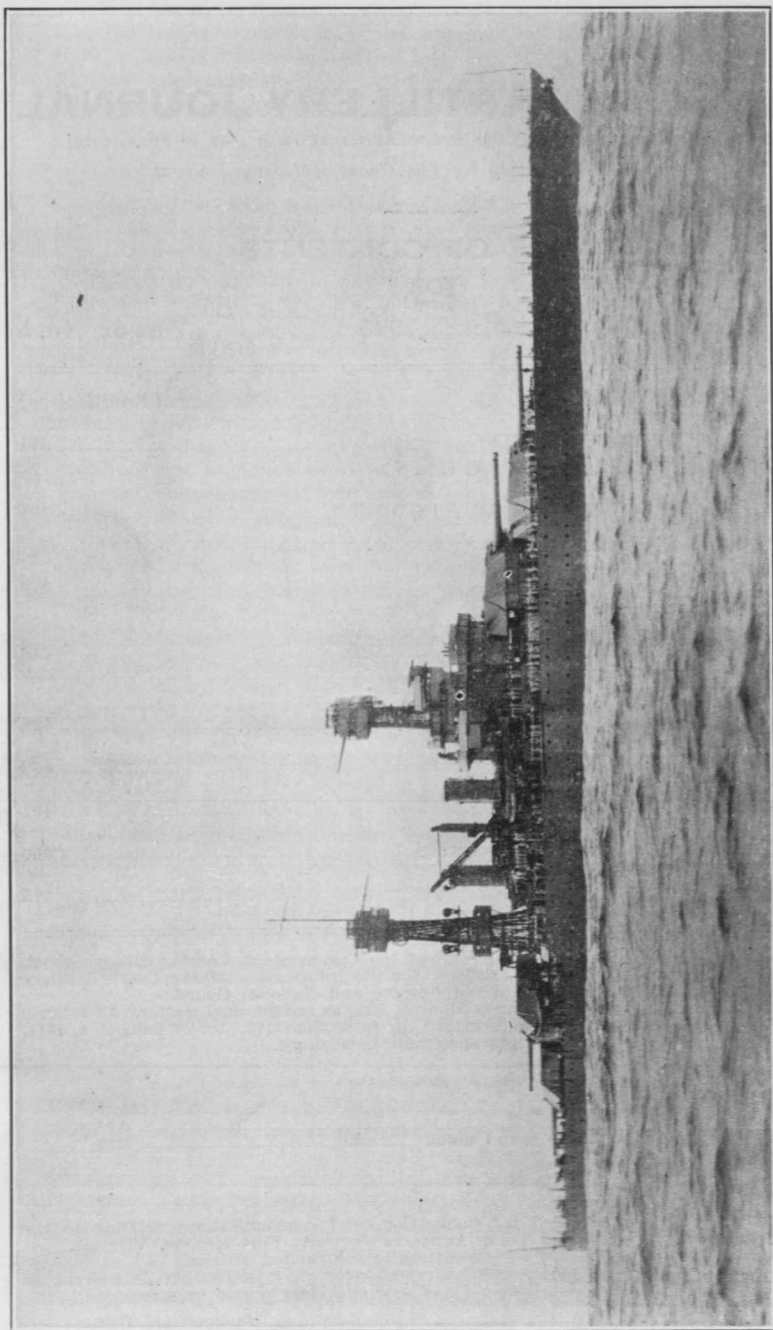
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THE WEST VIRGINIA

The West Virginia and the Colorado, its sister ship, are the last battleships to be added to the Navy, under the Treaty of Limitation of Armaments until 1936. The West Virginia has a length over all of 624 feet, a beam of 37 feet, draught of 31 feet and designed speed of 23 knots. Her armament consists of eight 16-inch guns and fourteen 5-inch guns. Maximum range of the 16-inch guns as mounted, is about 33,000 yards.

The Coast Artillery Journal

Vol. 62 No. 5

MAY, 1925

Whole No. 225

Coast Artillery Shooting

By MAJOR R. B. COLTON, C. A. C.

Second Prize, Journal Essay Competition, 1924

THE RATE OF FIRE

IT HAS been, and still often is, said that one hit in two minutes is better than no hits in one minute. True enough, but such a statement begs the question. There is no reason why speed of firing should materially affect accuracy of fire.

There is a positive element of advantage as to accuracy in rapid fire, since by firing fast enough with a gun of high enough muzzle velocity we can practically make the target stand still and secure the advantage of firing at a fixed rather than a moving target. At the very least, rapid fire eliminates to some extent the inaccuracies due to out of level of the gun carriage and errors in meteorological data.

Unless bell fire is used there is the same amount of time for setting the range whether the gun fires approximately every 15 seconds or every hour, hence we may reasonably expect the range setter to make approximately the same error in either case. So far as the range section is concerned there should be also little difference, for the range section must keep the range to the target posted continuously and obviously this range is independent of the rate of fire. The only factor tending to decrease accuracy of fire with increased

rapidity of fire is the increased rapidity of explosions, which does to some extent affect the nerves of the personnel—that is to say, for instance, ten explosions in three minutes affect human nerves slightly more than ten explosions in six minutes.

If bell fire is used the routine can be arranged so that the explosions come at such times as not to interfere with the operations of range finding. That this matter is of small importance is attested by the fact that it is customary to arrange bell fire so that the explosion comes at the time of the most important operation of range finding—that of observing, reading and transmitting base end data. Aside from this possibility, since in bell fire the range is posted for a definite time in the future, it is possible, by setting this time far enough ahead, to permit the range recorder, gun commander, emplacement officer and, perhaps, a specially appointed representative of higher authority, time to check the range set. However with all this checking the most fruitful source of error, that involved in the transmission of data is not, and can not be eliminated, and in the mean time the target is moving away from the points upon which the firing data was calculated. The increased length of predicting interval necessary for double and triple checking of data allows the range to become erroneous through the fault of no one concerned except the officer who prescribes such a system.

Our guns should be fired as fast as they can be loaded. All other preparations and operations are secondary and should conform to this fundamental rate.

BARNACLES

The decrease of fifty percent in the volume of fire of our major caliber guns during the last decade is largely the result of restrictions that have been placed on the method of loading and firing in the interest of safety and accuracy.

Taken individually each of these restrictions seems entirely reasonable and justifiable. Each one has attached itself, unnoticed, like a tiny barnacle, until at the present rate of multiplication of these restrictions we will soon be back to the speed of muzzle loading days.

In 1910 there was a very lamentable accident at a 12-inch gun battery in which the powder charge exploded while the gun was going into battery and before the breech was fully closed. In this case the safety feature of the firing mechanism failed to operate, and largely as a result of this failure I believe came the regulation prohibiting the insertion of the primer until the breech is fully rotated.

This safety regulation adds three or four seconds to the time of firing, since it makes the operation of inserting the primer consecutive to, instead of coincident with, the other operations of loading and in addition effectually prevents making the last part of the operation of closing breech coincident with the tripping of the gun.

As a temporary measure the regulation was a necessity, but the best corrective measure would have been to make the firing mechanism safe. Some modification of the safety mechanism was made by the Ordnance Department, but when friction primers are used there is still chance for a premature explosion. In addition to modifying the safety features of the mechanism for friction firing the Ordnance Department has designed a new electric firing system which either is, or can be made with insignificant expense, accident proof. This being true there is no reason why the electric primer should not be inserted *before* the breech is closed, and no reason why well-trained gun crews should not be permitted to trip the gun coincidentally with the last movement of the block in rotation.

The next barnacle to attach itself to the gun drill was the chamber sponge. My recollection is that prior to about 1911 the regulations only required the powder chamber to be sponged "when necessary." There were before that time several accidents in the navy due to flare backs, but flare backs are dangerous only when the powder is very near the breech at the instant of opening breech. However it is true that powder bags and their contents do not always burn up completely and smoldering particles have been found in the powder chamber upon opening breech. Therefore it is better practice to sponge after every shot rather than to depend on an inspection of the condition of the chamber after every shot. Our latest guns use compressed air sponging and this is the best solution of the problem. Nevertheless it would hardly be advisable to install air sponging on our disappearing guns, and hence it behooves us to find a method of sponging less time consuming than the present one, if possible.

It should be practicable to design a rammer head that would sponge the bore while the projectile is being seated. The rammer head could even be filled with liquid and arranged to extinguish any sparks lodging on the centering slope aft of the rotating band of the projectile.

The present powder tray followed the chamber sponge into our scheme of existence. Prior to its introduction the powder was rammed from the shot truck; occasionally the bags buckled, burst and spilled the powder over the emplacement. As a temporary expedient the home made powder tray served its purpose well, but it

should have been discarded long ago in favor of a tray integral with the truck.

Formerly the projectile could be seated before the tray back-latch catch was engaged. Now the ramming detail holds a series of conferences and finally the projectile ambles leisurely into place. All this slowness has as its object better seating of the projectile—which it doubtfully accomplishes and which is of doubtful value so long as the projectile is actually seated—and protection of the threads of the breech recess.

PERSONNEL ERRORS

Since the scheme of analysing target practices was introduced in the coast artillery battery commanders have gone to extremes in order to eliminate personnel errors. True, the battery with the smallest personnel errors has the best chance of securing hits if all other things are equal. But in general all other things will not be equal. For instance, the favorite method of eliminating personnel errors is the use of the system of firing on the bell, i.e. at regular intervals. This interval can be, and often is, made so long that every reading, every setting, and every operation can be checked by several different people. The attainment of accuracy by such means almost inevitably results in a very slow rate of fire, and it can be confidently asserted, in a tremendous loss of hitting power.

Speeding up the rate of fire renders it more difficult to prepare accurate firing data. Each explosion temporarily paralyses the process of transmitting, recording and setting data, both on account of the noise and the shock of the explosion. The more frequent the explosions, the less time relatively speaking is left for the operations of range finding and for this reason and on account of the effect of the explosions on the nerves the accuracy of range finding and range setting falls off somewhat.

Any reasonable person will agree that there is a happy mean between the extremes of speed and accuracy. This happy mean lies at the point where the loss in percentage of hits counterbalances the increase in the rate of fire. The loss in percentage of hits, if there be such a loss—which is extremely doubtful—can only be due to poor ramming at high rates of fire or to an increase in the personnel error, considering, as is customary, the instrumental error as a part of the personnel error.

So far as ramming is concerned a properly trained section will ram better and more uniformly at a high rate of speed than at a slow one. As regards the personnel error there exists a great misconception—it really has a very minor effect on percentage of hits.

Personnel errors (including therein the instrumental errors) are only one of three types of accidental errors affecting the accuracy of coast artillery shooting, and hence should not be considered separately but in connection with their relation to the other errors, which are the armament or gun error and the adjustment error.

First let us consider the case of a gun with a probable error of 100 yards fired by a personnel with no error. If adjustment is made on the basis of four shots as is usually the case the probable error of adjustment is $100/\sqrt{2}$ or 50 yards, and therefore the total battery probable error is $\sqrt{100^2+50^2}$, or 112 yards.

Now let us suppose that the same gun is fired by a personnel with a probable error of 20 yards. Then the probable error of adjustment (on the basis of four shots) is $\sqrt{100^2+20^2}/2$, or 51 yards, and the total battery probable error is $\sqrt{100^2+51^2+20^2}$, or 114 yards, as against 112 yards with no personnel error. Hence we see that the effect of the 20-yard personnel probable error is to increase the total battery probable error less than 2 per cent.

Table I below shows the effect of various personnel and instrumental errors on the total battery probable error when adjustment is made on the basis of four shots.

TABLE I

<i>Gun Probable Error, Assumed</i>	<i>Total Personnel (and instrumental) Probable Error, Assumed</i>	<i>Adjustment Probable Error, Resulting</i>	<i>Battery Probable Error, Resulting</i>
100	0	50	112
100	20	51	114
100	40	54	120
100	60	58	130
100	80	64	143
100	100	71	158

Interpolating in Table I above we see that a personnel error equal in value to one-half of the gun probable error will increase the total battery probable error only about 13 per cent, and that beyond this point the increase of the battery probable error is considerably more rapid. While personnel errors should in any case be held to a minimum it would appear reasonable to state that in the majority of cases a personnel probable error less than one-half of the gun probable error should not be considered too large if the rate of fire is rapid—certainly not too large if the rate of fire is thereby increased 25 per cent above the rate for the minimum personnel error.

INSTRUMENTAL ERRORS IN RANGE FINDING

The more important means of range finding in current use in our service are:

1. The horizontal base method.
2. The depression position finder.
3. Coincidence range finders.
4. Stereoscopic range finders.
5. Guns.

Until a few years ago the scale of our plotting boards was 300 yards to the inch. Modifications of our guns has necessitated in many cases a scale of 600 yards to the inch; however, as the width of a pencil or other convenient dot is only about 1/60 inch, the average error of the horizontal base method of range finding due solely to the scale of the board is very small—not more than three or four yards.

As regards angular errors, the following table shows approximate range errors in the center of the field corresponding to an angular error at either station of one one-hundredth of a degree, for a base of 2000 yards.

<i>Range Yards</i>	<i>Error Yards</i>
3,000	0.8
6,000	3.2
12,000	12.7

It is seen that the error increases practically as the square of the range, but is not very large. Generally this error can be kept near or below 10 yards by using a base line suitable for the range. This is accomplished by maintaining the range-base line ratio at or near 5 to 1 (i.e., by maintaining an angle at the target of about 10 or 15 degrees), or by using advanced base lines.

The angular error made at the observing station may be due

1. To failure to bisect the observing "point".
2. To observing slightly off time.
3. To an error in reading the azimuth.

If the smoke pipe is 3 yards wide and one observer reads on the right side and the other on the left side, when the range-base line ratio is 5 to 1, there will result an error of 15 yards in the range.

If the target is traveling 600 yards per minute, one-fifth second delay between stations may result in an error of $5 \times \frac{1}{5} \times \frac{600}{60}$ or 10 yards. Time of response of the ordinary human brain to sound may well vary as much as one-fifth of a second, while the electrical

and mechanical lag of time interval bells may also equal or exceed this figure.

The error in reading the azimuth is chiefly dependent on the backlash in the instrument and the training of the reader. As the smallest reading is .01 degree even perfect reading of a perfect instrument necessarily results in an average error of .0025 degree.

The case of the depression position finder is quite different. Here usually one instrument with a fixed height of site is customarily used for all ranges. If curvature of the earth and refraction be neglected, the range as read from a D. P. F. is found by the formula

$$R = h \cot \theta$$

which reduces for long ranges to the formula $R = \frac{h}{\theta}$ or $R = \frac{3438h}{\theta}$ where h is the height of site in yards and θ the angle of depression in minutes.

As the height of site is constant, an error of one minute of arc will have much greater value at long range than at short range. This fact is mathematically expressed by the formula

$$\Delta R = -\frac{R^2}{3438h} \Delta \theta$$

In other words the error of a depression position finder will vary as the square of the range if the error in measuring the angle of depression is constant.

This type of error results from the natural backlash of the instrument and from the width of the horizontal crosswire in the instrument, each of which give a fairly constant average angular error regardless of the range.

There is, however, a second and different error due to the inability of the observer to estimate the exact position of the water line of a moving target. The ship shoves up at the bow a considerable wave, and the wash at the side and stern is irregular. If an error of one-third yard in water lining is made at a range of 10,000 yards, using an instrument with a 100-yard height of site the corresponding range error will be $10,000/100 \times 1/3$, or 33 1/3 yards. At 20,000 yards, neglecting curvature of the earth, this error would become 66 2/3 yards.

Since the effect of the curvature of the earth is to lower the effective height of site of a D. P. F. as the range increases, in actual practice angular errors produce range errors varying faster than the square of the range and linear vertical errors produce range errors varying more rapidly than the first power of the range. It

is customary to assume that the average error of a D. P. F. varies as the square of the range.

Depression position finders may be expected to give the following average errors for a height of site of 100 yards, and correspondingly less errors for greater heights:

10 yards at	5,000
40 yards at	10,000
160 yards at	20,000

The range as read by a coincidence range finder is determined by the same formula as in the case of a depression position finder. In fact all range finders use the same formula, and really differ only in the means of reading the angles and in the shape of the triangles involved.

A depression position finder of 100 yards height of site can compete with a 1000-yard horizontal base because it discards the clumsy plotting board, or rather is itself a very delicate and accurate plotting board, discards one observing station, and maintains its base line perpendicular to the range line.

A coincidence range finder of 10-yard length can compete with a 100-yard D. P. F. because in addition to the advantages of a D. P. F. it has the added advantage of a very accurate and delicate method of measuring angles and is not subject to errors of water-lining.

The error of the range as read by a coincidence range finder varies in both theory and practice as the square of the range.

A coincidence range finder of 30-foot length may be expected to give the following average errors:

10 yards at	2,500
40 yards at	5,000
90 yards at	7,500
150 yards at	10,000

The stereoscopic range finder is practically equal to the coincidence range finder as regards accuracy per foot of length and pound of weight.

If the length of coincidence or stereoscopic range finders is increased or decreased, their accuracy is increased or decreased in the same proportion.

Guns, when used as range finders, have errors less than those of the usual coincidence or stereoscopic range finders and hence are used almost exclusively for range finding purposes in fixed targets. When used on moving targets they have little value except in special cases because so much time is necessary to take a "reading" with them and so much ammunition is wasted in so doing.

SYSTEMIC ERRORS IN RANGE FINDING

In coast artillery range finding there are two fundamental operations—that of locating the past course of the target and that of estimating its future course—both of which must be accurate both as to time and distance. There are many means and methods of performing these operations in use in our service at present. The method which is perhaps to be considered standard consists in plotting and predicting on a plotting board, the data being secured by means of a horizontal base system. This system is quite familiar to all coast artillery officers and need not be described here. It will be worth while, however, to point out the source and magnitude of the errors common in the system.

For this purpose I will consider at present only courses that may be termed “straight,” i.e. courses not intentionally “sinuous”. In such courses the first, and perhaps the fundamental source of error lies in the determination of the past range. An average accidental error of 10 yards is customarily accepted as the value of this error. As the range travel is usually determined from two successive ranges, the average error in the range travel on this basis will be 14 yards, or the square root of the sum of the squares of two 10-yard errors. The travel alone does not appear in the final or future range to the target. It is first divided by the predicting base (usually a multiple of the observing interval), in seconds, and then multiplied by the time from the last observation until the splash occurs (i.e. the dead time). This operation is performed mechanically and for this reason the real significance of the operation is sometimes lost sight of. The important thing to note is that the travel is first divided and then multiplied by time in order to get a result which is to be added to the last known range. This being the case, it follows that the error in the travel will appear in the final, or future range, diminished or increased by a factor which is the ratio of the dead time, (the time between the taking of the last range observation and the fall of shot) to the predicting base. For guns this factor may be as small as 0.3 at mid-range and for mortars it may be as large as 4. It is usually greater for bell fire than for fire at will, since for bell fire it is customary to ~~always wait until the full predicting interval has elapsed before the gun is fired, while if the gun is fired when ready it may be fired at any time during the predicting interval or thereafter.~~ If the predicting interval is 30 seconds, guns fired on the bell will always have a dead time of 30 seconds plus the time of flight. If guns are fired at will the dead time with the same predicting interval will be for a fast section from 10 to 40 seconds plus the time of flight, or an average of 25 seconds plus the

time of flight. For a 15-second time of flight and a 30-second observing interval, this gives an average factor of 1.5 for bell fire and an average factor of 1.33 for fire at will, which correspond to average errors of 21 yards and 19 yards respectively. Slow sections may, however, gain advantage by firing on the bell as the dead time for bell fire cannot exceed the predicting interval and time of flight. If guns were fired at will with an observing interval of 15 seconds and a predicting base of 30 seconds, the factor would become 1.08 and the average error 16 yards, or 25 per cent less than the average error of bell fire at present.

This particular error is most striking in mortar fire. Here the factor is usually a 60-second predicting interval plus a 60-second time of flight divided by a 60-second predicting base. This gives a factor of 2, and an average error of 28 yards. By reducing the predicting interval to 15 seconds the factor would be reduced to 1.25, corresponding to an error of 17 yards, or a reduction of this particular error by 40 per cent.

In addition to the error of the last range and the error obtained in the calculation of the future travel as discussed above, there remains an important error caused by failure to fire the gun at the calculated time. In mortar fire under the old regulations an error of 5 seconds was considered permissible, while the range for guns was estimated to the nearest five seconds from the time range board. In either case the average error is probably about 2 seconds, though there is no real data to support this statement. Assuming an average error of 2 seconds in time, there will be an average error in range equal to the range travel of the target in two seconds. For the ordinary target practice course, in which the tug makes about 8 miles an hour and runs at an angle about 70 degrees with the line of fire the range travel is 80 yards per minute, and a 2-second error is only two or three yards. For the average case in actual service we may expect speeds of 24 miles per hour at 45 degrees with the line of fire or a range travel of 500 yards per minute. Here an error of 2 seconds amounts to 16 yards, which is quite comparable with the other range finding errors previously mentioned.

Recapitulating, it will be noticed that under service conditions using methods at present standard, average errors of approximately 10, 20, and 15 yards due to location, prediction, and time errors respectively are to be expected for guns, while errors of 10, 30, and 15 yards are to be expected for mortars. This corresponds to total average range errors of about 25 yards for guns and about 35 yards for mortars. In other words, errors greater than 20 yards are to be expected on half the shots fired, even at target practice.

When a suitable horizontal base is not available, or cannot be used on account of the difficulty of identifying targets in the case of a general attack, resort must be had to the depression position finder, the self-contained position finder, or to the gun itself.

Suppose we take the case of a 6-inch disappearing gun battery of two guns equipped with a 15-foot coincidence range finder firing at a target traveling 1200 yards per minute at an angle of 45 degrees with the line of fire at a range of 6000 yards.

The average error of the range finder is 120 yards.

The travel of the target is 850 yards per minute.

The maximum rate of fire is eight shots per minute.

The time of flight is 9 seconds.

If the course of the target is plotted in the usual manner at 30-second intervals location, prediction and time errors will be as follows:

<i>Location</i>	<i>Prediction</i>	<i>Time</i>
120	$120 \sqrt{2} \frac{25+9}{30}$	$\frac{2}{60} .850$
or 120	190	30

which corresponds to a total average error of about 230 yards.

If instead of using single readings the range is read every 5 seconds and the average of 6 readings is plotted every 30 seconds the accuracy of the plotted point will be increased, and the dead time will also be increased by 15 seconds. The average errors to be expected are

<i>Location</i>	<i>Prediction</i>	<i>Time</i>
120	$120 \sqrt{2} \frac{49}{30}$	$\frac{2}{60} .850$
$\frac{\sqrt{6}}{\sqrt{6}}$	$\frac{\sqrt{6}}{\sqrt{6}} \frac{30}{30}$	
or 50	110	30

which corresponds to a total average error of about 125 yards.

It is seen that the largest error comes in prediction and that this error may be reduced (maintaining 5-second reading intervals) by increasing the number of readings used to obtain the average value of a plotted point.

The following table shows the values of the various average errors to be expected and also the corresponding dead time, according to the number of readings averaged:

<i>n</i>	<i>Location Error</i>	<i>Prediction Error</i>	<i>Time Error</i>	<i>Dead Time</i>	<i>Total Error</i>
1	120 yards	190 yards	30 yards	34 seconds	230 yards
6	50 yards	110 yards	30 yards	49 seconds	125 yards
9	40 yards	80 yards	30 yards	64 seconds	95 yards
16	30 yards	50 yards	30 yards	99 seconds	65 yards
64	15 yards	30 yards	30 yards	339 seconds	45 yards

Variations of the method of plotting will give slightly different values for the errors and of course different errors will be obtained for each type of gun. However, it will be noted that to obtain an accuracy comparable with that of the horizontal base a dead time ten times greater than that of the horizontal base system is necessary, and as there is no assurance that the target will hold steady on its course inspection of the above table will show that it is not worth while to average more readings than can be taken in a period of 30 seconds. If ten readings instead of six could be taken in 30 seconds an increase in accuracy of about 20 per cent would be obtained.

There is yet another means of using an inaccurate range finder which tends to reduce in some cases the error in the range as set on the gun. This method consists in throwing the travel or prediction term into correction from observation of fire, and applying the ranges as read by the range finder (or the average of several of them) directly to the gun. The system works well if the range travel is constant and poorly when it is variable. This is equivalent to saying that by firing fast enough with a gun of high enough muzzle velocity we can practically make the target stand still, and obtain all the conditions of a stationary target, in which case a range finder is a luxury, not a necessity, when the target is visible from the battery.

In the last resort the gun itself may be used as a range finder. When this is the case it is to be assumed that overs and shorts can be sensed. If the target is changing range very slowly the gun is a very good range finder, and if the target is changing range very fast it is nearly worthless as a means of range finding.

Thus if a target is passing broadside to a 6-inch gun battery of two guns at a range of 6000 yards and at a speed of 300 yards per minute there is time of four minutes in which the range will vary only 30 yards and the target may therefore be considered to be practically stationary in range. In these four minutes the battery can fire 32 shots, and allowing 8 shots for initial range adjustment (which is also range finding in this case) the battery should obtain 10 or 12 hits in the four minutes.

Things are quite different, however, if the target, at a range of 6000, is traveling at a speed of 1200 yards per minute and at an angle of 45 degrees with the line of fire. In this case in $3\frac{1}{2}$ minutes the range will have decreased 1750 yards, and at a very non-uniform rate. The following table shows the range and range travel for minute intervals

<i>Time</i>	<i>Range</i>	<i>Range Travel</i>
0	6000	
1	5230	770 yds.
2	4650	580 yds.
3	4300	350 yds.
4	4300	0
5	4650	350 yds.
6	5230	580 yds.
7	6000	770 yds.

No battery commander would ever attempt to depend on his guns alone for finding the range under the conditions of the table above. In this case the battery commander uses nature's range finder—his naked eyes—to make an estimate of the course speed and range to the target, and therefore every battery commander becomes a special case and the method cannot be analyzed. However, if the battery commander organizes a plotting section and calls on this section to furnish ranges at say 15-second intervals, fair results can be obtained. In this case he would give to his plotting section data of the following nature:

"Range 8000 yards, course 30 degrees, speed 1000, coming in," and thereafter apply such corrections to range, speed, and angle as he could best determine by observation of fire, landmarks, and maneuvers of the target. The results are of course indeterminate. With training such as naval officers obtain daily in the ordinary performance of their duty the range, course and speed of vessels can be estimated with considerable accuracy. Coast artillery officers do not and cannot obtain such training.

Naval officers have not only the advantage of training in the estimation of the fundamentals of range finding, but also of the fact that in naval engagements it is quite customary to fight at practically constant range with guns that fire several times more quickly than ours. When guns are fired quickly at a visible target that maintains its range nearly constant range finding with the gun is a simple and well understood proposition.

So far we have only considered the errors involved in finding the range to a target traveling on a so-called "straight" course. When the course is sinuous all the errors mentioned above are present, and in addition there appears a large error due to the turning of the ship during the dead time. This error when the ship is approximately broadside to the battery and holds its direction and rate of turning is very nearly equal to the product of the radius of turning and the versine of the angle turned during the dead time.

The following table gives the value of the radius of turning for various speeds and rates of change of bearing:

TABLE 1

<i>Rate of change of bearing in degrees per minute</i>	<i>Speed in Knots</i>		
	10	20	30
	<i>Radius of Turning</i>		
10	1940 yds.	3880 yds.	5810 yds.
20	970 yds.	1940 yds.	2910 yds.
30	650 yds.	1290 yds.	1940 yds.

TABLE 2

The following table shows the value of the versine of certain angles:

<i>Angle</i>	<i>Versine</i>
0°	0.000
5°	0.004
10°	0.015
15°	0.034
20°	0.060
25°	0.094
30°	0.134
35°	0.181
40°	0.234
45°	0.293
50°	0.357
55°	0.426
60°	0.500

The errors for the circumstances mentioned above, i.e. when the ship is approximately broadside to the battery and maintains its speed, direction and rate of change of bearing, are therefore for a 20-knot ship, changing its bearing 10 degrees per minute.

16 yards for a dead time of 30 seconds
 58 yards for a dead time of 60 seconds
 236 yards for a dead time of 120 seconds

And for the same ship, changing its bearing at the rate of 30 degrees per minute the errors are:

42 yards for a dead time of 30 seconds
 172 yards for a dead time of 60 seconds
 645 yards for a dead time of 120 seconds

The figures given above show the importance of reducing the dead time to a minimum, but it must be remembered that the errors given are maximum errors, and that the average errors would be far smaller, probably about one-fourth as great as those shown, since it is unreasonable to assume that the ship will always continue to turn at the same rate and in the same direction during the dead time. It is safe to say any reasonably long sinuous course when taken in its entirety would not cause an average error in the coast artillery range of over 75 yards, and if fire is properly adjusted

this error would not be great enough to materially reduce the number of hits by coast artillery batteries in the case of a run-by provided the batteries were supplied with sufficient ammunition, since ships running on a sinuous course must remain under fire longer than when they run straight.

By reduction of the dead time which is now excessive for some batteries, particularly for mortars, the sinuous course can be shorn of all its terrors for guns at any except extreme ranges, and the errors for mortar batteries can be reduced to a point where the sinuous course would certainly no longer be a profitable maneuver for the enemy when he is confronted by coast artillery fire alone.

THE SINOUS COURSE

Irregular course of ships—the question as to whether ships in order to avoid the effects of heavy artillery fire, will attempt to steam an irregular course has been much discussed. On the one hand such action would interfere with vessel tracking of the coast forts and consequently with the accuracy of fire of their guns; on the other hand, the ship would materially diminish the accuracy and volume of her own fire.”—*The Tactics of Coast Defense*, John P. Wisser, 1902.

In 1923 the problems of 1902 are still with us and still unsolved. Since 1902 the sinuous course has come into considerable naval use as a means of avoiding torpedo attacks from submarines, and the scheme of turning into the splash which results in a sinuous course is said to have been used during naval engagements by the Germans.

The sinuous course has in general been considered a defensive measure and not well suited to offensive operations for the reason stated by General Wisser; namely, it results in a reduction of the number of hits by the ship using it.

There is, however, considerable more reason to expect its use in the future than there has been in the past. Naval vessels in the future will be liable to attack by submarines and airplane bombers at the same time they are attacking the coast forts. The sinuous course offers considerable protection against these forms of attack and for this reason if for no other it may be adopted. The amount of protection afforded by it will depend on the nature of the course, the fire control methods of the coast defenses, and the ballistic qualities of their weapons.

An idea of the possible nature of sinuous courses may be had from the fact that a battleship moving at 15 knots (standard speed), or $16\frac{7}{8}$ knots (full speed), can turn on a radius of 500 yards, but in so doing loses 30 per cent of its speed if it turns through 90° , and of course a correspondingly less amount if the turn is through a

smaller angle or at a longer radius. (See *U. S. Naval Institute Proceedings*, page 1383, No. 234, August, 1922).

In addition to the deliberate turning of a ship there is always present a certain amount of yaw that is superimposed on the ship's course. This yaw is in fact present whether the course be "straight" or "sinuous." A 22,000 DWT tanker (light) equipped with gyro compass yaws at a rate of $\pm 2^\circ$ per minute when attempting to hold a straight course. Loaded, this ship yaws much more. The helmsman customarily carries as much as five degrees of helm (Sperry-scope, Vol. 3, No. 9, 1922, page 9 and following.) The period and amount of the yaw is dependent upon the type of ship and the helmsman.

In smooth weather the army transport St. Mihiel yaws as much as $\pm 5^\circ$ with good steering on a straight course. Excellent steering reduces this to about $\pm 1^\circ$ in calm weather.

It therefore appears that sinuous courses may be run by naval vessels with as much as 70° change of bearing per minute, and that even so-called straight line courses are in effect sinuous courses with a rate of change of bearing of from one to five degrees per minute.

In order to crystallize the problem the following specifications are given for a course designed to enable a naval vessel to best escape mortar fire.

(1) The average time of flight of mortar projectiles being 60 seconds and the customary predicting interval being 30 to 60 seconds, there will usually be about $1\frac{3}{4}$ minutes of time from the last plotted point to the time of splash. Hence the sinuous course should not oftener than necessary cross its previous tangent, or its mean course, at times differing by $1\frac{3}{4}$ minutes or thereabouts.

(2) If the curvature of the sinuous course is usually held in one direction longer than twice the time of flight the plotter may by assuming the curvature as continuing, gain a possibility of a more correct prediction.

(3) If the curvature is uniform from period to period, the plotter may gain accuracy by assuming the curvature as constant, either continuing or reversed. Therefore the course should be entirely irregular. It should have short straight legs joined by irregular curves. The maximum change of bearing per minute need not exceed 25 degrees if the speed of the vessel is 450 yards per minute, or about 13 knots, and need not exceed 15 degrees per minute if the speed of the vessel is 20 knots.

When a coast artillery plotter is confronted with such a course he has only three guesses; namely, that the vessel will turn right, go

straight ahead, or turn left. All are equally possible, hence the middle one would appear to be best. It is certainly as good as any other and by far the simplest.

It has often been assumed that a plotter would be able to guess what the ship was going to do next by inspecting its past track. Such reasoning is faulty. Past history really only shows what can be done, not what will be done, and it rarely shows the maximum that can be done.

It has also often been assumed that messages from the observing stations, "ship turning port" or "ship turning starboard" would enable the plotter to guess the ship's course during dead time. Such messages are qualitative rather than quantitative. They do not relate to instantaneous conditions, but are obviously the observer's estimate of what has happened in the last five or ten seconds of the observing interval. These messages therefore have small value when compared with the quantitative record of the plotting board, and in any case do not tell what the helmsman is going to do next.

Finally, it cannot be too strongly emphasized that once the plotter has placed the setforward point on the plotting board, the matter is henceforth in the hands of the helmsman. He is a free agent and may turn as he chooses. It is true that finite time is required to shift the helm from hard over port to hard over starboard, but the moment the shift begins the ship begins to follow.

At Fort H. G. Wright experiments were carried out in the summer of 1918 in conjunction with the navy, using a converted yacht about the size of an army mine planter, to determine among other things the effect of a sinuous course on coast artillery range finding.

Many different sinuous courses were run and the range finding errors were compared with those obtained on straight line courses. The sinuous courses run by this vessel were designed to escape torpedo fire from submarines and hence approximated the specifications laid down above for mortar fire.

In the case of the mortar battery tests errors of several hundred yards were at times made in the location of the setforward point by the plotter. After several tests it was decided that the best method of predicting was to lay off the predicted and setforward distance along a line through the last two or three plotted points. When the vessel was running on a sinuous course this gave slightly better results than were obtained by allowing the plotter to guess, and when the vessel was running a supposedly straight course the plotter, if instructed to guess, had a tendency to mistake every wobble of the ship or small error of a plotted point for the beginning

of a sinuous course and thereby make errors of several hundred yards on "straight" courses.

The tests indicated, when the range finding errors were compared with the probable error of the mortar battery, a reduction in percentage of hits by the battery to about half that percentage obtainable on a straight line course.

The tests made in connection with gun batteries showed for the sinuous course only a very small reduction from the percentage of hits to be expected on a straight course.

Such results indicate that a vessel attempting a run-by would not adopt a sinuous course as protection from fire from the defenses, since due to loss of speed on a curved course and due also to the increased length of a curved course, she would be under fire so much longer than on a straight course that the actual number of hits to be expected would be about the same as if a straight course were used, and the irregularity of her course would reduce to some extent the effectiveness of her own fire.

This reasoning does not, however, apply to the case of a long distance naval bombardment, where the ships could dart into range, fire their shots quickly and seek safety in distance, nor does it apply to any kind of naval attack in which the enemy's navy fears attacks from our submarines or is attacked by our airplanes.

The submarine has only a limited supply of torpedoes, and after firing a shot must again maneuver into position before firing another. For this reason, unless the number of our submarines be great, the enemy obtains a substantial advantage by reducing the percentage of hits obtained by our submarines, and will be very apt to adopt a sinuous course whenever submarine attack is imminent.

The question of what defensive measures to adopt when attacked from the air has not yet been decided by any navy, but some naval officers advocate a sinuous course as a means of escaping aerial bombs. Here again, as the number of bombers is apt to be quite limited, the effectiveness of bombing will be determined by the percentage of hits obtained.

Aside from sinuous courses adopted deliberately by the enemy sinuous courses may result from poor seamanship, accidents to steering gear, lack of knowledge of local waters, maneuvers to avoid collisions, the scheme of turning into the splash, or general jockeying for position.

When the allied fleets attacked the Dardanelles forts they maneuvered for several hours in a narrow channel, and I doubt not that they produced, perhaps against their will, courses more sinuous

than could be desired by the most ardent supporter of the "sinuous course."

Thus it is seen that the sinuous course has been used in the past and most probably will be used in the future. Such being the case it behooves the coast artillery to take heed of it.

To combat the sinuous course we need only adopt range finding methods that reduce the dead time to a minimum, i.e., the interval that elapses between the time the vessel passes the position of the last used plotted point and the time the shot falls, and to make our corrections from observation of fire based on the setforward point rather than on the position of the target at the instant of splash.

The necessity for reduction of the dead time to a minimum comes from the fact that the possible error of locating the setforward point varies about as its square, i.e., about as the square of the sum of the predicting interval and time of flight. Actually, if the vessel travels at constant speed, this error is more nearly proportional to the versine of the angle through which the ship turns during this time, but for practical purposes the rule of the square is accurate enough.

For instance, if a mortar battery fires with a predicting interval of one minute, the time of flight also being one minute, and the error of the setforward point due to the sinuosity of the course is 200 yards, by reducing the predicting interval to 30 seconds we should expect the error to be reduced in the ratio $(1.5)^2/(2)^2$, or to 112 yards.

There is, of course, a limit to the reduction of the predicting interval, but experience has shown that a predicting interval of 30 seconds is entirely practical for mortars.

The necessity for correcting fire on the basis of the setforward point rather than the target arises from the fact that if the setforward point has been incorrectly located this error will be applied as a part of the correction of fire on the next shots, when as a matter of fact it is an accidental range finding error that may reverse its sign on the next shots.

For example, suppose the ship has turned 100 yards left during the predicting interval and time of flight and the shot fell 100 yards right of the ship. If corrections are being made relative to the target a correction of right 100 yards would be applied. If at the time the shot to which this correction was applied fell the ship had in a similar manner deviated to the right this corrected shot would with accurate shooting fall 100 yards further away from the ship than if no correction had been made at all.

In other words, the best we can possibly expect to do is to hit the setforward point and the best way to do this is to correct our fire on the basis of the point we hope to hit.

There is no serious difficulty involved. At the most it merely necessitates the use of a second plotting board and additional base end instruments, which would be a welcome relief from the present horde of improvised spotting devices. In addition the use of this method by necessitating an additional plotting board would in several other ways increase the efficiency of each battery—probably as much as 100 per cent. Trial shot data could be obtained without the present delay, two targets could be tracked up to the moment of opening fire, and no time need be lost in changing targets once fire has been adjusted.—(*To be concluded.*)

The Regular Army is the model for the whole manpower of the country. The Regular Army must carry all the overhead and provide all of the instruction. It must devote some of its attention to its own efficiency and to the defenses of Hawaii and of Panama, whose loss in war might prove fatal to the fleet and our commerce on the sea. It must be strong enough to bear the first shock of battle and to hold an attacking foe until our civilian soldiers could be fitted and hardened for the rigors of campaign. The Regular Army needs, therefore, particular attention. Yet the Regular Army has borne the brunt of successive reductions in recent years. It now amounts to less than half what the Act of 1920 contemplated it should be. In spite of its reductions, its training tasks have increased. The Regular Army is the crux and focus of our whole situation. When it suffers, the National Guard, the Organized Reserves, and all civilian defense agencies suffer just as students in a school suffer when teachers are inadequate or improperly maintained.—*Major General John L. Hines, Chief of Staff.*

Relations of Land Power and Sea Power

By COLONEL S. C. VESTAL, C. A. C.

EDITOR'S NOTE: Colonel Vestal considers this subject under two hypotheses: the first, where the superior land power is inferior on the sea; and the second, where the superior land power is superior on the sea. The following article deals with the first of these conditions. The second will be published in a later issue of the JOURNAL.

A LITTLE over a century after Rome overthrew the last primary state at Pydna, the Romans lost their own freedom and the Republic became an empire; and unity of government became an ideal which ruled the thoughts of men and, to a less and less extent, as time went on, their actions, for fifteen hundred years. It is a significant fact that Dante, who wrote early in the 14th century of the Christian era, could conceive of no form of government except that of an undivided Roman empire.

The World War swept away five potentates who bore the name of Caesar as a title, namely, the German Kaiser, the Kaiser of Austria, the Czar of Russia, the Turkish Keiser-i-Rum,, and the Czar of Bulgaria. I wish to trace briefly the history of these titles.

The German emperor and the Bulgarian czar assumed their titles in quite recent times; but the other three could claim a fairly good succession back to Augustus. The Czar of Russia and the Turkish Sultan claimed the succession through the Greek emperors. The Austrian title came through Charlemagne and the Holy Roman Empire.

In the fifth century, A. D., the Western Roman Empire was overrun by barbarians who established governments that acknowledged the overlordship of the Roman Empire. When the Western Empire ceased to be, the barbarian governments acknowledged fealty to the Eastern emperor. The Western Empire was reestablished in 800 A. D., by Charlemagne, who claimed succession through the Eastern emperors.

In 843 the empire of Charlemagne was divided amongst his three sons. To one was given the eastland, which was the beginning of modern Germany; to another the westland, which was the beginning of modern France; and to the third, the middle-land from which arose Holland, Belgium, Luxemburg, Alsace, Lorraine, the Rhineland, Switzerland, and Savoy. It has ever since been a bone of contention between its neighbors.

The empire of Charlemagne was revived by Otto I in 962, under the name of the Holy Roman Empire; the line of Roman emperors was continued in unbroken succession henceforth until the last Roman emperor, Francis I, the 122nd from Augustus, took the title of Emperor of Austria (1803) and renounced his title of Emperor of the Holy Roman empire in 1806 upon the demand of Napoleon.

Napoleon forced Francis to renounce the title for the purpose of assuming it himself, gave his son the title of King of Rome, which had been borne by the eldest sons of the emperors of the Holy Roman Empire, and carried his imperial robes to Moscow for the purpose of crowning himself as Emperor of the East and of the West, in succession to Francis and the Czar.

Almost simultaneously with the rise of the Holy Roman Empire, the independent states of modern Europe took their rise. Modern Germany claims the year 843 as the beginning of her national existence; and the history of France began the same year. The various kingdoms of England were united under King Egbert in 829. Five kingdoms arose in Spain between 873 and 1087 which were finally united under Ferdinand and Isabella shortly before the discovery of America. For more than eight centuries, therefore, Europe has consisted of a number of independent states. Throughout this period one at least of these states has been trying to dominate the rest.

The first, most persistent, and most dangerous effort came from England. The danger was most imminent in the reigns of Henry II (1154-1189), Edward III (1327-1381), and Henry V (1413-1422). A French king was brought prisoner to London and an English king was crowned in Paris. The Banner of St. George was carried beyond the Pyrenees and the Alps. The English won a great battle south of the Ebro. English warriors leaving behind them the devastated fields of France, entered Valladolid in triumph and carried terror to the gates of Florence. The English victories over the French at Crecy (1346), Poitiers (1356), and Agincourt (1415) compare well in completeness and immediate effect with Cannae; but in their ultimate effect they were as indecisive as Cannae. Crecy and Agincourt are in the region of the Somme.

Sea power played an inconspicuous, though not unimportant part during these years. There were naval battles, notably at Sluys in 1340, where the French lost 230 ships and 20,000 men. The English had command of the sea, practically throughout the period, which enabled them to carry on their wars on the continent; but they were too weak on land to effect their purpose. If England had been linked to the continent by a peninsula, she would probably have

been able to overrun it; and there would have been one power in Europe, as in Roman times. There was then no state in Europe fitted to play the role of umpire which England herself has played in later times.

The death of Henry V in 1422 was a fatal blow to the English cause on the continent. After his death the English power steadily declined; Joan of Arc raised the siege of Orleans in 1429; the English evacuated Paris in 1436; and Guienne, their last continental possession, in 1453. Civil war at home, the War of the Roses, prevented the English from renewing the war on the continent. When domestic tranquillity was at length restored, a new Europe had arisen. The France of Francis I and the Empire of Charles V confronted each other as rival powers and England found herself the virtual umpire of Europe, a role which she has fulfilled almost continually from that day to this by giving moral and material support to the weaker of the two strongest continental powers.

The year 1453 has been selected by historians as the dividing line between modern and medieval history, on account of the fall of Constantinople. The year 1453 is important, not because of the fall of Constantinople, which had been surrounded and cut off from the adjacent territory for years, but because it marks the time when the English finally left the continent of Europe and changed their policy from conquest of the continent to that of prevention of conquest by other powers.

When Henry VIII came to the English throne in 1509, the mighty state of France stretching from the Atlantic to the Mincio threatened the liberties of the western powers. Henry formed a league with Spain, the Emperor, and a number of smaller powers. The league drove the French from the Duchy of Milan. In 1514 it was dissolved in the belief that the power of France was broken. In 1515, Francis I came to the throne of France and renewed the war. He gained a great victory at Marignano which placed Italy at his feet. English subsidies prevented reconciliation between Francis and the Swiss and enabled the Emperor Maximilian to continue the war. In 1516, King Ferdinand of Spain died and his extensive but disjointed possessions passed to Charles of Hapsburg, who made peace with France. The emperor soon followed his example. To all appearances France was supreme in the west of Europe; but on the death of Maximilian in 1519, Charles succeeded to the heritage of the Hapsburgs, was elected emperor; and France suddenly found herself surrounded on all sides by a great power led by an able prince who was prepared to assert all the prerogatives of a Roman emperor. Charles purposed to restore the old imperial unity of Charle-

magne. France nerved herself for the coming struggle. Both sides needed the support of England.

The war began in 1521. Henry allied himself with Charles V; but in February, 1525, one of Charles' lieutenants gained a crushing victory at Pavia, and captured the French king. Henry was awakened from his dream. He suddenly saw all Europe in danger of being overrun by an ambitious prince to whose power there was now no counterpoise. Henry entered into a defensive alliance with France and agreed to use his best offices to secure the release of the French king. On the release of Francis early in 1526, Henry joined a holy league for the deliverance of Italy, formed by France, the pope, and the lesser Italian states.

On May 5, 1527, one of Charles' generals took Rome and sacked it. The superiority which Charles acquired by these victories remained throughout his reign. The war was brought to a close by the treaty of Cambrai in 1529. It was renewed in 1535 and lasted three years. It broke out again in 1542 and was again brought to a close in 1544.

Toward the close of his reign, the religious wars in Germany weakened Charles' position internationally. He was driven in headlong flight through the Brenner Pass and compelled to accept the treaty of Passau in 1552, which defeated his hopes of rendering the imperial authority absolute and hereditary in his family. Chagrined by the turn of affairs in Germany, Charles laid aside his various crowns in 1555 and 1556. His son, Philip II, received the Netherlands, Naples, America, and Spain; while his brother Ferdinand, was elected emperor. Thus two Hapsburg lines were established, one in Austria, and the other in Spain, which were a unit in international relations for more than a century and a half.

The Hapsburgs annexed Spain and her vast dependencies by royal marriages, somewhat as Germany practically annexed a number of Balkan states prior to 1914. By the same means they now annexed England for a time. When Philip II came to the Spanish throne, he was the husband of Queen Mary of England, and England was fast becoming a province of the Spanish monarchy; but his ambitious schemes were frustrated by the death of Mary in 1558 and the advent of Elizabeth. The weakness of France during a period of about forty years of religious wars which followed, left Spain and England the great rival powers of Europe. The sole aim of Philip was to extend his empire. He knit his disjointed dominions into one great despotism, made Spain his home, and converted his outlying possessions into Spanish provinces. The princes of Italy were subservient to his wishes and the Austrian branch of his family

was ready to assist him in any enterprise. Elizabeth was confronted with the question whether she should maintain a war abroad or wait till the subjection of all the natural allies of England should give her enemies leisure to begin hostilities in her kingdom.

Philip long maintained an alliance with Elizabeth. Whilst he himself was encouraging rebellion in Ireland and Scotland and she was seizing his treasure ships and aiding his rebellious subjects in the Netherlands, fear that she might do worse, fear that France might become strong, made him cling to the English alliance.

In 1571, he performed an estimable service to civilization by the destruction, at Lepanto, on the coast of Greece, of the Turkish naval power which for a generation had terrorized the Mediterranean and ravaged the coasts of the Christian nations.

In 1580, he annexed Portugal, with its possessions in the east and the west, its harbors, and its navy, which was second only to the navy of Spain. The conquest of Portugal drew France and England together. In 1584, Philip began to gather his vessels in the Tagus for the invasion of England; and in the same year, his forces took Antwerp. But many states favored the cause of Elizabeth through fear of the gigantic power of Philip. Scotland, France, and the Dutch republic adhered to the cause of Elizabeth; Denmark seized his ships in her harbors; and the Hanse towns retarded the equipment of Spanish ships in their ports. Philip expected to decide the war by two battles, one on the sea and one on English soil; but the defeat of the great armada in 1588 removed Spain as a deadly menace to Europe and the active disintegration of Spain set in rapidly.

By the assassination of King Henry III of France, in 1589, Henry of Navarre, a Protestant, came to the throne as Henry IV. Elizabeth supported the new king with men and money and Philip aided his enemies. Henry gained two great victories in 1589 and 1590 and three years later removed all opposition by becoming a Catholic and by publishing edicts which gave toleration and religious peace to France.

The net results of Elizabeth's reign were the independence of the Dutch Republic, national unity and domestic peace in France, and the destruction of the Spanish hegemony of the western world. She was resolute in her refusal of the sovereignty of the Netherlands which was offered to her; and she rejected with scorn the offer of the Protestants to make her the "head of religion" and "mistress of the seas." Her amazing success came mainly from the wise limitation of her aims.

With the defeat of the Armada, Spain ceased to be a European menace. During the greater part of the sixteenth century, now

coming to its close, she had been either alone or in combination with the empire, the source and the cause of the great European wars. France had begun the century in the role of wanton aggressor; but she was soon reduced to the defensive and became one of the "allies." In the first half of the next century, which is marked by the Thirty Years' War, the empire became the aggressor; and France, under the wise and able leadership of Richelieu, became the conservator of the liberties of the nations.

The Thirty Years' War, which broke out in 1618, was caused by the desire of the German emperor, Ferdinand II, to establish a great overshadowing empire in Central Europe. Spain was the ally of the emperor. In this war England took no part. For the greater portion of it, she was torn by civil dissension and civil strife as the result of the efforts of the Stuart kings, James I and Charles I, to make themselves absolute monarchs.

This is the only coalition war in modern times in which England has taken no part. The House of Commons entreated King James to enter the war, but James thought that he could mediate through the aid of Spain. He was painted with a sword which nobody could draw, though many were pulling at it. It was remarked at the time that Denmark had agreed to contribute a hundred thousand herrings to assist against the emperor, the Dutch a hundred thousand butter-boxes, and the king of England a hundred thousand ambassadors. By a threat of war, James actually brought about a suspension of arms through the summer of 1621, but when the Imperialists discovered that he had nothing but words in his armory they resumed the war. His obstinate refusal to go to war at the command of his people furnishes an apt illustration of the fact that the people are generally more ready than their rulers to go to war against outlaw nations. There were many instances of this in the World War.

The first ten years of the war was largely a struggle amongst the Germanic states and was favorable to the emperor. In 1625 Denmark entered the war against the emperor. In 1627 she was thoroughly defeated and made a separate peace.

Richelieu watched carefully the progress of affairs in Germany. He aided the enemies of the emperor and sought to avoid the necessity of throwing the French sword into the balance. He found in Gustavus Adolphus, king of Sweden, a salutary weight to keep down the Austrian power. In 1628 he made a secret treaty with Gustavus whereby he promised him a subsidy if he would invade Germany; and three years later he made a second treaty promising a still larger subsidy. At the head of a nation of one and a half million people, Gustavus set out in 1630 to attack the exalted successor of

Caesar and Charlemagne. What remained of life to him was one continued series of victories for which he was chiefly indebted to personal endowments derived from nature and industry.

He gained a victory over the superior forces of Tilly at Breitenfeld, north of Leipsic, on September 17, 1631. After his victory Gustavus marched to the Rhine where he arrived in December with an army increased by new allies to 60,000 men. His wonderful success began to excite the apprehension of the French. He held a splendid court in Mayence, in the winter of 1631-32, which may well be compared to that which Napoleon held at Dresden just before he set out on his Russian campaign.

Thither came many princes and ambassadors, his queen, and his ministers. At this time he had eight armies afoot and the extent and brilliancy of his operations are comparable with the achievements of the greatest soldiers. He spent the summer and autumn of 1632 maneuvering against Wallenstein. Their final battle was fought at Lutzen in November, Gustavus was slain, but the Swedes were victorious.

The death of Gustavus was undoubtedly a relief to Richelieu, who had long since perceived that in his attempt to limit the power of the emperor he had evoked a greater power. But Richelieu was too wise to embarrass Gustavus before he had come to grips with the emperor. Gustavus himself saw the necessity of turning his attention eastward from the Rhine in order to allay the natural suspicions of his French allies; but in May, 1632, his successes in Bavaria led the French king to delay the payment of his subsidy. In freeing Germany from the despotism of Ferdinand, Gustavus intended to impose his own yoke upon the liberated.

The war dragged on for fourteen years after the death of Gustavus. The Swedes suffered a great defeat at Nordlingen in 1634. The next year Saxony and Brandenburg made a separate peace with the emperor and the Swedish cause was brought to the verge of ruin. France now entered the war against Spain and the emperor. In the last years of the war, the French generals, Conde and Turenne broke the military power of Austria; and the allies made peace with the emperor at Westphalia in 1648.

Ferdinand had sought to bring about the unity of Central Europe; but the consequences of the union were so menacing to the neighboring nations that they assisted the smaller German states against the emperor. To prevent a renewal of the menace, the allies dismembered Germany at Westphalia.

It is difficult to avoid both Scylla and Charybdis. By shattering Germany, France was left alone amongst a large number of

weaker states; and all the great wars of western Europe for more than two hundred years after the peace of Westphalia proceeded from the ambitions of France and the weakness of her continental neighbors. Bismarck united Germany between 1864 and 1871 and Germany took up the role in central Europe of the Germanic empire which was shattered at Westphalia.

Sweden had started out as the champion of the Protestants and she had ended by becoming the natural enemy of every Protestant state on the continent. After the war Sweden possessed territories all around the Baltic, which was virtually a Swedish lake. Her position around that sea bore a considerable resemblance to that of the Roman empire around the Mediterranean; and it had the weakness of the Roman empire, namely, the lack of defensible frontiers.

In 1625, in the course of the Thirty Years' War, appeared the *International Law of Grotius*. The author was a native of Holland, one of the allies in this war. After the appearance of his book, Grotius was for ten years, the ambassador of Sweden to France, two of the allies against the Germanic empire. Throughout his writings, he expressed the views which are natural to an intelligent, thinking inhabitant of a coalition country in the midst of a war against a powerful, aggressive enemy, such as the Germanic empire was at that time and such as Germany was in the World War. He emphasized the fact that the rules of international war should favor the weaker nation; and he preached the duty of the nations to aid the weaker nation when a powerful aggressor seeks to increase his strength by absorbing his weaker neighbor. He was undoubtedly selected as ambassador because he held such views.

Our international law comes not from Grotius but from Vattel, a native of Switzerland, who wrote in French, under the influence of French thought in the period when France was the great aggressor in Europe. Vattel revised the work of Grotius and gave it a turn such as a German writer would have given it in 1625 or during the period of the World War. He preached the duty of neutrality on the part of all nations not actually engaged in war, thus favoring the powerful aggressor, who would be free to overcome his weaker neighbors, one by one. The Hague Treaties of 1907 are a codification of the principles of Vattel. Strange to say, the whole tendency of international law writers in time of peace is to accept and elaborate the views of Vattel. I respectfully submit that as inhabitants of the country which maintains the Monroe Doctrine, a spontaneous offer of alliance to every country on the American continents which may be attacked by non-American nations, we should take the work of Grotius as our international law Bible.

When Louis XIV personally assumed the reins of government in 1661, France stood forth as the wealthiest, most compact, and most powerful state of Europe. Her income was twice that of England. Spain had fallen into helpless decrepitude; and the disunited Germanic states were a temptation to their stronger neighbor. Early in his reign Louis acquired a real superiority in Europe by showing himself to be a very dangerous and aggressive neighbor. One of his first acts was to compel the king of Spain to send an ambassador to Paris to declare in the royal presence that henceforth Spanish ambassadors would not compete for precedence with French ambassadors. He compelled the pope to send his own brother as a legate upon an embassy of humiliation and penance to Paris, for a broil in the streets of Rome which had been started by members of the French embassy.

He bought Dunkirk and Mardyke from Charles II of England and began to fortify Dunkirk and build an artificial harbor. He began to fortify his frontiers, increased his military forces, and held frequent military reviews. Such was his strength on land for more than fifty years that no single European state could withstand him, and two great coalitions, in which half of Christendom was arrayed against him, failed of success. At the beginning of his reign, the French army numbered 100,000; it was increased to 200,000 in the war with Holland; and it counted more than a half million in the third and last struggle. His fleet numbered a hundred of the best ships in the world and was able to hold its own for a time against the combined fleets of England and Holland.

In the summer of 1667, Louis attacked Spain and in two months his troops overran Flanders and took six great fortresses and in the following winter he occupied Franche Comte. England, Holland, and Sweden concluded a triple alliance which forced Louis to acquiesce in the Peace of Aix-la-Chapelle, in 1668. Louis retained French Flanders, but restored Franche Comte to Spain.

He was astonished and exasperated that a small state like Holland should join in thwarting his ambition. He secured an alliance with England by a secret treaty with Charles II, wherein he granted Charles an annual subsidy of 200,000 pounds; and in 1672 his troops overran Holland. The Dutch opened their dykes; and Amsterdam, like a vast fortress, stood in the midst of the waters, surrounded by friendly war vessels. De Ruyter, the Dutch admiral, put to sea with 150 ships and gained a victory over the combined French and English fleets, June 6, 1672. Spain, the Empire, and Brandenburg came to the rescue of Holland and a long war ensued. The English people compelled their king to make peace with Holland and a small body

of British troops was sent to aid the Dutch; but fear that Charles might make himself absolute at home restrained Parliament from granting funds for an active war with France. Peace was signed at Nimeguen in July, 1678. Holland obtained honorable and advantageous terms; but France retained Franche Compte and many towns in the low countries at the expense of Spain.

The allies disbanded their forces; but Louis retained his and increased them and made the years of nominal peace a time for conquests. His ambition, to quote Macaulay, was to be "sole master of Europe." Holland had taught him in the last war the secret of the Romans, that to be master of Europe one must be master of the sea as well as invincible on land.

Louis accordingly increased his navy, raised its personnel to 60,000 men by the year 1681, and established naval bases at Toulon, Brest, Havre, and Rochefort. He took possession of Strasburg; purchased Casale in Italy; seized Alost in the Spanish Netherlands; bombarded and took Luxemburg; seized Courtrai and Dixmude in Flanders and the German city of Treves; and he bombarded Genoa and compelled the Doge himself to come on an embassy of humiliation to Paris. He sent a thousand troops to Rome as an escort and guard to the French ambassador, and he seized the papal district of Avignon which was enclosed by French territory.

The encroachment of Louis and his formidable armaments alarmed the European nations and a large number of them formed the League of Augsburg, in 1687, a weak defensive alliance designed to resist the further encroachments of the French. Louis resorted to open hostilities in September, 1688 by invading Germany. Simultaneously with this invasion, William, Prince of Orange, the Stadholder of Holland, sailed with a small expedition to England. He was received with joy by the discontented subjects of James II; Parliament declared William and Mary jointly king and queen of England; and England was definitely enlisted in the struggle against France.

Louis overran all the country west of the Rhine; but in the midst of his triumphs news came of William's success in England and he prepared for a war of defense by evacuating his advanced positions. In evacuating the Palatinate, he systematically ravaged and destroyed the country. Nearly a half million people were given three days of grace, after which they had to shift for themselves. Spain and the empire joined the allies in the spring of 1689 against Louis who was left without a single ally except the Turk and insurrectionary forces in Ireland.

In this war, France disputed the command of the sea with Holland and England. Her fleet gained a great victory at Beachy Head

on June 30, 1690; the French landed a small force on English soil, exhibited in miniature the devastations committed in the Palatinate, and drove all classes in England to the support of William's government. Frightfulness, whether it be committed on the sea, from the air, or by invading hosts, always has, in every age and every country, the opposite effect from what its proponents expect.

In 1692, Louis prepared for a grand invasion of England; but the allied fleet composed chiefly of English vessels gained a great victory at La Hogue, the greatest gained by the English over the French since Agincourt, and the command of the sea was definitely lost to the French.

The war on land was fought out chiefly in the low countries. Early in the spring of 1687, Louis, for the first time in his long reign, spontaneously offered equitable and honorable terms to his foes. By the treaty of Ryswick, France restored to the empire all she had gained by trick and by force since the peace of Nimeguen, save only Strasburg, and she razed the fortifications of Strasburg.

But the treaty of Ryswick was a peace without victory. In France the people reproached Louis with having made a peace as if he had been vanquished and the French plenipotentiaries were covered with ridicule and reproaches. The allies soon learned to their chagrin that they had not bridled the power of Louis XIV.

The English army was now cut down to seven thousand men; many persons in England loudly proclaimed that England would never again go to war; King William was personally very unpopular; and it was generally believed that he had lost his influence in England and in Europe. Louis XIV, like the German emperor in 1914, took the G-2 estimate of England at its face value. In 1700, he accepted, for his grandson, Philip of Anjou, the dying Spanish king's bequest of his kingdom, which was sufficient to raise a continental coalition against France; and the next year he recognized as King of England the son of James II, on the death of the exiled king, which was sufficient to bring England into the coalition. The war began in Italy in the spring of 1701, and in the following September, England, Holland, and the empire formed a grand alliance, which was soon joined by Denmark, Sweden, the Palatinate, and most of the German states. The failing health of William prevented him from taking command on the continent, and the conduct of the war was intrusted to John Churchill, Earl of Marlborough, whose splendid military and diplomatic talents at length freed Europe, for a time, from the French incubus.

William died on March 8, 1702, and three days later Queen Anne entrusted Marlborough with the entire direction of the war.

In this war the French made no serious effort to control the sea. The English took Gibraltar in 1704 by a joint military and naval expedition. In an attempt to recover it the next year, the French fleet was dispersed by a storm, many of the scattered vessels were captured by the English, and during the remainder of the war, France sent no large fleets to sea.

In the higher leadership, the allies, under the direction of Marlborough and Prince Eugene, were better served than France. This war furnished the only instance where the allies have had such an advantage from the beginning to the end of the war. The French king, in the decline of his mental and physical powers, attempted to control his armies from Paris, to the great detriment of military efficiency. Blenheim, Ramillies, Oudenarde, and Malplaquet broke the pride of Louis; and he offered terms which yielded all except the main essential point for which the allies contended, namely, the establishment of the French prince on the throne of Spain. The death of the Emperor in 1711 gave a new aspect to the war. The Archduke Charles, whose pretensions to the Spanish throne had been supported by the allies, became emperor. From the point of view of Holland and England, the remedy which they proposed was now as bad as the disease which they wished to cure. They feared the union of Spain and the empire as much as the union of France and Spain; and they quietly dropped their original aims, and made peace.

Philip retained the throne of Spain by the terms of the peace of Utrecht in 1713, but he had to make costly concessions to the empire in Italy and the Netherlands; Minorca and Gibraltar went to England; and France consented to the re-establishment of the Dutch barrier forts, to dismantle Dunkirk, to recognize Anne as Queen of England and to expel the Stuart pretenders from French soil.

The union of France and Spain which was confirmed by the Treaty of Utrecht, was the mainspring in European politics henceforth until the outbreak of the French Revolution. But the empire was strengthened at Utrecht as an offset to the French-Spanish unit; and, as a consequence, Europe was not threatened by any great over-shadowing power until the rise of the French Republic threatened Europe as she never had been threatened by any of the European monarchies.

Since the Treaty of Utrecht England has been continuously the main barrier against the ambition of the strongest continental state, as she had been intermittently prior to that time. Her insular position has made her, until the United States awoke to the realities of the situation in 1917, the one great power which could have no

dreams of expansion on the continent of Europe and whose great interest lay in the maintenance of European peace on the basis of an observation of European treaties. England has been allowed to have command of the sea without serious protest from the world at large because the weaker nations have feared to allow such command to pass to any continental nation, which, like ancient Rome, should be at once the strongest on land and the strongest on the sea.

Against France and Spain, England maintained a two-power standard for her navy during the 18th century. Thus, at the beginning of the American War, she had 150 ships against 140 French and Spanish ships. During the 19th century she pursued a similar policy against the two strongest continental navies. When Germany became the great threatening power, the meaning of the term was slightly altered and England endeavored to lay down two keels to one laid down by Germany. By the recent Washington treaties she secured a 5-to-1.75 standard as against the strongest military powers on the continent.

In 1789 the Revolution broke out in France; control soon passed into the hands of the national assembly; and republican France began a series of aggressions against neighboring states which made the aggression of Louis XIV appear tame and out of date. Ignorant revolutionists, as has recently been illustrated in Russia, always believe themselves called upon to legislate for mankind and rule the world. Republican troops soon occupied Avignon, Venaissin, Porentui, and Geneva; the French assembly annexed Savoy, declared war on the Germanic empire in April, 1792, and against all nations in the following November. The general declaration was interpreted by specific declarations of war on England and Holland in February, 1793, and against Spain on March 7 of that year. Thus began twenty-two years of war which was interrupted only by one short interval of nominal peace. France made war on every nation in Europe, occupied every great capital on the continent except Constantinople and Stockholm, and wrested peace after peace from the conquered nations. But her victories on land were undermined and ultimately brought to naught by her disasters at sea. The revolution disorganized the French navy; and England controlled the sea from the beginning of the struggle.

Napoleon grasped the relationship between land power and sea power upon this planet of oceans, islands, and continents, and he made peace in 1802, in order to build and train a fleet. "Let us concentrate all our activity upon the navy, and destroy England," said he. "That done, Europe is at our feet." And again: "Peace is necessary to restore a navy—peace to fill our arsenals empty of

material, and peace because then only the one drill-ground, the sea is open."

But Napoleon could not forego, in time of peace, his aggressions against the smaller continental states; Britain divined his purposes; and she declared war, eighteen months, as Napoleon himself averred, before he was ready to renew the war on the sea.

Europe was ultimately saved from the despotism of France by the fact that the command of the sea was in the hands of a nation that could not be reached by the gigantic armies of France. If England had not existed, or if she had followed the advice of Mr. Fox, who thought that *republican* France could do no wrong, France would have re-enacted the story of Rome after the defeat of Carthage.

At Vienna, the German states clamored for the dismemberment of France, as Germany was dismembered at Westphalia, and as Germany is threatened with dismemberment today; but she was saved by the influence of the Duke of Wellington in the allied councils. Dismemberment of the great continental nations is not a remedy for Europe's ills. It is only an aggravation. France was shorn of her continental conquests in 1815, and reduced to her boundaries of 1789, except that she retained Avignon and Venaissin, the first conquests of the French Republic.

In the peace which followed the downfall of Napoleon, France remained the strongest power on the continent. Unfortunately, her statesmen were not possessed of the wise firmness and moderation of Richelieu and Queen Elizabeth; but she did not run amuck, because she was restrained by the general coalition of Europe against her, partly acknowledged, partly tacit. The nations bet on the wrong horse in 1870; and France became what Spain became after the defeat of the Armada, namely, the object of the care and solicitude of the nations, which, for their own safety, cannot permit gigantic and overwhelming land and naval power to be accumulated in the hands of any single nation.

When the war broke out in 1914, Britain had, what she considered to be, a margin of safety over the combined German and Austrian fleets. But Germany went to war in expectation that she would have command of the sea. She believed that England was decadent and that her hands were tied by troubles in Ireland and India; and she accepted at its face value, as an expression of English public opinion, the outpourings of English pacifists all tending to the conclusion that England would not fight. The German fleet, either by accident or design, was in Norwegian ports, in a position to sweep around the coasts of France and cut off her reinforcements

from Africa; but it had to beat a hasty retreat when the British fleet moved to its war stations, ready for action. If the 44th and 45th French divisions had not come from Africa, and the English army had not landed in France, William II might well have made good his promises to his soldiers to end the war by Christmas.

And now I wish to ask a question: Why did the Romans succeed in conquering the civilized world, and why did Charles V, Philip II, Louis XIV, the French Republic, Napoleon, and William II fail in a similar object? Rome succeeded because no aid could come from the outside world to help the struggling nations on the continent which were striving against the slow but steady advance of the legions; later aspirants for world dominion failed because aid came from without. When Rome secured command of the sea she was able to prevent aid from coming across the sea; but no conquering nation in modern times has had command of the sea except for short intervals.

No nation ever attempts to gain a preponderance of armaments upon both land and sea unless it is actuated by aggressive purposes. The nation which, like Germany, attempts to gain such preponderance, brands itself as an international bandit.

The liberties of the nations will be at an end whenever any country which has the best army in the world gains command of the sea; or, *vice versa*, whenever any country, which has the best navy in the world, builds up the most formidable army. This is the one great central but easily forgotten fact of human history which each age has to discover anew. The hegemony of the ancient world soon passed to Rome when that republic already possessed of an invincible army, wrested the command of the sea from Carthage. The defeat of the British fleet at Jutland would have placed the modern world in a similar position in regard to Germany, unless, indeed, the American fleet could have restored the command of the sea to the allies. The modern world is distinguished from the ancient chiefly by the fact that it has not been brought under the domination of a single nation. It has been saved from this fate by the fortunate fact that the strongest military state has never been the strongest naval power, thanks to the insular situation of England, to her ability to command the sea, and to her inability to become the strongest military power. Herein lies the secret of the existence of the free commonwealths of the modern world.

Competition in naval armaments is one of the effects of excessive land armaments. There is never any naval competition between countries which maintain small armies, however great their naval

forces may be. This is a fact of supreme importance at the present time. Nations like Great Britain and the United States, which maintain strong navies but comparatively weak skeleton armies raised by voluntary enlistment in time of peace, measure their naval strength not by each other's naval strength, but by the naval strength of countries which have powerful conscript armies backed by trained reserves ready for instant mobilization. For more than four centuries England has gauged her building program by that of the powerful military nations of continental Europe. She will beyond all doubt continue the same policy for a period which can be measured only by centuries.

England has never considered the strength of the American navy in determining her two-power standard; not because blood is thicker than water, as some would have us believe, but because she has known full well that she has nothing to fear from the aggressions of a country whose army does not greatly exceed the needs of domestic peace. And we have been indifferent about her navy for the same reason. If Canada were capable of mobilizing a great army as quickly as the United States, our attitude towards the British empire would be entirely changed; because the British navy and the Canadian army would be a dangerous menace to us. We have been sensitive to any increase of the Japanese navy, because Japan has a powerful army, and our relation to her from the geographical point of view is such that we dare not allow her to be in a position to control the Pacific in such a way as to enable her to carry out great aggressive campaigns.

Nations that depend upon naval power for defense never enter upon a war that can in any way be avoided. The English, like the Romans, have generally had wars thrust upon them, and like the Romans have generally begun their wars with disasters. As England and America each have a tremendous interest in the peace of the civilized world, which can be threatened only by countries having large armies, each is vitally interested that the other should not neglect its naval forces.

A strong naval power which maintains a comparatively small army is not a menace to any strong military power unless the military power by its aggressions unites the world in a coalition against itself; in other words, England, which relied upon her navy as her first line of defense, would never have begun a war of aggression against Germany, and the United States with its small army will never begin a war of aggression against Japan, which keeps up a large and efficient army.

Absolute suppression of all trade with the bandit nation should be enforced in future wars, if the history of the world continues to repeat itself. In the last war the allies did not declare a blockade in order, apparently, to avoid irritating neutrals, whose battles they were fighting. They preferred to follow an illegal practice, as measured by international law standards, which attained the same ends and permitted the compensation of owners of ships and cargoes. The Second Peace Conference of 1907 stipulated that commercial and industrial relations between belligerents and neutrals should be especially protected and encouraged. This is the freedom of the seas which Germany desired—freedom from blockade which was necessary to bring her to her knees and stop her aggressions. The international law of Grotius justifies the measures which the allies enforced, or should have enforced, against Germany; indeed, if they had proclaimed the principle of the Father of International Law at the beginning of the war, they would have had a moral and intelligible code to follow.

No nation has been able to acquire the hegemony of the modern world, because no modern nation has ever succeeded in combining superior land power and superior sea power. This is the great strategical teaching of modern history. The liberties of the nations have been preserved through the efforts of great leagues of states which have united to restrain nations that have sought to combine superior land power and superior sea power. Success has crowned the efforts of the leagues only because, by uniting the naval forces of one or two states and the military forces of many states, they have been superior to their enemy upon both land and sea.

The primary purpose of all the work of the War Department is to provide for national defense. In carrying out this purpose it has piloted the country successfully through six major wars. More than 100 other disturbances, only less serious because the foe was less powerful, have engaged its efforts. On an average of once in every year and a half of our national existence the Army has been called into service.

With the Siberian A. E. F.

By MAJOR L. L. PENDLETON, C. A. C.

IN ANY discussion of the Siberian A. E. F., it is advisable to review briefly the causes which contributed to the sending of an A. E. F. to Siberia. The removal of Russia as a factor in the World War, under the insidious Bolshevik propaganda, was the hardest blow of the war to the allies. The Monarchist party of Russia held out the hope that the Russian people would flock to the standard of almost any expedition intending to restore the old regime. Accordingly, several attempts were made, notably that of General Denikine in southern Russia, and that of Admiral Kolchak in Siberia, in which he undertook to move on Petrograd from Vladivostok. The Japanese, who had a deadly fear of the spread of the Bolshevik propaganda to their own country, lent willing assistance of every kind to Kolchak, and in order to keep it from appearing to be purely a Japanese sponsored expedition, the other allies were invited to join in its support. The French, British, and Italians sent only a few officers and specialists, but the United States sent two regiments of infantry from the Philippines, the 7th and 31st, filled to war strength by drafts sent over from the United States. General Graves and his staff went from California to take command, with special instructions from President Wilson, the nature of which, it was said, even the War Department did not know. Our A. E. F. arrived in Siberia in September, 1918; its orders were therefore issued some time sooner than this, when affairs on the French front were not so favorable to us as they became shortly thereafter.

I arrived in Vladivostok in February, 1919. It was, of course, still the dead of winter, and the ice in the harbor was three or four feet thick. The elements of the expedition were at that time disposed around Vladivostok and out along the railroad in various detachments. The headquarters were in the city, and about one battalion of the 31st was also there. The remainder of the 31st was out of the city, but not far away. The 27th had one battalion at Spasskoe, about 100 miles out, while the remainder of the regiment was at Verkne-udensk on the Trans-Siberian railway beyond Lake Baikal—close to the head of Kolchak's advance, over 3000 miles away.

It is only the very rare individual who can learn from the experience of others—with Kipling I might say, “Be warned by my lot, which I know you will not” (and learn of the Infantry from me). The Siberian A. E. F. was a purely Infantry expedition. So far as I am aware, there was not a single line officer or enlisted man of any other branch than the Infantry in Siberia, except myself. I claim the doubtful distinction of having served at some of the most isolated and lonely posts in the Coast Artillery from Fort Morgan, Alabama, to Grande Island in the Philippines, not forgetting Hausamont and Mailly in France, but in spite of my previous experience, I must confess that at first I felt a bit lonely in Siberia.

When I reported to the Chief of Staff of the expedition in Vladivostok I was reminded of the story of the Irishman who went into a saloon, and finding a fight in progress, inquired if it was a private fight, or could anyone get into it. Without exactly saying so, they gave me to understand this was their own private war—and as I had recently come from the French front, they resented the introduction of modern European methods into a purely Asiatic conflict. I was allowed to “cool my heels” both literally and figuratively in Vladivostok for a few days before receiving orders to go to the Suchan coal mines as Mine Guard Commander. Needless to state, I was surprised at being given an infantry command—but by this time I had learned the commonest of all Russian expressions “*niechevo*” (it does not matter!). The command at Suchan was a bit peculiar. It was called the Allied Mine Guard, and consisted of one company each of American and Japanese infantry and a platoon of Chinese infantry.

The American company was divided into three detachments, the Japanese into two, and the Chinese, of course, were not divided. It was still the dead of winter, and fearfully cold. There was nothing to do but to try to keep warm—and get as familiar as possible with the country and with local conditions. The allied troops occupied the mine district in October, 1918, when it became evident that the miners would not work under the Bolshevik regime. They were all ardent Bolsheviks, but under that doctrine they were all “comrades,” so there was no one to make them work, and they didn’t.

Our troops put back in control the old Czaristic superintendent and the miners went back to work. Force of habit, as well as hunger, had a great deal to do with that.

The Suchan district is wonderfully rich in coal. They were mining from three levels at that time, the lowest, the 1600-foot level, where the coal was almost anthracite in quality. The mines had from 2500 to 3000 employees, including those on the narrow gauge

railways handling the coal, and the total population of the district was between 10,000 and 15,000. Besides there were numerous villages a few miles away from the mines—wherever there was enough level land to support an agricultural community.

The extreme cold kept things quiet, and it was very dull at Suchan once the novelty wore off, which did not take long. The Russians used to amuse themselves with amateur theatricals and dances, held every Saturday night in their public building which they called the "Narodny Dom" or People's House. The plays were quite well done, I thought; better than the average mining community in America could have done. The dances were the Russian folk dances, of which you have all doubtless heard. They are nothing like our waltz and two-step, but are a succession of figures and evolutions—very gracefully done as a rule and interesting to watch. The American soldiers tried the dances and a few became quite skillful at them. Oddly enough, the only solo dance they ever tried there, called the Cossack dance, was best done by an American corporal who had once been on the Keith circuit. The Russians used to applaud him heartily—but it seemed to me they resented a bit his "stealing their thunder."

I spent a great deal of time at first, during the cold weather, getting acquainted with my Japanese company, exchanging calls, drinking tea, (I never could learn to like "sake") and learning all over again how to speak Japanese, for they were really very poor in English. My predecessor had been forced to speak to them in Russian, through his interpreter to theirs.

Just as I was flattering myself that I was about to win the confidence of the Japanese officers, they were relieved and a new company sent in, and it all had to be done over again. The new Japanese company started off with a rush. They had a photographer with them, and he took pictures of everything in the country, including the fords of streams, and even a group picture of all the officers, both American and Japanese. No doubt all these pictures are carefully filed away in their archives, against the day when they may again operate there. I was not supposed to have any administrative control over the Japanese troops, only tactical—that is, I assigned them an area to guard—and would have commanded them in action had it ever come to that. A few instances will illustrate some of their methods.

On one occasion, the Japanese asked permission to send a patrol to look over a road in their area, which I of course granted, but told them not to cross a small river about five miles out which by that time was commonly accepted as our district boundary. They did

cross the stream, however, and were promptly fired upon by the Bolshevik sentry in the woods, and withdrew hastily, after considerable firing. The Bolsheviks had a messenger at my office inquiring about the "invasion" long before the Japanese reported the matter.

Still later than this, I gave them warning not to be caught out far from camp in small parties, for fear of ambush. They did not relish the restriction, for at that time the Americans went about freely. Two of their number fell into a trap, though, were ambushed, shot, and cut to pieces. We did not find their bodies until the next day. They were cremated with military honors, a platoon of American troops attending the ceremonies.

I cannot leave the Japanese without relating an incident illustrating their discipline. Soon after their arrival their captain suggested that I make them a speech in Japanese. I demurred, but he insisted, so I finally agreed. About 100 of them—all those off duty—were marched over to my headquarters, where they solemnly presented arms and listened to my very brief speech, if you would call it that; it was only a sentence or two, which I had written out and had corrected by the captain, both as to grammar and pronunciation, before I tried it on them. The illustration of their discipline is that not a single Japanese allowed even the shadow of a smile to flicker over his face during the speech.

The Chinese troops never gave me any trouble. They were stationed some ten or fifteen miles from my headquarters, in a large village, where nothing much in the way of disorder ever broke out, so I visited them only a few times while the train waited for me. The story of the Suchan mines during the spring and summer of 1919 is the story of Russia in miniature. The Bolshevik doctrine gradually grew and spread, practically unopposed and supported by a lot of wildly fanatical leaders, until it had in its grasp the mines and all the surrounding territory. My orders were to remain absolutely aloof and neutral in Russian internal affairs. You can see how difficult this was when we were running a coal mine for the purpose of keeping Kolchak troops supplied at the front. However, I did my best to remain neutral, and, having promulgated an order that no armed men other than my own forces would be allowed in the mine district, I made it apply to the Kolchak troops as well as to the Bolsheviks or Partisans, as they called themselves.

Before this order was put into effect, however, the Kolchak troops had already made several expeditions into my territory, operated from the mine railroad and robbed, tortured and murdered many defenseless old men who fell into their hands. The young men, of course, took to the woods. The troops perpetrating these out-

rages were not Russians, except for a few Cossack officers. They were Tartars, Mongols and Chinese brigands under the Kolchak banner for the spoils of war only. Kolchak attempted to draft the young Russians into his army, but they invariably disappeared either before or after joining his forces. On one occasion I received orders to investigate a raid made by the Kolchak troops, it having been reported as particularly atrocious. One of my officers volunteered to go, and accompanied only by his interpreter, spent a night in the village. The report he brought back would have made your blood run cold. It was promptly transmitted to Vladivostok, and I heard later that it was cabled almost verbatim to President Wilson, who was then in Paris at the Peace Conference. That report was said to have been the deciding factor in influencing him not to recognize the Kolchak government and to keep hands off in Russia. A wise decision, I think, since there was little to choose between the two factions. Although I finally succeeded in stopping Kolchak troops from using the mine railroads, I could not stop them from approaching my territory from the sea, so they came that way, and a small war raged a few miles from the mines. We brought in the wounded on both sides, who were few in number, to the mine hospitals and kept in touch with the situation as best we could. At first the Kolchak troops were stronger, and marched some distance up the valley, robbing and burning as they came; then the Bolshevik forces began to gather and soon the Kolchaks were back on the beach, surrounded on three sides, and in a desperate situation. Two of my officers went down to see what was going on. They were cordially received by both sides, being allowed to pass the Bolshevik lines, and spent one night with the beleaguered garrison. This night had been selected for a general assault by the Bolsheviks, but they very kindly postponed it until the Americans got out of the way, which they did next day, bringing with them the farewell letters of the garrison, all of whom expected to be killed there. However, they were shortly relieved by a second expedition and their lives saved. Being reinforced, they again took the offensive and moved up the valley toward the mines once more.

While we had trouble like the above with the Kolchak troops, all my difficulties with the Bolsheviks were limited to words, except for the murder of the two Japanese soldiers, which I have mentioned, and the murder of several Russian civilians who did not join their side promptly enough. Responsibility for these murders was of course promptly disclaimed by the Bolshevik leaders, and, since murder is common in even our highly civilized America, I could do nothing about it.

The Russian rouble fell in value so fast that we could not keep the miners at work, having nothing with which to pay them, so they finally struck, or quit, for which they could scarcely be blamed.

General Graves and his staff paid a visit to the mines about this time and it was necessary to put an American crew on the train to get his party back. The Red leaders made propaganda of this, saying that our soldiers had come to Siberia to take from the Russians their jobs.

I was also visited by one of the chief Bolshevik leaders, Shevchenko by name, who had just issued a fiery proclamation against the allies, including the Americans. We drank tea and talked for an hour or so. His interpreter was a doctor who had graduated from Johns Hopkins. He apologized for his proclamation against us, but at Suchan we had already passed so many hard words we had hardly noticed his. A little later when I got into Vladivostok I found our headquarters building bristling with machine guns and filled with guards, which they told me had been added after Shevchenko's proclamation. He was a fine type of Cossack officer, very blond, short and stockily built and said to have won many medals for bravery in action from the Czar's government.

I had many calls from other Russians, mostly Bolsheviks, one of whom nearly gave me heart failure by taking a wicked looking bomb out of his pocket and placing it carefully on the desk between us when we sat down to talk. Suchan was at this time very much in the limelight in the Vladivostok papers, which accused me of being a Bolshevik and General Graves of supporting me in that attitude. This, I believe, was because we tried to be neutral. It just couldn't be done.

Finally an interallied commission was sent up to see what was causing all the trouble at Suchan. So far as I know this was the first session of the World Court; it had representatives of at least six nations on it, and examined witnesses and deliberated for a week or more. I never knew what report they made, but in this case no news was good news, I am sure.

Our relations with the Bolsheviks grew daily more tense, their leaders, former mine employees, were no longer allowed to visit the mine district, which they had left of their own accord. On the sector next to mine, the standard gauge railroad, Major Cutrer had been on the war path after them for a week or more. My garrison had been increased by one company of American infantry, H of the 31st.

The Bolsheviks declared war on us, which was still only words, as I did not fear an attack. I did fear, however, an attack on, or

rather some damage to the railroad at a point where I had no guards. A shipment of supplies arrived for us about this time, and it required threats of violence accompanied by the full intention of carrying out the threats, before the Russians would move our supplies for us. Once convinced we meant business, they moved them in record time.

I was about this time transferred to Vladivostok, where I was made assistant to the Chief Q. M., A. E. F. S., and my place at Suchan taken by another officer. I don't want to conclude the story of my regime at Suchan without telling how we almost acquired some new territory there, a small village called Novitskaya that lay just across the river outside the mine territory. For months it was robbed regularly by marauding bands of both parties, who did not dare cross the stream into the mine territory. Seeing this condition, the inhabitants of Novitskaya sent me a letter, signed by every householder and head of family in the village, praying me to annex them to the United States of America, and promising true faith and allegiance, if only we would protect them from the pillaging of the armed troops of both sides. Nothing could be done for them, but I have always considered their letter as a very unusual document.

About the only change made by my successor at Suchan was to get some machine guns. The Bolsheviks blew up the railroad, cut the telegraph line, and for two or three weeks we heard nothing from Suchan except the wildest rumors. Finally a relief expedition of two companies of infantry and a machine gun platoon was sent in. The garrison was found to be all right, but to have lost one officer, captured by surprise while out fishing, and one officer and several men killed and others wounded in an unsuccessful attempt to get back the captured officer. The reinforced garrison then attacked the village which I had wanted to go after some weeks before, and of course took it and captured one Bolshevik leader whom they exchanged for the American officer. He had been in captivity for a week or more, and said he expected every day to be his last. The Bolsheviks insisted that the Americans take back also an army mule captured with the officer, saying that the mule had caused them more casualties with his heels than all the rest of the American forces with their weapons.

The mine guard remained at Suchan a few weeks longer, but as the mines were out of commission, the railroad broken, and as it was necessary to supply the troops by sea, which required a twenty-mile haul over a rough and closely wooded road, where the carts were constantly fired on by snipers, our troops were withdrawn by sea, and the territory taken over by a Japanese regiment.

My service in Vladivostok covered about two and one-half months of the best part of the year, June, July and August, and was very interesting, though I never saw any more Japanese, except at a distance, and seldom went to our own headquarters, being then a full-fledged Q. M., and stationed at what we called The Base, about two miles from headquarters. I met a rather well-to-do Russian family of Polish descent, and in their home saw something of the life and customs of the Russians. The things which impressed me most were the way they consumed vodka and ate. They began their last meal about ten and finished at midnight, and then suggested a stroll on the beach or a card game.

By this time I had lost my war grade as lieutenant colonel and was a captain again. One day we got to talking Suchan with this Russian family, and they were horrified to discover that I was the famous, or rather infamous, supporter of the Bolshevik regime at Suchan, as their newspapers had made them believe. They finally said, "Well, we know you now, and you seem to be all right, but if we had known in the beginning that you were the colonel who commanded at Suchan you would never have been received in our home." I'm rather glad they didn't know it, for they forgave me, and I spent many pleasant week-ends at their summer home on the beach.

There is one very distinctive Russian custom about which returned travelers like to mystify their friends back home, by saying they have seen pink seals in Russia. Their friends at first ascribe this to the vodka they consumed, but it really has reference to the custom of both sexes going in swimming without bathing suits. This was one of the sights of Vladivostok, for on a hot summer evening it seemed that the whole city had taken to the water.

I left Vladivostok in August, 1919, bringing home with me the First Siberian Casual Battalion, composed entirely of men coming home for discharge. Our expedition remained in Siberia another winter and was withdrawn early in 1920, Kolchak's attempt having failed, and he himself having been killed.

The outstanding characteristic of the Russians seems to me to be their cruelty, which is barbaric—"man's inhumanity to man" is nowhere better exemplified than in Russia. For all that, I found them to be a very likable people, and in spite of the saying "scratch a Russian and you will find a tartar," they seemed all white to me. I do not believe there is anything for the world to fear from the Russian people themselves, could their voice be heard. There may be much to fear from their vicious, fanatical and dishonest leaders, but after all, isn't this something which all the world, and not Russia alone, has to contend with, to a greater or less degree?

Notes on Artillery in War

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*Extracted from an article published in the Revue d'Artillerie, and translated by
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SINCE the close of the World War the uses of divisional artillery have been studied and discussed in the most minute details. At schools and in maneuvers its problems have been made the subject of numerous publications. However, the use of corps artillery does not seem to have excited the same degree of interest among officers. In the following article it is proposed to examine certain points concerning the use of artillery in general, and then the principal mission of corps artillery, without any pretense at reaching a final complete solution.

For this study two cases will be considered: (a) Stabilization more or less prolonged where the enemy artillery is stationary long enough and has fired sufficiently to make it possible for a part of his emplacements to be spotted and mapped; and (b) War of movement where nothing is known in advance of the enemy artillery or of the trend the battle will take.

STABILIZATION

DAILY FIGHTING (aside from general offensive and defensive operations)—This consists of two kinds of fire: Destruction and neutralization.

FIRE FOR DESTRUCTION—Its success depends upon the following conditions: 1. The fire should be observed or controlled from start to finish. 2. The battery commander and the observer should both possess a good photograph of the target. 3. The importance of the target should be estimated and ammunition consumption gauged accordingly.

There is a marked advantage in the concentration of the fire of several batteries; in general, a group of three batteries. For example, using 155-mm. long, figures given by the Instruction Manual are: 400 shots; rate, 3 shots every $\frac{1}{4}$ minutes; duration of fire, about 45 minutes. Corrections made for atmospheric variations.

Before commencing fire the target should be verified to see that it is still occupied by a battery, or observed that a battery has been firing from this position during that same day.

The solution which naturally comes to mind is to attempt immediate destruction of all batteries noticed in action. In reality, this is not so simple as it appears. For fire of such importance it is found useful, if not indispensable, that the battery commander, or observer, has a good photograph of the target. Moreover, he must know the time when the battery was last seen in action, the availability of aviation and the ammunition supply on hand.

During a campaign the enemy has naturally met with the same difficulties as ourselves and has frequently wasted his munitions in fire on battery emplacements vacated several days before.

NEUTRALIZATION FIRE—Neutralization fire is always used when the enemy artillery shows vigorous activity, in order to silence him, for the moment at least.

Two cases are considered: 1. When means of observation have been able to spot firing batteries in action. In this case they were neutralized without difficulty by dense short concentrations of fire by several groups. In order that these concentrations shall be released rapidly and without warning, data should be prepared in advance on all known enemy battery positions. This forms a special chapter in the plans for the use of corps artillery.

2. When fire is from unknown enemy batteries. In this case something must be done and done quickly for the sake of morale. However excellent the morale of the troops, it must be admitted that they are bewildered by fire which cannot be returned by their own batteries.

During the war the following was frequently adopted: The Commanding Officer of the corps artillery, who always had at hand a map showing the enemy artillery and bulletins of information for preceding days, informed his intelligence agency that as soon as a sensible bombardment was noticed he be notified as to the probable active enemy batteries. If these are unknown, he chose from among the enemy batteries already located those which had been firing habitually in the bombarded area, or those which had recently fired there. He then ordered thirty shots fired rapidly on each battery selected. If this did not produce results, he picked other enemy batteries. Knowledge of the caliber of the shells which had fallen on his men was of great help to him. It is likely that a battery which is not forced to remain in action under fire will be silenced, for the moment at least, after thirty projectiles fall upon it. In this way the active enemy battery may be spotted, and if it resumes

its fire, can be eliminated by a concentration of fire. In any case, the ammunition has not been wasted; it has been expended in reprisal and to harass a definitely located enemy target. Where no other course is open, it is often desirable to strike a forceful blow on a few known enemy batteries. In this case concentrated fire was delivered on those batteries most recently reported active. This limits the fire, and obviously omits some of the guilty batteries. Nevertheless, this is a fire of reprisal and inflicts punishment on enemy batteries.

ARTILLERY IN THE OFFENSIVE

LONG PREPARATIONS—In this case the position attacked presents the character of a fortified front, and the infantry assault is preceded by a more or less long bombardment.

In 1918 this type of preparation undertook the destruction of enemy artillery several days before the main attack. Instructions issued October 31, 1917, stated the following: "destruction of batteries is the greatest gauge of success and should be regarded among the first considerations of the command."

The war furnished a good example at Verdun in the attack on Hill 304 in August, 1917.

To carry out the above policy, French batteries were emplaced several days in advance. The Germans took note and attempted to put them out of action. The result was that heavy batteries in the rear had to be put into action to protect the ranging batteries, until finally the corps artillery was engaged. The heaviest German bombardment fell at 8:00 P. M., August 19th, just prior to the time when the French infantry attack was to be launched at 4:00 A. M., August 20th. The concerted French artillery effort succeeded in silencing the German batteries so that the infantry attack went off as scheduled.

The above cited example led some to the conclusion that advance preparation was not necessary, since enemy batteries could be neutralized at the desired moment. * * *

Between the doctrine of 1917, which sought the destruction of enemy artillery, and the new doctrine which seeks to silence it, there should be a mean solution which can be stated thus:

1. Whatever the phase of battle, the artillery if it has the time and means necessary to destroy an enemy battery which is known and definitely located should do so.

2. Artillery provided with special shells should gradually and completely neutralize any enemy artillery which is revealed.

SHORT PREPARATIONS—If the artillery preparation is short, one cannot expect to undertake the destruction of enemy artillery

and must be contented with merely neutralizing it. During the war neutralization was effected by partitioning enemy batteries among artillery groups of like power and caliber. The fire most often used was cast steel shells, commencing at the time fixed for the preparation and delivered with intensity for several minutes, when the enemy reaction became noticeable.

To each group were assigned supplementary targets which were also the normal targets of other groups. Enemy batteries were also surprised with special shell, and atmospheric conditions being favorable, fire was delivered with these projectiles commencing four or five hours before the attack. It may be stated that neutralization with high explosive under these conditions was unsatisfactory and succeeded only when using special gas shells.

Adjustment and return of fire is prescribed in orders of March 20, 1922. This calls for a strong blow by at least three groups of long range guns which will successively eliminate various targets. Fire is opened by surprise simultaneously by all units to secure a maximum effect.

No indication is given either of the length of fire or the number of projectiles allotted. These depend upon circumstances which are variable, such as detection of enemy batteries, morale of their personnel, precision of fire, calibers used, etc., which only the experience of war can determine, and these experiences were not sufficient in the last war. But there is no objection to giving general instructions with approximate data.

EXECUTION OF FIRE: Case I.—Where there is a photograph of the battery to be neutralized. The dimensions of the zone of fire are determined by the rectangle which circumscribes the battery. It is convenient to plot to scale this rectangle, including batteries, dumps and field works from the photo and sketch it on the firing map. Scale 1/20,000 was used successfully.

In general, direct control on the objective is impossible in a surprise attack or where observation is impracticable, hence it is necessary to re-locate from an auxiliary registering point. The agreed allowance for corrections will depend upon the method of shifting from the registering point to the target. The best results were obtained by moving in three equal increments of $0^{\circ}.3$ in deflection to right or left and one per cent up or down in range.

Case II.—No photograph is available, but the metric coordinates of the enemy battery are known.

Dimensions of the target must be estimated with liberal allowances for widely separated pieces, probably in quincux as the Germans frequently placed their guns in 1918, and covering a large area.

Obviously the ammunition consumption and duration of fire will be proportionately greater in this case, but relatively the same as enunciated under Case I.

Case III.—The enemy battery is known only by his hectometric coordinates. (Squares 100 meters on a side).

This is a common case, especially in the offensive, where a battery is spotted by aerial observers who cannot photograph it. Also where batteries are sighted which have not yet fired, and in cases where the enemy artillery has just been withdrawn to new rear positions.

Conclusions—When the target is known only by its hectometric coordinates, the ammunition consumption and the time needed to destroy the target prohibit the use of any of the commonly approved methods.

Whenever a photograph of the target is available, it should be used to determine the horizontal plan of the target.

It is recommended that enemy batteries in action be photographed without delay and the negatives rapidly distributed to all artillery commanders to include the echelon.

Air observers should be trained to spot the enemy batteries with greater precision than that afforded by the system of hectometric coordinates. (A hectometric grid is one composed of squares whose sides equal 100 meters).

Choice of groups to use. In principle this will depend upon the locations and degree of resistance offered by the enemy batteries. However, it is best to employ a concentration of at least one group of heavy long range guns which will strike the target obliquely, if not in flank. Due to imperfect communications the use of flank fire can be expected only in long occupied sectors whose telephone systems are perfectly organized.

THE ATTACK—During campaign, neutralization fire was opened at the hour set for the attack. The maximum rate of fire was employed at H-hour. At this moment, when aerial observation was possible, the observer invariably signalled a number of important enemy batteries, heretofore unknown, which had just gone into action. It was then a question of how to include them in the pre-arranged program of neutralization. Must the neutralizing fire against some known batteries be totally abandoned in favor of the newly discovered, or must the fire be diminished on some to release batteries to fire on new enemy targets? Results actually obtained were very unsatisfactory in either case.

It was not a case of the artilleryman being ignorant of the power of concentrated fire. It frequently happened that an enemy

battery which was spotted as very active was subjected to the fire of several groups, but this was only the exception; a general neutralizing fire was the established rule.

It is likely that when the first concentration is fired during the preparation for attack, the enemy gunners knowing that their turn will come later, leave their positions and retire to the rear, expecting to resume their posts when the bombardment is over.

As a matter of fact when they do return, it is to find their batteries shot to pieces, guns out of commission, for the time at least, shelters caved-in and munition dumps exploded. However, a part of the damage will be rapidly remedied, and it is only fair to admit that at H-hour there will be many pieces again in action.

An actual example justifies these conclusions. On the Somme in July, 1916, a group of 155s was bombarded for three consecutive nights with heavy guns and high explosive shells from German 105s and 150s. Every morning at daybreak when the enemy had just ceased and the French gunners were able to remove their masks and breathe freely a phone call would announce that an aviator was just leaving to observe the destructive fire of the group on an enemy battery. Although no batteries in the service had better morale, the French artillerymen were justly indignant when forced to fire 500 or 600 rounds and work men who had neither slept nor removed their masks all night.

If a fire of neutralization is to produce its maximum effect, enemy personnel should have no respite after the concentrated fire, but be harassed by a slow fire conducted at the rate of approximately 100 to 200 shots per hectare per hour, according to whether 155s or 75s are used.

In the first case illustrated, where a photograph is available, the area to be covered by fire is four and one-half hectares (11 acres). The hourly ammunition consumption for a single enemy battery as target will be 450 shots for 155s, and 675 shots for 105s. To maintain this rate will require eleven 105 guns or ten 155s, approximately a group. It is safe to assume that an effective enemy counter-battery fire can be expected which is not always easily silenced.

Do not forget that the enemy is not idle and will do all in his power to conceal and protect his batteries by all means at his disposal. A German map captured May 9, 1918, had 52 French emplacements spotted. Of these, nine were correct, three were within one hundred meters and forty were incorrect. As a matter of fact, the French actually had in that zone 67 batteries, 55 of which were not shown at all on the German map.

An artillery map found at Montdidier gave the following results regarding precision: Of 54 batteries indicated, 15 were spotted within less than 50 meters, 16 with an error between 50 and 250 meters, and 23 never existed. The correct number of French batteries in the sector at that date was 68.

The Germans were as careful as the French to hide their battery positions. Their artillery regulations of September 1, 1921, emphasize the greatest caution in occupying battery positions to combine protection with concealment against aerial and land observers. The principal approved means of camouflage recommended are: concealing the real and revealing false field works, multiplicity of emplacements, temporary removal of guns, and smoke screens. A favorite scheme was to delay the occupation of a position until the night before the attack. Thus, when the attack opens, only a part of the opposing batteries will have been previously spotted, the majority being batteries announced for the first time.

What to do in the latter case is a difficult problem to solve. The time factor is against the defense. Before the new batteries can be spotted, the attack will have gained momentum and perhaps succeeded. For this situation no set solution is offered; it remains one of the unsolved problems of the artillerymen.

ARTILLERY IN THE DEFENSE—As soon as an attack is imminent the Army Commander orders a counter-preparation.

Counter-preparation is directed against enemy infantry and artillery, as well as against his posts of command, etc. Interdiction fire may also be continued.

All corps artillery batteries should be in position to defend the main line of resistance. They should also be given the mission of counter-battery and interdiction fire against distant enemy batteries. (Provisions Instructions for the Tactical Uses of Large Units.)

According to these regulations: in the offensive, corps artillery is more often charged principally with the mission of counter-battery and interdiction fire, while on the defensive it is needed to assist in breaking up the enemy attack before it can be launched. When used for one purpose, and when for the other, is a question for the high commands to answer. The guiding principle is to concentrate upon and eliminate known targets, rather than have an aimlessly directed fire over a large area.

The selection of enemy batteries as targets is another question. As a rule, they will be the most active and annoying of the spotted emplacements. This, too, offers its difficulties. A battery may

show great activity by the number of its flashes, yet be comparatively ineffective, while an unnoticed battery may be firing with disastrous effect. In this doubtful situation it was the policy of most artillery commanders to open fire on the enemy batteries which they had already spotted with greatest precision, and could therefore expect certain results with a minimum ammunition expenditure.

If in spite of counter-preparation, the enemy attack is launched, a stationary barrage is put down. The fire can be profitably combined with that of neutralization against artillery, and interdiction against communications. Always the target of the artillery is the enemy infantry upon which it must inflict the greatest casualties. All corps artillery must participate in interdiction and counter-battery fire and finally in the barrage. In brief, the possibilities of counter-battery are the same in the second as in the first phase of the defense. It will be used in the same manner and even targets will be similarly chosen.

OPEN WARFARE

THE APPROACH—The uses of artillery during this period are determined by the available guns and ammunition at the disposal of the artillery commander. An army corps must depend upon its organic artillery equipment, augmented by that of the divisions. Ultimately it may expect reinforcements from the Army Artillery. It is best, therefore, to consider first dispositions of corps artillery and when it will enter the action.

FIRST PHASE—The approach march begins as soon as the army corps comes within range of high power artillery. In the late war this was about 20 kilometers (12.5 miles). Provisional Instructions state: "In the approach, the Corps Artillery should be so placed as to readily respond to the Corps Commander's personal direction when he deems it desirable."

The place in column of corps artillery should meet the following conditions: Not to obstruct the march of infantry; be able to respond rapidly when needed; not be in a vulnerable position.

In the first phases of the approach where the infantry leaves the main roads for more direct routes to designated positions, or where the divisional artillery deploys preparatory to opening fire, the Corps Artillery will follow the main body of infantry as closely as possible. For example: A group of 105s leaves the main road to seek a position in the vicinity of the axis of march of each of the divisions. The two groups of 155s do likewise in rear, near the central axis of march of the army corps, or in the absence of a corps axis, then on some designated divisional axis. The principle to fol-

low is to so locate the Corps Artillery where it may quickly and energetically respond to the Corps Commander's wishes when needed. If confusion is to be avoided, keep the Corps Artillery oriented on the situation with a clear understanding as to what is to be expected of it.

SECOND PHASE—As soon as necessary, the divisions quit the road. They then take advantage of the open country, but retain such formations as will keep them well in control of their leaders. Corps artillery follows in echelon, marching by long bounds so that there will always be a sufficient number of batteries available to return the fire of any enemy batteries which are revealed. Thus, from the moment when the infantry leaves the roads and assumes an "articulate formation," the Corps Artillery advances by bounds similar to, but of greater length than those of the divisional artillery.

Since the emplacement of 155s takes considerable time and effort of men and animals, especially where the ground is bad, it is not emplaced until its need is definite. It therefore moves along the road from shelter to shelter, regulating on the infantry corps axis. Only the two groups are successively deployed and emplaced at one time. If the enemy artillery is active and so numerous that the 105s and divisional artillery are insufficient, the 155s must be rushed forward and emplaced. A serious concentration should include at least two groups of 155s and one group of 105s.

"Hammering" tactics may be effectually employed in the same proportion as the enemy artillery is weakly protected, and where a sudden engagement diverts him from the usual concealment precautions and he is exposed to air and land observation. Observed fire is frequently possible in such engagements and should always be attempted, as it reduces the area of the zone to be bombarded and saves ammunition.

Exact information about enemy batteries furnished at the desired time and gained by all practicable methods of observation is of particular interest. The artillery information service should be organized for the rapid procurement and dissemination of such information. The aviation should also increase its photographic service, which alone will furnish the best means of checking results.

It must be feared that even before the first skirmishes, the advance guard, and at times the main bodies of divisions, will come under the fire of long range enemy guns against which our Corps Artillery will be powerless. In this situation the aid of army artillery should be requested.

ENGAGEMENT—Regarding the engagement, Provisional Instructions state: "It is the work of a first echelon with its various arms, which in general includes, aside from the advance guard, the first elements of the main body and all the necessary artillery." So far as corps artillery is concerned, the first echelon will include all its organizational artillery, and be able, in special cases, to expect reinforcements from the army artillery. When this artillery is deployed, the necessary precautions must be taken in the selection of positions, so that when reinforcements arrive, deployment will not interfere with the normal groups already installed.

THE ARTILLERY IN BATTLE—When the divisions are checked by a strongly held position and an attack is necessary, the Corps Artillery is reinforced by a part of the Army Artillery Reserve, and if necessary, by artillery accompanying rear units.

Although this reinforcement is generally carried out progressively as the situation develops, yet it requires time. However, it is in the interest of efficiency not to be impatient, but be reconciled to certain allowable delays for reconnaissance, organization of the command and preparation for fire.

An artillery battle commenced during the approach march will be continued without interruption if ammunition permits. At the moment of attack, with or without preparation, conditions will be analogous to those of stabilization, though more aggravated. The number of enemy battery locations known before the attack will be appreciably reduced. Being of hasty construction, they are less permanent and therefore more easily shifted. For example, if the attack follows the day after first contact between divisions, the chances are that there will be few enemy batteries still at their positions of the previous evening, hence for targets, select only those spotted in action that very day. The difficulties pointed out in the above will be acute, but in part hold some compensations derived from the advantages cited in the approach, viz.: batteries have less protection and are more exposed to observation.

THE ARTILLERY ATTACK—BREAKING A FORTIFIED FRONT—The chief function of artillery in this case is rapidity of movement, especially rapidity of withdrawal from its emplacements.

After the break, the divisional engineers will rapidly reestablish transport communications to allow the passage of divisional artillery, which includes the groups of 105s (short). As the work progresses the groups of 105s are next to move forward, and on rare occasions, the 155s and other corps artillery are passed. The army corps engineers are charged with the completion of communications

to permit the passage of truck trains and heavy equipment which time does not permit the divisional engineers to attempt.

The result is that corps artillery is divided into three classes:

1. Batteries of 105s which accompany the divisional artillery.
2. Heavy artillery, especially 155s which are slow.
3. Heavy mortars which will not be needed again soon are put in traveling positions on wheels and concentrated on a good road.

Thus, the heavy artillery soon becomes scattered over a wide area. This decentralization makes the exercise of a united command extremely difficult. If the 105 groups succeed in keeping up with the divisions they are temporarily assigned to the divisional artillery. If all artillery succeeds in passing, it remains under the orders of the Artillery Commanding General and the Commanding Officer of heavy artillery. Any remaining 155s will advance when they can. Mortars and other heavy materiel not immediately demanded will join the Army Artillery.

When the advance is again checked this artillery will be re-allotted; the Army Reserves being distributed where needed, according to the missions and tasks of each army corps. So far as the Artillery is concerned this system of progression is characterized by the fact that in an advance where the 105s cannot follow immediately, counter-battery is assigned to the divisions until all the organic artillery of the Army Corps has been able to rejoin the advance.

The above outlined system is naturally subject to certain more or less important modifications. Towards the close of the battle of 1918, and for a long period of time, the artillery of the 15th Corps consisted of four groups of 155-mm. G. P. F.'s (I/83, II/83, V/83 and IV/90), well drilled and efficient in maneuvers. They were grouped under the orders of the lieutenant-colonel commanding the 83rd. During the entire period where the progress was slow but continual, these units were advanced by long bounds in groups of two at a time, thus leaving the corps two firing groups at all times. However, when the groups of 155 (long) M/77 were withdrawn, it was at the expense of much difficulty and fatigue, and the personnel were completely exhausted.

It might be well, therefore, to show how the 155 G. P. F.s managed their withdrawals. In the morning when the enemy commenced to retreat, the commanders of the two rear groups went forward by auto to reconnoiter, each in his previously selected zone. They advanced as far as possible, studying roads and battery positions and then returned to report on their missions. Where road repairs were needed they sent forward details that very evening. When the enemy

halted to offer resistance these groups moved forward on a line with the two groups in advance, or to even more advanced positions.

All means of ammunition supply, including the ammunition trains, remained under the group commander. It may be recalled that about this time the shortage of trucks reduced this transportation by one-half, if not two-thirds. Each evening the group commander was notified of the place, frequently distant, where he must replenish his munitions, as well as his allowance. The group went for its munitions, shuttling back and forth from its new to its old positions, and at no time was it ever short of ammunition. It always obeyed orders to open fire, and never abandoned a shell at any of its numerous successive emplacements.

This example shows how the reinforcement by complete regiments, organized and equipped in every detail, simplifies the exercise of command in every way and increases the effectiveness and efficiency of heavy artillery.

At the close of the advance in 1918 the aviators frequently left the artillerymen without information, due to the long distances of the landing fields from the gun positions. The balloons, on the contrary, rendered good service. A perfect liaison was maintained between observer and gunner. Either the balloon ascended in the vicinity of the batteries, or else the batteries emplaced near the balloon.

Those who would wreck our military forces love to say that some ninety percent of the taxpayers' money is expended on war, while less than ten percent is devoted to education. These people are evidently talking of congressional appropriations only. The taxpayers carry four separate and distinct burdens. That is, they carry national, state, county and city budgets. It is the duty of Congress alone "to provide for the common defense," but it is not its duty to provide for education. How unfair, then, to compare the amounts Congress appropriates for war and for education!—*Captain L. M. Overstreet in the United States Naval Institute Proceedings, September, 1924.*

EDITORIAL

What Do You Do With Your Old Journals?

EVERY Coast Artilleryman has at one time or another to decide the question of the disposition to be made of his JOURNALS. Some officers retain all of them and have them bound semi-annually. Others retain all of them, but do not have them bound. Still others retain only those they consider may prove of future use. However, as an officer advances in years he accumulates many JOURNALS, and it often proves a laborious task to find the desired information in them. True, an index to each volume is published every six months, but an officer of ten years' service would have to go through twenty of them to be sure he had completely informed himself on the subject under consideration.

The suggestion has been made that the JOURNAL should publish each year a list of articles that should be retained, the assumption being that the others could be thrown away. The objection to this is that some officers are interested in one type of article and others in another, and such a list, if published, certainly would not be a suitable guide for all. It has been suggested, too, that the JOURNAL should publish each year a complete index of all articles since the inception of the JOURNAL thirty-three years ago. Such an index, however, would occupy nearly 300 pages and the cost would prove prohibitive.

A general officer of the Army, formerly a most distinguished Coast Artilleryman, with a reputation for writing convincingly and delivering sound addresses, suggests that a solution to the problem would be for the reader each month to cut out the articles he particularly desires to keep and to place them in envelopes of a suitable size, each labeled with an appropriate title, such as fire control, spotting, ballistics, strategy, tactics, military policy. Or, if an officer desired, leather bound folders could be substituted for the envelopes. One merit of this system would be that from time to time the contents of the envelopes could be reviewed and obsolete matter destroyed, and another that an index of their contents could be maintained in the envelopes.

With the country's present policy governing military education, every officer as he advances in age and rank, is called upon increasingly to express himself in writing and in speech. He cannot escape this duty. All officers are sooner or later instructors of Regulars, National Guard, Reserves, on college duty, or on duty in summer training camps. They are on staff duty and their value to their commanding officers is measured largely by the information at their command. Later as commanding officers, the regard with which they are held by their subordinates is materially influenced by their knowledge of the technique and tactics relating to their commands.

To prepare a study or an address when the information relating thereto is available is not difficult, but to do so when the facts are not at hand is a task to be dreaded. A filing system such as outlined above would materially assist an officer in the location of valuable and pertinent data and would greatly lessen the drudgery involved.

Air Service and National Defense

Hundreds of editorials have been published recently regarding the capabilities of aircraft in warfare. The problem has been presented to the newspaper and magazine reading public time and again and its importance to the future welfare of the nation has been impressed upon it. In the beginning, before the subject had received wide publicity and both sides of the question had been thoroughly aired, the trend of the majority of the editorials was to the effect that a new weapon had made its appearance that would revolutionize methods of warfare and would greatly minimize the usefulness of naval and land forces. In the last month or so, however, the thought expressed in the editorials and magazine articles seems to have materially changed and the general view now seems to be that the airplane's part in warfare will prove that of an auxiliary, but a most important one, to armies and navies. A discussion of this subject recently appeared in the pages of the *Outlook*, one of the best known and most conservative publications of the country. The following extract from this article is believed to be of particular interest:

The fallacy behind what General Mitchell has said lies in the assumption that principles of warfare change with changing weapons. This is not true. The broad principles of naval warfare are the same today as they were at the battle of Salamis, 2405 years ago. Military strategy has not fundamentally changed since the days of Hannibal and Caesar. Foch put in practice the principles that lay behind Napoleon's campaigns.

The fact that in recent years we have conquered a new element and move about in the air does not in the least change these principles of warfare. It still remains true, and always will remain true, that warfare is determined by objectives. It is and must be the business of navies and armies to seize and hold positions. It is not their business to kill or maim except as they do it incidentally to their main purpose. Whatever else they do, they fail if they do not seize and maintain objectives, and succeed if they do seize and maintain them. By the nature of things, these objectives must be on the surface of the world. They may be on a land area or a sea area, but they must be on the surface. When an airplane carries a bomb it carries it with the purpose of dropping it upon the surface somewhere. The objective of the airplane must be either an objective sought by an army or an objective sought by a navy. An airplane cannot of itself seize and hold any objective whatever. It performs the function of a weapon either of the army or of the navy.

The Plattsburg Idea Grows

[PUBLISHED IN THE *Detroit Free Press*.]

In 1922 about twenty-two thousand young men received military training in the summer camps established throughout the country as a result of the Plattsburg idea born in the brain of General Leonard Wood and applied in the camp which gives the idea its name. In 1923, the number increased to twenty-four thousand five hundred, last summer about thirty-four thousand took training in twenty-nine different camps. This year, thirty-nine camps will be open, and it is estimated that from thirty-eight to forty thousand men will go to them to be instructed in the rudiments of practical soldiering.

This constant increase in interest is both pleasing and significant. It indicates that there is a steady and growing realization throughout America that Mr. Bryan's conception of a million men who were to spring to arms overnight is a monstrous absurdity; and that in the present unsettled condition of the world it is highly necessary for the young manhood of America to keep itself in a state of preparedness so that if a call to defense comes, those upon whom the burden of preserving the country must fall, will be able to give an effective account of themselves.

The steady growth of interest in the camps provides proof that the post-war drive of the pacifists is receding from its high mark of accomplishment, and that the sentiment of the country with regard to questions of national defense is becoming more and more healthful.

It is highly probable that many more young men than actually go into the camps would do so if the government should provide the facilities. President Harding desired to see one hundred thousand under arms each season. His ideal was far from excessive. In a

country as large as ours, the total he set is modest, and ought to be realized.

There is a local application. It is that on July 24, next, a camp for Michigan boys will open at Camp Custer. This camp will remain in operation until August 21. There will be no cost to those who go to it to take training. The expense will be borne by the government. On the other hand they will have an opportunity to gain knowledge and experience which will give them assurance in case of another war crisis, they will be capable of being of some real use to the nation.

A Universal Deflection Board

Neither the Mortar Deflection Board, Model 1906, nor the Gun Deflection Board has been entirely satisfactory, and neither of these is adaptable to use with all types of seacoast armament.

It is evident that training and supply would be greatly simplified if seacoast artillery could be provided with a universal device for solving the deflection problem for Case 2 and Case 3 firing, instead of continuing to use several slightly different devices for accomplishing the same purpose. Preliminary studies indicated the possibilities of securing a suitable single device for solving the deflection problem for all classes of fixed and mobile artillery, in view of which the Ordnance Department designed and built the Deflection Board, Model 1923-E. This device the Coast Artillery Board does not recommend for manufacture, as it believes present conditions are considerably different and offer fewer complications than those the 1923-E Board was designed to meet. However, its development has served a most useful purpose, because working from it the Coast Artillery Board has developed a standard universal deflection device that it is believed will satisfy the needs of the Coast Artillery. This board may be improvised locally from drawings, charts and instructions that can be secured by application to the Coast Artillery Board. A brief description of the board, together with the recommendations relating thereto and the action of the Chief of Coast Artillery thereon, is published in the Coast Artillery Board Notes of this issue of the JOURNAL.

PROFESSIONAL NOTES

Principles of Organization

Shortly after the Armistice in the World War, various arms of the Service convened boards to come to conclusions as to the lessons of the war. Later a board of distinguished officers was convened, called the "Superior Board," on organization and tactics. This Board arrived at conclusions on various subjects of organization and tactics. The report of this Board was reviewed by the General of the Armies assisted by a large number of very efficient officers, and certain principles of organization were enunciated.

In 1920, a special committee was appointed by the Director of the War Plans Division of the General Staff to define the general plan of organization to be adopted for the Army of the United States provided by the Act of June 4, 1920. This Board held exhaustive hearings. There appeared before it a large number of the best qualified officers in all branches of the Service and the General Staff. This Board came to certain conclusions and laid down certain principles of organization.

From the above-mentioned various sources, the study of other sources, and the experiences of many officers, the following conclusions are drawn:

- a. That the division is the unit upon which organization should be based.
- b. That it is essential that the total strength of the division shall not exceed 20,000, as this number is regarded as a maximum—greater than many officers consider desirable. Taking this number as a maximum, to increase the auxiliaries above the absolute minimum necessary would lessen mobility and would reduce the percentage of infantry below that considered adequate.
- c. That the division employed in the World War, while in many ways admirably adapted to the character of warfare in France, was too large and unwieldy; that it was, in fact, an army corps without possessing such organization; and that its large size complicated the question of transportation by road and railroad, increased the difficulties of its entry into and withdrawal from battle, retarded deployment, and made impracticable adequate supervision of smaller units by the Division Commander and staff.
- d. That, while the character of warfare most likely to be encountered by the United States in the future will differ from that encountered in Europe during the World War in that stabilized and highly organized lines with flanks resting on impassable obstacles are not likely to be met, the increased development in the range and mobility of artillery, machine guns, and other armament, and the rapid development of aviation, indicate that in any war of the future against a first class enemy the forces encountered will be organized in great depth, even though the ground may not be so organized. The organization of our divisions, therefore, should be such as to insure sufficient striking power to meet and overcome such organization in depth. Mobility is important, but fire power and power of penetration are also important considerations.

e. That we should organize in the most effective way to meet a strong, virile, aggressive enemy, supplied with the most effective armament and equipment, because, after an emergency has arisen, such an organization can be more readily modified to oppose a minor enemy than a less effective organization can be strengthened to oppose a strong one.

f. That the type division should be such as to meet probable requirements, taking into consideration the nature of the enemy with which it is probable we will have to contend, the terrain over which we will probably operate, such as the nature of roads, railroads, etc., and the probable conditions of supply. With such a division, under certain circumstances, elements may be left at home to increase mobility, or elements added, to meet special conditions. Penetrating ability depends in large measure upon the strength of the infantry units. Therefore, the controlling principle of organization is that the percentage of infantry should be kept at a maximum and the percentage of auxiliary troops at a minimum, thereby giving both great power and mobility.

g. That a division composed of two infantry brigades and one artillery brigade, while not possessing the same mobility as a division of one infantry brigade and one regiment of artillery, is sufficiently mobile, if the auxiliaries and smaller combat units are kept at the minimum. Such a division also possesses great striking power and great power of penetration, is capable of maneuver, has a better framework for absorption and employment of artillery reinforcements, better preserves the higher tactical organization developed during the war, and better facilitates compliance with those provisions of the Act of Congress which contemplate the preservation of our war organization designations.

h. That the four regiment system for the infantry of the division seems, after careful consideration, to be the best, not only because it provides great driving power, but also because it adapts itself to maneuver. Nearly every combat unit must use different formations to meet different situations. Therefore, whether or not the three or four unit formation be adopted makes not so much difference as does the amount of infantry with its included machine guns and the absolutely necessary auxiliaries.

i. That the length of time a division can stay in the line varies with the strength of the division in relation to the front held and the activity of the enemy, and is not particularly affected by organization.

j. That the machine gun is essentially an infantry weapon. It is employed to increase infantry fire in battle. Its use for barrage fire or interdiction fire is the exception. It is employed in most cases immediately with the infantry and should, therefore, be under the battalion commander as a constituent part of the infantry battalion, the real combat unit.

k. In order that the battalion may not be too unwieldy, while still maintaining the fire power and maneuverability which a real combat unit must possess, the battalion should consist of three rifle companies and one machine gun company.

l. That, for many reasons with which practically every one agrees, the infantry company should not be reduced below a war strength of 200 men. This strength is necessary to give sufficient penetrating power, after allowing for the wastage which commences immediately upon entering the combat zone and increase upon entering the battle line. Wastage results not only from casualties in battle, but casualties from sickness, detachments, stragglers, etc.

m. That, without modification of the type of division, the auxiliaries and smaller combat units of the division can be relatively less than in the type di-

vision employed during the World War, with a consequent distinct gain in the general effectiveness and mobility of the division, by

(1) Reducing the number of rifle companies in a battalion from four to three.

(2) By reducing the number of machine guns to correspond with the reduction in riflemen, without reducing the percentage of machine guns.

(3) By reducing the organic artillery of the division by the 155-mm. howitzers, without disturbing the artillery brigade organization.

(4) By reducing the Engineers, Sanitary Troops, and other auxiliaries.

These reductions should be such as to retain as organic parts of the division only those units which are always necessary for immediate employment in the habitual or average circumstance, transferring to the Corps and Army those units needed for reinforcement of the division to meet unusual or special circumstances of battle.

n. That each unit from the army down to and including the battalion should be provided with a Chief of Staff (executive in the case of smaller units) and four assistants: one for personnel, one for intelligence, one for operations, and one for supply, and that in the regiment the lieutenant-colonel should be the executive. In the smaller units it may be desirable, and is practicable in case of necessity, to combine two or more of these functions in the person of one staff officer.

o. That, while a small cavalry unit is desirable in a division for tactical employment, road supervision, and other mounted work, the advantage of maintaining cavalry divisions, each of an aggregate strength of not to exceed 6000, makes it best not to assign cavalry as an organic part of an infantry division or an army corps. Such cavalry as may be required from time to time should be attached to divisions or corps by army headquarters.

p. That the divisional train should be kept at a minimum, all other transportation being pooled in corps, army, or rear echelon.

q. That the division habitually requires some air service, and, therefore, it should have an observation flight of some ten or twelve planes. Furthermore, it is only through the closest personal association that real cooperation between the air and ground can be obtained.

r. That a light tank company should be a component part of the division. It constitutes a divisional reserve, replacing the old machine gun reserve of the division. In addition, a large mass of tanks should be pooled in the Army and assigned to divisions for special actions.

s. That the present policy of the War Department requiring all signal personnel within the brigade to belong to the arm of the service composing the brigade should be continued.

t. That the peace time units must be kept at sufficient strength for proper training and to enable them to perform police duties or engage in minor expeditions without an increase in peace establishment. The maximum practicable number of cadres should be provided. Cadres are harder to train than individuals, but they lend themselves to rapid expansion without disrupted change in time of emergency.

Based on the above considerations, it is deduced that the fundamental principles of divisional organization include the following:

a. That the divisional organization be such as to function most efficiently under the requirements of the character of warfare in which we are

most likely to be engaged, and the conditions in the theatres of operations in which we are most likely to serve. No one organization is best adapted to all situations.

b. That the organization adopted be elastic. This is secured by following underlying general principles of organization and by providing adequate staffs.

c. That the organization adopted in peace be that best suited to meet the most probable conditions of war in which the particular army engages, elasticity being provided to meet possible unusual conditions and to permit rapid and greatest practicable expansion.

d. That mobility be considered as one of the first requisites of organization without sacrificing the necessary power of penetration. Our army is most likely to operate on the American continent and mobility is especially necessary under all probable conditions of warfare in this theatre. Our A. E. F. division of over 28,000 officers and men was entirely too unwieldy for war on this continent. The road and railroad situation alone is sufficient to justify this assertion. Any division in excess of nineteen or twenty thousand is too unwieldy and lacks necessary mobility.

e. That only indispensable auxiliaries be retained, the infantry being kept at the greatest practicable proportion. Auxiliaries not always necessary in a division can be pooled in the corps and army or in rear echelon available for attachment when necessary.

f. That the staffs of the division and auxiliary units and echelons of command be sufficient to meet the demands resulting from attaching additional units to the division to meet special situations.

The above conclusions are arrived at after consultations with many able and representative officers and are believed to be sound and can safely be used as a guide in organizational studies.

Artillery Ordnance Development

EDITOR'S NOTE: The following notes were compiled in the Office of the Chief of Coast Artillery by Captain Aaron Bradshaw, C. A. C. Credit is accorded the "Monthly Digest of Activities of the Ordnance Department" for much of the information contained therein.

IMPROVEMENTS IN SMALL CALIBER ANTIAIRCRAFT WEAPONS—The following information on this subject is extracted from a letter from Major G. P. Wilhelm, O. D., on duty in the Office of the Chief of Ordnance. Antiaircraft fire in the World War was with the caliber .30 Browning machine gun on improvised mounts firing the present service ammunition and war time tracer. The mounts were unstable and practically useless, and the tracer ammunition was very inaccurate, had a large percentage of blinds, did not follow the trajectory of ball ammunition, and metal fouled badly. The present tracer ammunition, which is not only standard for manufacture, but is being issued to the service, gives a brighter trace, a longer trace, less percentage of blinds, is very much more accurate, follows the trajectory of ball ammunition, and does not metal foul.

Next, there has been a big improvement in ball ammunition, the trajectory being greatly flattened, the range being greatly increased, the dispersion being cut in half and metal fouling eliminated. This new service ammunition is being made at the present time for the Navy, and while it is not yet a standard for manufacture for the service, it will be within sixty days, and the development work is entirely completed and finished.

The most effective small caliber antiaircraft weapon is the Browning machine gun, caliber .50. This weapon is to be the standard antiaircraft weapon for antiaircraft batteries, and has tracer ammunition which will trace 2200 yards and armor piercing ammunition with a maximum vertical range of around 6000 to 7000 yards. This weapon has the same rate of fire as the caliber .30, about 500 to 600 shots per minute. Both the caliber .30 and the caliber .50 have improved types of mounts and improved sights.

Going now from what we actually have to what we have under development, it might be well to mention the fact that low flying planes attacking ground troops, such as occasionally occurred in the World War and which is predicted for a future war on a large scale, will be met not by shoulder rifles such as the Springfield which are hand operated, but by semi-automatic rifles, such as the Garand, Thompson and Pederson. This increased rate of fire means that low flying planes will encounter such a blast of fire from ground troops that they probably will not risk the attempt.

In addition to these small caliber antiaircraft weapons, there is what I consider the most important improvement of all, and that is the automatic 37-mm., which in caliber is about half way between the small arms and the artillery. It is, however, automatic and uses a supersensitive fuze, and fires a shell at the very high velocity of 3000 f.s., and carries a tracer in its base. This means that it will be a very effective weapon within its range against planes, as the tracer will enable direct gun pointing instead of complicated fire control systems, which are too slow for the faster planes at low altitudes, such as the diving pursuit plane.

Summing up, we, therefore, have already accomplished or have in the process of development the following:

- a. Semi-automatic infantry shoulder rifles.
- b. Very greatly improved tracer ammunition for caliber .30 machine guns.
- c. Very greatly improved ball ammunition for caliber .30 machine guns.
- d. Improved mounts and sights for caliber .30 machine guns.
- e. Caliber .50 machine guns with superior mounts and sights to any used in the World War, and firing types of ammunition not encountered by planes in the World War.
- f. Automatic 37-mm. 3000 f.s. gun with supersensitive fuse and tracer shell.

In discussing antiaircraft fire a distinction should be made between the target made by a pursuit plane and that made by a bomber. The pursuit plane is small, speedy, very maneuverable, and practically impossible to hit, except in a dive toward a ground target, such as a machine gun nest, in which case it is easy to hit, as its flight and the trajectory are in prolongation of each other. On the other hand, it is useless against any battleship or fortification, in so far as material damage is concerned. The contrary is true of the bomber. It is large, slow and unwieldy and makes a fair target. It, of course, is of chief use against the battleships and fortifications.

THE PRESENT STATUS OF ARTILLERY FUSE DESIGN—During the period following the Armistice surveys of the existing standard types of fuses were made, the tactical needs of the fusing services were considered in considerable detail, and the types necessary for development determined upon.

In these surveys three primary types of fuses were determined upon as necessary for development to meet the more urgent present day demands of the artillery branches of the service. These types are:

1. A combination superquick and short delay point fuse for mobile weapons.
2. A delayed action base fuse for armor piercing projectiles for the larger caliber seacoast weapons.

3. An antiaircraft time fuse which would function independent of atmospheric conditions and which would operate through a sufficient length of time to use the full power of any antiaircraft gun to be placed in service.

The principal requirements of each of these types and the present state of their development is set forth below:

First—The combination superquick and short delay fuse was required to be a bore safe fuse in which the primer or fulminate detonator could explode before the fuse cleared the muzzle of the piece and yet would fail to cause a detonation or explosion of the shell charge. It should give superquick action equivalent to the French I A. L. fuse and delay action equivalent to the short delay French fuses, our Mark IV and Mark V fuses (black head). The fuse should, if practicable, be suitable for all sizes of point fused mobile projectiles so that but one type should be required for production. It should be simple and rugged in construction so that it would be possible to produce it in required quantities in case of an emergency.

The E-13 Model IV fuse has been developed to meet these requirements. It has passed all shop tests devised to test the bore safety features. It has been tested at the Aberdeen Proving Ground with satisfactory results in the 75-mm. field gun for functioning. Tests in the outer zones of the 155-mm. howitzer have been generally satisfactory but too many "duds" have been encountered in the inner zones. For a time trouble was encountered in ricochet action in the 75-mm. gun, but this appears to have been overcome.

Second—The fuse for A. P. projectiles was required to be bore safe and to give delayed action behind armor plate without regard to striking angle and other conditions of impact. The fuse was required to be as rugged as the projectile and always function with a delay after impact.

Shortly after the Armistice a new policy in furnishing seacoast projectiles was put into effect, only the type formerly known as shot (A. P. projectiles tested against caliber plate and in future at oblique angles) would be furnished for primary seacoast armament for use against armored targets.

The fuse developed to meet these requirements is the Mark X. The fuse met service test requirements and has been declared standard for manufacture. In the production of the fuse some difficulties have been encountered. The delay train contained an ingredient which does not stand storage in an entirely satisfactory manner and the Semple plungers have not functioned with the degree of sureness desired.

Steps are now under way to correct both of these unsatisfactory features. It has been found desirable to cut the delay time of this fuse to approximately half the time formerly required; this will no doubt assist in solving the problem of the delay train. Satisfactory tests have been made with this shorter delay produced on an experimental scale. This fuse is in production.

Third—The requirements for an antiaircraft fuse have not included a requirement for bore safety since such fuses have been used in connection with bore safe boosters, a considerable quantity of which are available.

The principal drawbacks of powder fuses used in antiaircraft work have been wide variations in time and a percentage of duds when fired to great altitudes and variations in time due to changes in atmospheric conditions. The features desired are uniformity of timing regardless of atmospheric conditions or

elevation of the gun and a greater length of time than has usually been reliably obtained with powder fuses.

To meet these requirements several lines of development have been followed or considered.

Attempts have been made to perfect the time fuse used with mobile artillery shrapnel (21-sec. Comb. Model 1907). Tests have been conducted with fuses in which the time trains have been burned under an increased pressure, likewise under regulated pressure. From the results obtained thus far it does not appear that an adequate solution will be attained by following these lines of experiment.

A more interesting line of investigation has been found in the use of "slagging powders." A composition has been found which seems to be nearly independent of atmospheric pressure and which will burn when loaded in fuses and spun at speeds encountered in antiaircraft use. This composition has given some interesting results when burned at pressures which might be encountered in service use and has shown a marked freedom from influence of reductions in barometric pressures and a high rate of spin.

This line of investigation while distinctly encouraging, has not been pushed far enough to indicate whether or not it will furnish an acceptable solution of the antiaircraft fuse problem.

During and since the World War the Ordnance Department has encouraged the development of mechanical time fuses.

The Waltham time fuse produced in quantity during the war does not operate satisfactorily in the 3-inch gun with a twist of 1 turn in 25 calibers. Partly on account of the difficulty with the high rate of spin, the twist of rifling in antiaircraft guns of this caliber has been reduced. With reduced spin the design of mechanical time fuses has made considerable progress. Three of the four companies interested in this work during the war have dropped the work, leaving the field in the United States entirely to the Chelsea Clock Company. This company has during the past year submitted samples on a contract with the Ordnance Department which have approached our requirements.

Samples of two foreign designs of mechanical time fuses are due for delivery during this calendar year for test at the Proving Ground.

The mechanical time fuse is considered to be the best type for antiaircraft purpose, and if the production costs can be held down, and it appears possible to accomplish this, the mechanical time fuse will no doubt come into general use for high altitude firing.

4.7-INCH MOBILE GUN, M. 1920E.—Decision was reached on January 15 to suspend development work on the 4.7-inch A. A. gun and mount, M. 1920E. This materiel has been under test since the latter part of 1922. The conclusion now is that the A. A. gun of this caliber is heavier than is required, and that a gun of smaller caliber will be more satisfactory. A caliber 105-mm. gun is being developed to replace this gun.

37-MM. 3000-F.S. GUN.—On January 22, approval was given for the rifling of one of the 37-mm. 3000-f.s. guns with a twist of 1 turn in 35 calibers. Firings with the two guns rifled with a twist of 1 turn in 40 calibers have not been made. Comparative tests of the two types of twist will be interesting.

All three guns have 12 grooves, depth .02-inch, and width of lands .15-inch. Designs of adapters for these guns, to be made so that they can be used as sub-caliber tubes in a 4.7-inch gun, M. 1906, were also approved. The first firings with these adapters will be made at Aberdeen Proving Ground.

8-INCH 45-CALIBER NAVY GUN CRADLE, RAILWAY ARTILLERY—On January 8, authority was granted by the Chief of Ordnance for the manufacture of a cradle and tipping parts for an 8-inch, .45-caliber Navy gun. These parts will be sent to the Aberdeen Proving Ground and mounted for test purposes on the 12-inch Howitzer Railway Mount, M. 1918. The maximum range expected with this gun is close to 35,000 yards.

POWDER TABLE FOR 16-INCH GUN—Owing to the difficulty reported by the 1st Corps Area in pushing 16-inch powder charges from the powder cars onto the powder table of the rammer, approval was given on January 15 for the manufacture of one table equipped with rollers for application to a mount at Fort Tilden. Test of this table will be made by Coast Artillery personnel.

NAVY HEIGHT FINDER—A project was approved on January 8 for the purchase of one Navy Mark XXXII Height Finder, manufactured by the Bausch and Lomb Optical Company. This instrument will be shipped to the Coast Artillery Board for comparative test with other types of height finders now at Fort Monroe.

EQUIPMENT WITHDRAWN FROM SERVICE—The Adjutant General has approved the withdrawal from service of the following A. A. fire control equipment:

Horizontal distance altimeter, M. 1917, sets complete.

Observation grills, M. 1917 and M. 1917 MI.

Range computer with tripods and carrying case, M. 1920.

Deflection computers.

These instruments will be held in store at Frankford Arsenal pending development of a fire control system for the 37-mm. A. A. guns now under manufacture.

Recommendation was made on January 26 by the Ordnance Department to the Adjutant General that the A. A. data computer, M. 1916 (Brocq) be withdrawn from service and placed in war reserve. One computer, however, is to be retained by each of the 61st, 62nd and 63rd Coast Artillery Regiments, for instructional purposes. Notification of the action on this recommendation has not been received.

CALIBER .50 MACHINE GUNS—Recommendation has been made by the Ordnance Office, that the Browning machine gun, caliber .50, Model 1921, water-cooled, (without tripod or mount) be adopted as the standard antiaircraft machine gun for manufacture and issue to the Army. This gun has undergone extensive tests and is regarded as a satisfactory weapon for antiaircraft defense. Work on a satisfactory antiaircraft sight for this weapon has been under way for several months, as will be recalled from report in an earlier *Digest*.

ANTIAIRCRAFT MACHINE GUN MOUNT—In carrying on the development work for an antiaircraft mount for caliber .30 and caliber .50 machine guns, as reported in November, 1924, issue of the *Digest*, a conference was had this month at Fort Monroe, Va., between Ordnance Officers and the Coast Artillery Board. As a result, further specifications have been evolved, which, when incorporated in the pilot model to be built, will, it is believed, be of value in producing a satisfactory mount. Work on this project is being pushed with vigor.

TRIPODS FOR ANTIAIRCRAFT MACHINE GUNS—A conference was held with the Coast Artillery Board at Fort Monroe in connection with the development of caliber .50 and caliber .30 antiaircraft tripods. As a result of this conference, recommendations were made by the Coast Artillery Board to undertake the development of an antiaircraft tripod that would give greater stability. It was also

specified that the shoulder rests should be provided with antiaircraft machine guns to assist the gunner in directing the gun.

FIRINGS OF 14-INCH GUN, EXCESSIVE PRESSURES—As a result of a number of excessive pressures that occurred in the firings of the 14-inch gun, in Panama, a program has been laid down covering some firings at Aberdeen Proving Ground with a view to determining the cause of these high pressures.

3-INCH A. A. SHELL—Firings at Aberdeen with the 3-inch A. A. Model E-5 shell indicate that the stability factor was too slow. Mr. Kent of Aberdeen was called in conference in connection with a redesign of this shell. The redesign has been completed and calculations show a suitable stability factor for the new design. The drawings of this new design are not being made.

RANGE TABLES; WORK IN PROGRESS—Antiaircraft fire control data for 4.7-inch A. A. Gun, Model of 1920, firing A. A. shell, Model E2 armed with mechanical time fuses. 40 per cent completed.

Complete Firing Tables, including Pratt Range Board data for 14-inch Gun, Model of 1920, firing 1560-pound A. A. Projectile (shot). 25 per cent completed.

Complete Firing Tables, including Pratt Range Board data for 10-inch Gun, Model of 1888, firing 510-pound Projectile with groove in back of lip of rotating band. 10 per cent completed.

Preparation of complete firing tables to include Pratt Range Board data for 12-inch Mortars, Models of 1890, 1908 and 1921, firing 700-pound D. P. and C. I. Shells with old zone velocities. 10 per cent completed.

Preparation of complete firing tables to include Pratt Range Board data for 12-inch Mortars, Models of 1890, 1908 and 1912, firing 1046-pound D. P. and C. I. Shells with old zone velocities. 10 per cent completed.

Study of Probable Error firings in 155-mm. Howitzer, Model of 1918 (Schneider) firing H. E. Shell, Mark I.

Investigation into the effect of density of the air on the time of fuse burning.

WORKS COMMENCED—Computation of trajectories giving the theoretical co-ordinates of position for a gun firing a projectile whose ballistic coefficient is 1.5, at velocities of 2600 f.s., 2800 f.s., 3000 f.s. and 3300 f.s. 70 per cent completed.

Zoning Chart and Range Elevation relations for 8-inch Howitzer, Model of 1920, firing H. E. Shell, Mark I, with aliquot part charges. 70 per cent completed.

Fleet Air Arm Control

[FROM THE *Naval and Military Record*, LONDON.]

Notwithstanding the manifestly conciliatory and concessional policy of the Air Ministry towards the Admiralty during the past year, there are definite indications that the controversy has not been finally composed by compromise. In one sense, indeed, compromise is only calculated to stiffen the attitude of the sea lord upon the whole subject, since it amounts to an inferential admission of the reasonableness of the claims which have resulted in it. The Admiralty contention is very simple and very logical. It simply demands the unfettered control of the whole of the aerial organization of the royal navy. The Air Ministry has gone a long way towards meeting this claim, but it is the one final reservation which remains the real bone of contention—the refusal to surrender administrative authority.

Even the new arrangements are quite unnecessarily cumbersome in consequence of this duality of control. In order to qualify as pilots in the fleet air arm naval officers have to be "lent" to the royal air force. We do not suggest that the system may not work perfectly well. But it is simply redundant. The air arm is as much an integral part of the navy of today as the submarine service. The new gigantic air cruisers and flying boats are intended purely for service with the fleet. As things now exist, the Air Ministry may interfere with their employment for any purpose the Admiralty considers necessary. That they would be extremely unlikely to do so does not dispose of the absurd anomaly under which they are able to do so. Duality of control has always proved a millstone around the neck of efficiency in all military organization. To deny to the navy the absolutely unrestricted use of any of its weapons or personnel is an indefensible proposition.

The Air Ministry was one of the mushroom growths of the Great War. There was no expectation that it would survive the Great War. Ever since the armistice it has been struggling to justify its continuance, even to the degree of usurping the functions of the meteorological office. Aircraft are as much part of an army as tanks, as much part of a navy as destroyers. The existent situation is simply a struggle on the part of a new bureau to survive against the sound, long-proven doctrine of the centralized control of all the component units of a fighting force.

The Japanese Army

[TRANSLATED BY CAPTAIN A. M. JACKSON, C. A. C., FROM THE *Revue Militaire Generale*.]

Since the World War new political constellations are tending to replace the old groupings of Powers. The Anglo-Saxon effort towards world hegemony is opposed in Europe by French policy and by Japanese policy in the Far East. At the present time France and Japan are the only two nations who possess a permanent army of real efficiency. Whatever be the diplomatic antagonisms or rapprochements reserved for the future, it is important to know the history, the doctrines, the *esprit* and the organization of the Japanese Army.

HISTORY

Prior to the abolition of the feudal system in 1868, military service was in Japan during many centuries, the exclusive privilege of the Samurai, that is, the gentleman. The peasants could not be soldiers inasmuch as the profession of arms was considered an honor and a pleasure. The Daimi, sovereign master, grouped together the Samurai, his vassals; armies were armies composed of clans and the wars were generally civil wars. That this military system could not endure after 1868 constitutes perhaps the most curious characteristic of the present army, the exalted sense of honor.

In effect, when the era of the Meiji (that is to say, the reforms) arrived, Japan adopted the European system of the armed nation and converted the privilege of service into a duty to which all social classes were bound. French instructors were then sought and French influence was for a time predominant. In the military schools it was the history of Napoleon, the French doctrines and strategy that were studied. It was the Japanese army such as had been organized by several modest French instructors and one or two Italians which, in 1877 suffered its baptism of fire and was able to repress energetically the revolt of the Satsuma, the last feudal clan hostile to the reforms.

But French influence was of short duration. The unfortunate war of 1870-71 did not immediately mark the decline. But from it, Japan could not but discern that Germany was becoming, more and more, the preponderant European state, that its rapid ascension was the work of a handful of statesmen and military men and that to French methods could be opposed German methods which success legitimized. French and German influences rivalled for a time. But in 1884 Marshal Oyama, the future conqueror of the Manchurian War, left for Europe to study the military organization of the different powers. On his return, the Prussian influence became preponderant and the Japanese Army was modeled on the German Army. In 1885 the Prussian General von Mohl was named military adviser to the Japanese Army and concerned himself particularly with the organization of the General Staff. German doctrines and military writers on the style of Clausewitz were the order of the day and their influence persisted until the downfall of the German hegemony. There must be noticed, however, certain reactions of the Japanese temperament which led to certain modifications in German doctrines (for example, those concerning discipline, based on the sense of honor). General von Mohl was besides energetically supported by a generation of Generals who can be considered as the real creators of the Japanese Army; Marshals Yamagata and Oyama, General Prince Katsura, who occupied himself with the administrative organization, and General Kawakami who was, with von Mohl, the organizer of the High Command.

The successive results obtained by the Japanese Army are well known: 1894, victory of Pyniang against the Chinese forces, capture of Port Arthur; 1900, the participation in an expedition to China of a Japanese contingent which set its heart to show itself by its bravery and discipline to be at least the equal of the best European contingents; 1904-1905, the Russo-Japanese War, wherein was proved the undeniable tactical and strategical superiority of the Nipponese Army. From this war, besides, the Japanese must have drawn precious lessons. It would be vain to recall them all as numerous military writers have charged themselves with this. Let us mention, however, the role—foreseen by the Germans—of trenches and field fortifications and the necessity of a heavy artillery, but relatively mobile, which the Japanese did not have and which had to be replaced by the artillery of their fortresses, efficient but handled with much greater difficulty.

During the World War the Japanese were attentive observers and were prompt to draw the tactical and strategical conclusions of their observations. The part played by materiel brought on numerous modifications in the present composition of the army and energetic efforts were made for the development and modernization of certain special arms, aviation for example. Let us note finally that the victorious issue of the war has substituted, from a military point of view, France influence for German influence. Certainly, military thought and study are in Japan sufficiently developed that the Japanese General Staff does not always accept tactical and strategical principles upon which agreement has not yet been realized, even in France. Such is the case, for example, concerning the respective roles of the infantry and artillery. But the great French generals are none the less admired and their doctrines studied; the Government has called for a French mission (Colonel Faure) to reorganize aviation.

A definite organization has not, however, been realized. The program called "The National Defense" elaborated by the Saionji Cabinet has not been followed up because of the slight international tension following the Washington Conference and the budgetary retrenchments necessary in consequence of the earthquake.

DOCTRINES AND MORAL FORCES

General Foch wrote to the generalissimo on September 8, 1914, during the battle of the marshes of Saint-Gond, "Hard pressed on my right, my center is giving, impossible to move, excellent situation, I am attacking." This word could serve as an epigraph to an account of the doctrines of the Japanese General Staff. The essence of these doctrines can be expressed thus, "Victory is only acquired by the offensive; one must always attack and above all when one has the inferior number." The victory of Mukden, for example, is a striking illustration of this theory. Another essential principle and which is somewhat of a corollary of the first is that of the preponderance, in all ranks, of the spirit of initiative. When the German influence became preponderant and the French instructors were replaced by General von Mohl's officers, these latter did not fail to attribute a good part of the German victories gained in 1870-1871 to the spirit of initiative, to which the subordinates of von Moltke bear witness. This example strongly impressed the Japanese staff. The students had besides to surpass the masters and strive to develop the spirit of the initiative even down to the private soldier. Promotion by selection and an age limit permitting of a young personnel, and decorations judiciously distributed reinforced by material arguments the belief in the omnipotence of the spirit of initiative.

But in spite of the part played by this spirit of initiative, war for the Japanese is not an art, but a science. From the first, the Tokyo staff recognized—and here we must admit the fortunate influence exercised by the Germans—the part devolved on organization, on the minute preparation of the slightest movements, on the supply of munitions and rations. To conceive strategic plans, to project, according to the circumstances of the terrain, the attack of the flanks or the breaking up of the center does not suffice. Only execution justifies strategic plans and that execution gives rise to technical problems that one must know how to solve. The Japanese are past masters in this; they have never been hasty improvisors but always before acting have studied the diverse technical problems of which circumstances required the solution.

From what Japanese officers affirm with particular insistence regarding the scientific character of war, it should not be deduced that this is for them above all a question of materiel. Certain formulae which, with us, have had their defenders, for example, "The artillery conquers, the infantry occupies," seem to them to be inexact or rather unadaptable to the resources of Japan. Even in the adoption of such formulae, one must take into account the respective situations of the different nations. The great role attributed in France to materiel is often considered by Japanese officers as translating the necessity of sparing human lives in a country where the birth-rate remains feeble. Japan in time of war is not sure of being able to maintain its maritime communications. Perhaps it will be forced to count only on its own metallurgical industry, still slightly developed; its supply of petroleum will be equally problematic*, briefly, its material resources could be dangerously diminished. Japan counts less on its materiel and resigns itself to sacrifice, in large proportions, its infantry. Fire power, the necessity of supporting the infantry, the coordination of the different arms are certainly denied by nobody. But the infantry remains the principal arm and for which the decisive part must be paid for in sacrifices.

*Let us note regarding this subject that the Japanese are particularly interested in the researches made in France with a view to the creation of a national fuel (for internal explosion engines). The fact that Japan's supply of petroleum is assured by the United States and the Dutch Indies, that is to say, would not or with difficulty be continued in case of war, creates in fact for Japan a perplexing military problem.

These sacrifices could be much heavier inasmuch as the services of reconnaissance appear to be insufficient. There, it seems, is still the big gap in the Japanese army. The Japanese cavalry is slight in numbers on account of the lack of horses. What of aviation, its development is recent. The machines in use are still, for the most part, of foreign origin. However, the Japanese authorities have recognized that want and their efforts permit us to believe that it will soon be filled.

The modern wars have demonstrated that moral value, patriotism and the resistance of the fighter count as much as material strength. The moral value of the Japanese Army is undeniable. In spite of sovietic propaganda, the great mass of the people is animated by a patriotism which, very often, constitutes a pure nationalism. This patriotism has roots the deeper because it leans on Shintoism, the religion of nature and ancestors. The Mikado himself is the descendant of the gods, Japan is the divine country par excellence and the entire Japanese people has a high idea of its nature and of its race. The revolution of 1868 was above all a reaction against the menace of a foreign domination. Japan has never been invaded, it has often been the conqueror and the people draw from this fact a great and legitimate pride.

To this patriotism there is added an extraordinary sense of honor, legacy of the feudalism of the Samurai. One knows the chivalric ideal of medieval Japan, the fidelity until death of the Samurai to their Daimios. But that which is least known that in an absolutely modern army, the spirit of other times still survives and that fidelity, the chivalric ideal of the Samurai, subsists in the private soldier as it does among the generals. Hari-kiri, that is, voluntary death for chivalric motives which sometimes seems futile to us, has not at all fallen into disuse, even in the circles most strongly impregnated with Occidental culture. Nothing in this direction is more demonstrative than the hara-kiri of the conqueror of Port Arthur, General Nogi and his wife, who did not want to survive their sovereign, Mikado Mutsu Hito.

Such a patriotism, such a sense of honor, renders military discipline easy. But this discipline could not be and has never been the strict German discipline, more concerned in obtaining obedience than assent. The Japanese soldier, accustomed to initiative, chivalrous and patriotic, cannot be treated as a machine. The Japanese people is quick-witted, open-minded, prompt, it is true, to criticize, but does not bargain its good-will. The Japanese discipline hence had to approach French discipline, to be an educational and flexible discipline. This flexible discipline besides is not prejudicial to work. The Japanese Army is an army that works. From the private soldier to the commander-in-chief, all military men have their work at heart. Training and instruction are always carried to the highest point and the army constitutes a strong arm in the hands of those accustomed to handle it.

ORGANIZATION

The army is recruited according to a system of conscription which, created in 1873, presents numerous analogies to the pre-war German system. In principle, all able-bodied men between 17 and 40 years, can be called to arms. In reality this case has never been produced. During the Russo-Japanese War call was made only to the Reserve, exclusive of the Territorials. All young men of 20 years are examined by an examining board. The able-bodied conscripts taller than 1.50 meters are divided by drawing into three categories. The conscripts of the first category serve in principle for two years in the active army, four years and four months in the first reserve, ten years in the second reserve and seventeen

years and four months in the Territorials. The conscripts belonging to the second category are thrown into a special formation, called the "Reserve Conscripts," analogous to the old German "Ersatz" formation. They are bound only to short periods of training. The conscripts belonging to the third category are thrown directly into the Territorials and are not bound to any military training. Conscripts between 1.50 meters and 1.44 meters in height are thrown into the Territorial army. Conscripts shorter than 1.44 meters or those who are temporarily sick are remitted, and the following year are either declared qualified for service or are definitely retired. So, only one part of the able-bodied contingent is effectively bound to the military service. The permanent army is, in effect, less than 300,000 men when each class contains 500,000 conscripts and 100,000 are remitted from the preceding year. Let us mention that only 1.5 to 2.0 per cent of enrolled conscripts are illiterate. The soldiers are divided into first and second class; the noncommissioned officers, of which a considerable proportion are professional soldiers, comprise sergeants-major, sergeants and corporals.

The recruiting of officers is organized thus: 1. The military preparatory schools situated at Tokyo, Sendai, Nagoya, Hiroshima and Kumamoto receive officer candidates directly and submit them to an examination. 2. The Cadet School at Tokyo receives the laureates of the preparatory schools. 3. A Staff College similar to our *Ecole de Guerre* whose function it is to train staff officers. Besides these there exist numerous schools of application to which the young officers go to pursue courses; artillery and engineers' school, infantry school of tactics, Toyana military school, cavalry school, school of fire for heavy artillery, school of fire for field artillery, military aviation school, etc. The military authorities have striven to construct young cadres. The limits (reduced by half in time of war) of service necessary for promotion have been fixed thus; from second lieutenant to first lieutenant and from first lieutenant to captain, 2 years; from captain to major, 4 years; from major to lieutenant colonel, 3 years; from lieutenant colonel to colonel and from colonel to brigadier general, 2 years; from brigadier general to major general, 4 years. The nominations of army corps commanders and marshals are left to the discretion of the sovereign. The age limit for superior and general officers has been fixed thus: major, 50 years; lieutenant colonel, 53 years; colonel, 55 years; brigadier general, 58 years; major general, 62; lieutenant general, 65. No age limit exists for marshals.

All officers do not come from the military schools. A certain number of officers called warrant officers are recruited from among the sergeants-major and all grades are open to them.

The reserve officers are furnished by ex-officers of the active army and by students for whom there has been organized a voluntary service of one year, followed during two years by a three months training period.

There were in 1921, in active service, 228 general officers, 2882 field officers, 12,686 junior officers and 2316 warrant officers, or a total of 18,052.

Finally, about the combat organizations, two different organisms coordinate and codify the wishes of the General Staff. The Council of Marshals and Admirals created in 1893 is primarily designed to advise the Emperor. Its competency is rather administrative and legislative; it refers essentially to regulations for the army. The Supreme War Council, created in 1904 is composed of officials (War and Navy Ministers and the Chiefs of Staff of the Army and Navy) and members nominated by the Emperor.

In Japan, as in France, the division is the essential unit. A division is composed, according to regulations, of two infantry brigades, that is 6 battalions of 600 men, a cavalry regiment of a strength of 3 or 4 squadrons of 100 men, a

field artillery regiment of 6 batteries of 4 guns, and a battalion of engineers formed in 3 companies of 150 men. Besides this, about 300 men are attached to the different auxiliary services. At peace strength, the Japanese Army comprises 20 divisions, of which two are in Korea. To these forces must be added the Imperial Guard at Tokyo. The permanent army numbers 272,000 men, and disposes of 45,000 horses.

Following the Russo-Japanese War and the World War, the special troops were carefully organized, notably the heavy field artillery, the machine gun companies, the trains, and the air service.

The heavy artillery has replaced the fortress artillery, stationed previously in the forts of Tokyo, Shimonoseki, etc., and which primarily had to play a purely defensive part. This is not a question of terminology. The heavy artillery having to possess a mobility which the fortress artillery did not offer, the materiel has been modified and the organization of the artillery units has been unified. Besides this, some field artillery cannons have been attached to the heavy artillery for cases where more rapid work might be required. A field artillery regiment of three battalions is attached to each division, with the exception of the 9th and 11th divisions, which possess mountain artillery regiments. Besides this, there exist 6 brigades of heavy artillery and 2 independent mountain artillery regiments of 2 battalions each. Two military arsenals furnish a goodly portion of arms, powder, munitions, etc. They operate at Tokyo and Osaka. The artillery depots are at Nagoya, Hiroshima, Kokura, Ryuzon and Heyo.

Machine guns of Japanese origin are allotted to one battery per infantry regiment.

The special troops further comprise two railway regiments, two regiments of telegraphists, one balloon company, which was organized before the Manchurian War, and finally the motor transport. The latter service, for reasons of a financial and economic order, has not yet really been organized. The Government has sent officers to France who are now taking courses in different automobile factories and who will, on their return to Japan, be charged with the reorganization of military transport.

Finally, there is an arm the development of which is actively pursued: the air service. Two officers trained in France who returned to Japan in 1911, were the first military aviators. An aerodrome was then constructed at Tokorozawa, near Tokyo. In 1915 there was created a corps of military aviators. It is now composed of four battalions, of which one is in Korea, and has 150 planes. An aviation school was founded in January, 1920 and since the first year, qualified 100 pilots, active and reserve. Since 1917 constant purchases have been made abroad, but at the same time considerable efforts have been made in Japan itself and soon, Japanese aviation having caught up with the times, all machines will be made in Japan. Besides, Japan has always kept itself informed of the progress realized by foreign powers. It was thus that a Japanese aeronautic mission was sent to the Italian front in August, 1918, and the arrival in February, 1919 in Japan of a mission composed of 60 French aviators directed by Colonel, since General Faure, recently deceased, was the signal for an intense and fruitful work by the Japanese air service.

PROGRAM FOR MILITARY LIMITATION

The general march of events, the signing of the Washington agreements and the disappearance of Russia as a military power of the first order, have led the Japanese Government, moved equally by financial and political considerations, to diminish slightly the effectives of the permanent army. Already, in 1922, the

Chamber had asked the Government to reduce the annual budget by at least 40 million yen (100 million gold francs) and to reduce from two years to 16 months the period of military service. In principle the Diet's demands were agreed to, but their realization has not yet been achieved. The plan for the reduction of the army has been but partially executed. It does not entail, however, a real weakening of the army. The number of effectives must be diminished but the cadres, the number of divisions and regiments is preserved, which will involve the same facilities and the same groupings of units in case of mobilization. Here are the changes which, once achieved, will lead to the reorganization of the Army.

	Composition after reorganization	Increase or decrease
Infantry	83 Regts., 8 ind. battalions	— 20 Companies
Cavalry	29 Regiments	— 29 Squadrons
Horse Artillery	1 Battalion	— 1 Battery
Field Artillery	19 Regiments	—108 Companies
Mountain Artillery	4 Regts., 2 ind. companies	+ 8 Companies
Heavy Artillery	3 Regts., 8 ind. battalions	+ 4 Batteries
Engineers	21 Battalions	— 7 Companies
Railway Service	2 Regiments	+ 2 Companies
Telegraphists	2 Regiments	+ 4 Companies
Air Service	6 Battalions	+ 2 Companies
Lighter than air	1 Company	
Motor Transport	1 Corps	

It will be noticed that beside the decrease of the infantry, the heavy artillery, the air service and the technical services will be augmented. The program is already partially realized. The duration and periods of military service have been reduced. Eighteen hundred officers and 56,000 men have quit the army and 13,000 horses have been lost. Numerous garrisons in Korea have been suppressed. But none the less, the Japanese Army remains by virtue of armament, morale, and availability, a factor of the first order.

Our National Match Teams for 1925

By MAJOR W. D. FRAZER, C. A. C., *Team Coach*

Play a man at his own game and he'll beat you," unless the game is purely one of chance. Only after you have mastered the game through much practice and experience can you expect to have a good chance of winning from the man who has specialized in it for years.

If you do play another man's game and beat him at it or even make him extend himself to the limit to prevent you from beating him you will certainly gain his respect, not only for your ability to play his game well, but because of the fact that he will realize that you are able to play your own game, whatever it may be, with even greater skill. Your reputation for efficiency cannot help but be benefited accordingly.

Following up this line of thought we find that through rivalry in competitions we learn to know our opponents very intimately and this knowledge develops into friendly intercourse which is carried into our daily occupations and results in better relations both socially and professionally. This is one reason for encouraging healthy competitions.

For six years the Coast Artillery rifle team has been slowly developing. Starting in 1919, with absolutely nothing in the way of equipment, a small group of rifle and pistol shots, without experience other than that obtained in our short

range qualification courses but filled with enthusiasm, entered the National Rifle Matches against the best teams of our Regular and National Guard services and from our civilian rifle associations. This team placed 34th in the National Team Match of that year. Each year since has seen an improvement and in 1922 and in 1924 the rifle team placed third, which is the best it has been able to do.

Developing a National Match Team takes time because of the fact that many good candidates after a year of training become unavailable for the next year's team due to discharge, foreign service or some other exigency. Also the rules of the match require that at least five members of the team be men who have never fired on a national match team. In our branch of the service, due to our limited small arms training, all of which is at short range, the team officials each year find it absolutely necessary to start the candidates off with a great deal of work on the fundamental principles of shooting. This is a big handicap which is not experienced so much in the branches which specialize in rifle marksmanship.

In spite of these handicaps the Corps should feel a pride in the achievements of the teams. In 1920 at Camp Perry the question was being repeatedly asked, mostly by civilians: "What does C. A. C. stand for?" or "What *is* the Coast Artillery?" In 1922 when members of that same aggregation, wearing the white shoulder patch with the red C A C on it walked off with the four most important national individual matches and the rifle and pistol teams placed third and fourth respectively in the big team matches, the reputation and standing of the Coast Artillery was established, and the Big Gun Corps was located in big letters on the national shooting map. In 1923 the team slipped to fifth place in the rifle team match, but "came back" last year to third place again, with a mental resolution that 1925 would be their year. And now as the training season starts and the long, strenuous, nerve-straining tryout looms ahead, let us see what our prospects are and what we need to win.

Primarily we must have the loyal support of every Coast Artillery officer and enlisted man, and especially those who can in any way help the cause along. If the Chief of Coast Artillery believes that we should have a team, and that means a good team, then it goes without saying that it behooves all subordinates to support that team in the same whole-hearted, self-sacrificing manner that General Coe has done. This support on the part of commanding officers does call for some sacrifices in the matter of personnel during the active outdoor period but when it is realized that the team will take less than fifty officers and men, and the range detachments as many more, from their regular post duties, the total is not great when spread over the entire Corps. The team fund subscribed last year will be sufficient for this season and no financial support is needed at this time. The team does, however, need most of all some more steady, reliable, hard-hitting, straight-shooting enlisted men of the type of Sergeants Christian, Hahn and Bentz and an enthusiastic group of young commissioned shooters with the intelligence and perseverance necessary to stand the gaff of nerve-racking tryouts, on whom we can depend in the future to be the nucleus for our annual teams.

The team does not need or want individuals whose dispositions and temperaments are such that they cannot sacrifice their self interests for the good of the team, who are the source of continual irritation and friction among their fellow shooters, who will not accept the principles and practice the methods prescribed by the team officials, who in other words are poor team men. No matter how well they may shoot, such individuals are not wanted on the team; we have had them in the past and we want them no more.

The prospects for the season are encouraging. There is for the first time since we entered the game enough old men to furnish from among their numbers five experienced strong shooting, dependable team shots and it is hoped that with the men who have had one or more years' training in previous tryouts but who did not make the team and the addition of a few good novices who always stand a chance, that a good team will be produced.

By the time this is in print, the Coast Defense tryouts will be under way and as it is from them that the team each year gets its new material, it is hoped that they may produce several "dark horses" who will make the older and more experienced shots fight hard for a place on the team.

An R. O. T. C. Demonstration

By J. M. SCAMMELL

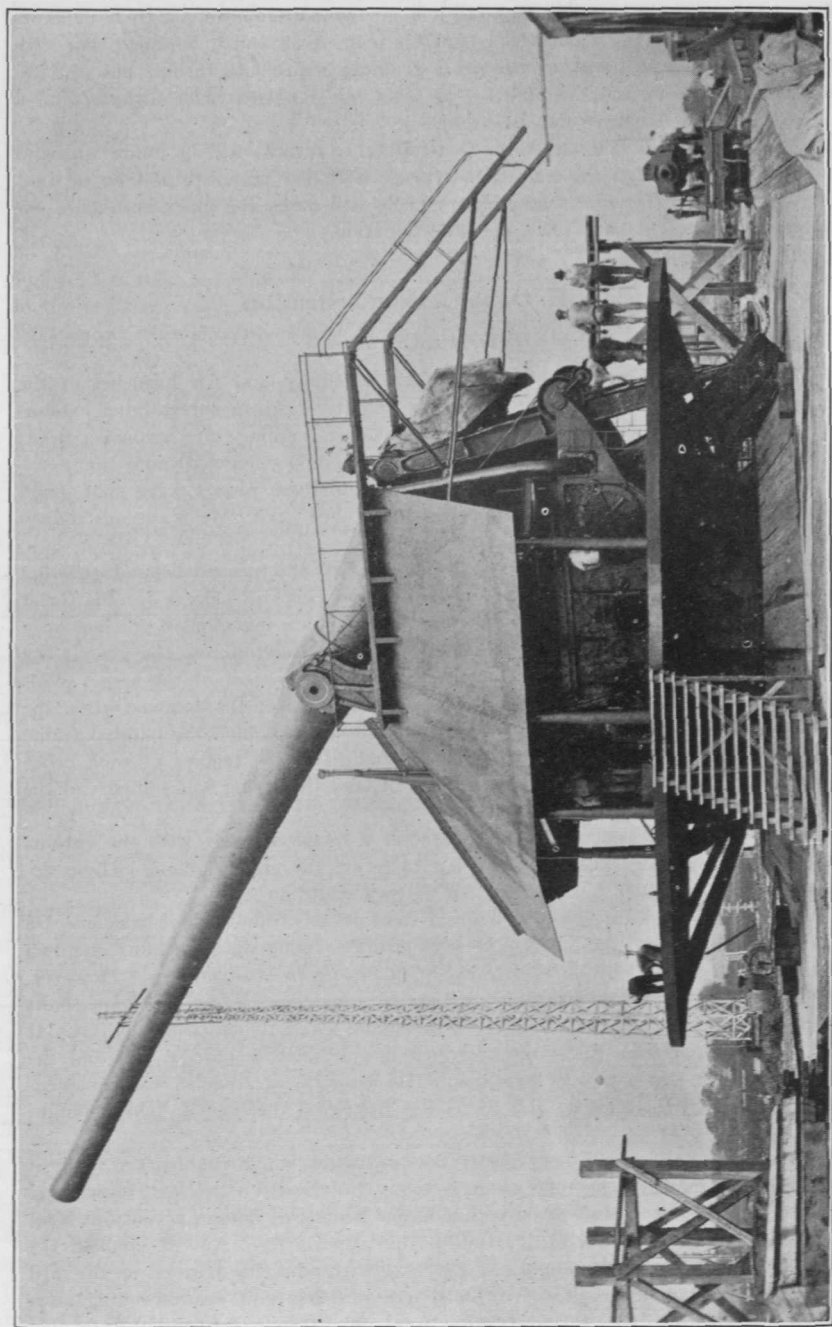
In connection with "Engineers' Day" the Artillery and Air branches of the R. O. T. C. at the University of California recently held an entertaining exhibit. The 1-pounder gun was used to demonstrate Coast Artillery fire against a naval target, and the machine gun served to show the public beyond dispute that General Mitchell is all wrong: the way that the miniature planes were shot down with blank cartridges brought forth cries of "Fake!" and "We want our money back."

The 1-pounder practice was equally successful, and proved beyond question that the country has in store for it such a brilliant corps of officers for the Coast Artillery as was never its fortune before. A model ship ingeniously perched on a collapsible wire frame above the painted waves was drawn across the grass. The fall of the projectiles was noted, and, after a single bracket of the target a hit was made. The third hit invariably sank the ship. After the demonstration the officious observer went over to inspect the contrivance. Behind the painted frame was a wooden platform with three mouse-traps on it, the trigger of each being controlled by a string. Whenever a hit was desired the string was pulled and the trap closed upon a magnesium flare cap.

There was a 75-mm. anti-aircraft gun on a truck together with the various instruments and range-finders for trying to locate the elusive plane. These devices received but little public attention as they made no noise.

The aircraft exhibit received a great deal of attention. There was one De Havilland observation plane complete with two Browning machine guns and two Lewis guns, together with an assortment of bombs up to 100-pounders. However, the exhibit that drew the attention of your correspondent was a new type, built for the "Round the Campus Flight." The engine was a 1-manpower bicycle. It was a monoplane from the wires of which flew a shirt, a pair of sox and the ground floor part of a pair of pyjamas. The name "Lost Angels" was conspicuously painted on the chassis, and there, too, appeared the legend, "Don't laugh; swear."

On the whole it was a very pretty demonstration which enabled the male of the species to do for once that which is today practically a lost art, namely, to strut before the female and to show that in one branch of human activity at least the despised masculine sex still maintains his superiority. And it enabled the female to enjoy herself thoroughly by listening with admiring interest as the lord of creation explained things to her in a self-conscious and condescending way, and to scream prettily as the nasty guns went off. Thus a thoroughly enjoyable time was had by all.



10-INCH GUN ON DISAPPEARING CARRIAGE, MODEL 1919, as assembled for test firing at Aberdeen Proving Grounds. Maximum elevation, 30° ; minimum elevation, -5° ; muzzle velocity, 2,700 f.s.; weight of projectile, 2,400 pounds; maximum range, 35,800 yards.

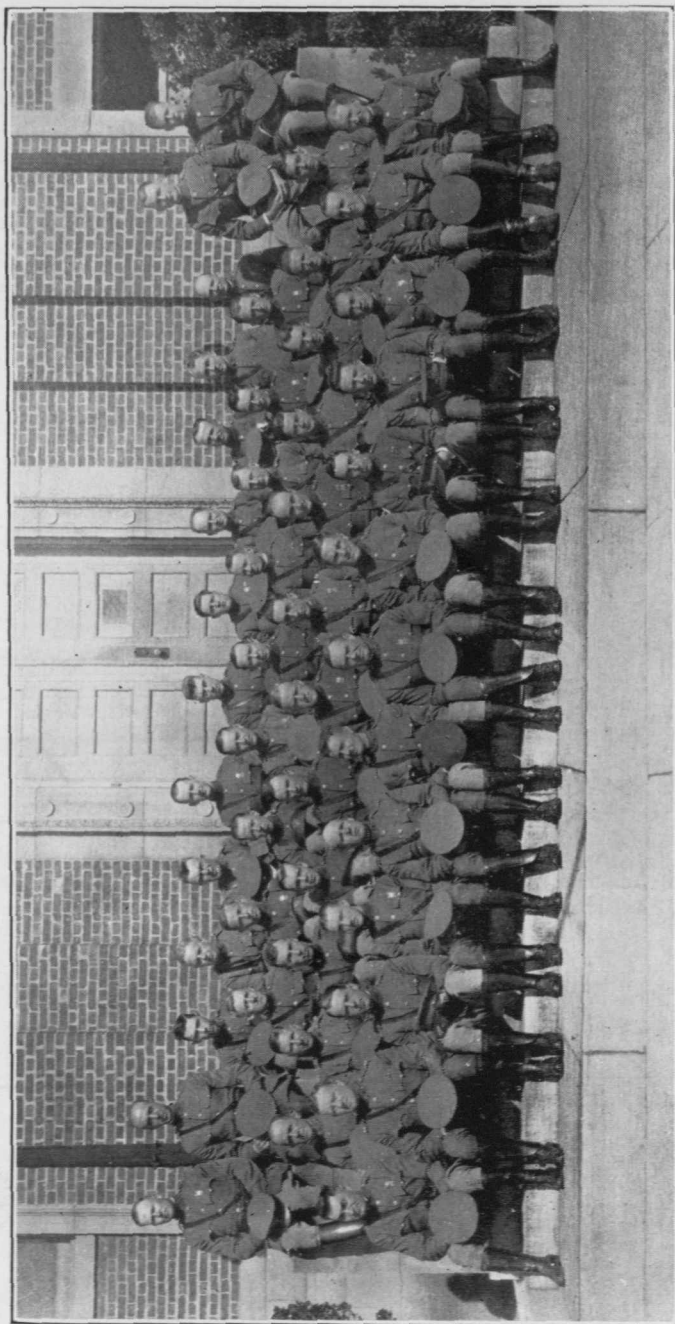
Coast Artillery Memorandum No. 5

This memorandum, issued by order of the Secretary of War, dated April 1, 1925, and prepared in the Office of the Chief of Coast Artillery, states that the subject matter contained in Coast Artillery Memorandum No. 1, War Department, 1923, Revised, has been incorporated in Training Regulations and in other publications which have been, or are about to be, issued to the service; that the provisions of Coast Artillery Memorandum No. 1, War Department, 1923, Revised, will be considered as inoperative upon the receipt of the publications referred to in the following tabulation which gives references to those publications containing or superseding the subject matter contained in the corresponding paragraphs of Coast Artillery Memorandum No. 1; and that when all of the publications have been received, Coast Artillery Memorandum No. 1 will be considered as rescinded in its entirety.

C. A. M. No. 1

Other Publications

Section I, Paragraph 1 a	T. R. 435-295, par. 16 c (1) (a).
Section I, Paragraph 1 b	T. R. 435-295, par. 16 c (2).
Section I, Paragraph 1 c	T. R. 435-295, par. 16 c (3).
Section I, Paragraph 1 d	T. R. 435-295, par. 16 c (5).
Section I, Paragraph 1 e	T. R. 435-295, par. 17.
Section I, Paragraph 2	T. R. 435-295, par. 16 c (6).
Section I, Paragraph 3	A. R. 90-30, par. 2; T. R. 435-300, par. 18; T. R. 435-295, par. 16 b; T. R. 10-5, par. 55.
Section I, Paragraph 4	A. R. 90-30, par. 6.
Section I, Paragraph 5	T. R. 435-300, par. 5 f; Provisional Training Regulation 435-51, par. 1; A. R. 90-70, par. 3.
Section I, Paragraph 6	Rescinded. A. A. Training is covered in Training Regulations 435- Antiaircraft Series, and in the Antiaircraft Bulletins issued by The Office of the Chief of Coast Artillery.
Section I, Paragraph 7 a	T. R. 435-222, par. 8, 17 and 19 b.
Section I, Paragraph 7 b	Rescinded.
Section I, Paragraph 8	Rescinded.
Section II, Paragraph 9	T. R. 435-55, par. 64; T. R. 435-295, par. 16 c (1) (d) 2.
Section II, Paragraph 10	T. R. 435-300, par. 18 a and 18 b; A. R. 775-15, par. 4 b.
Section II, Paragraph 11	T. R. 435-295, par. 16 c (1) (d) 2.
Section II, Paragraph 12	T. R. 435-300, par. 18 b; T. R. 435-220, par. 28.
Section II, Paragraph 13	T. R. 435-295, par. 16 c (1) (d) 2; T. R. 435-220, par. 28 d.
Section II, Paragraph 14	T. R. 435-220, par. 33; T. R. 435-55, Section II.
Section II, Paragraph 15	T. R. 435-55, Section III; T. R. 435-220, par. 33; T. R. 435-55 (Revised), par. 1.
Section II, Paragraph 16	T. R. 435-55, par. 29.
Section II, Paragraph 17	T. R. 435-55 (Revised), par. 37.
Section II, Paragraph 17 a	T. R. 435-55 (Revised), par. 31.
Section II, Paragraph 17 b	T. R. 435-55 (Revised), par. 31.
Section II, Paragraph 17 c	T. R. 435-55 (Revised), par. 37.
Section II, Paragraph 18	T. R. 435-55, par. 26; T. R. 435-55 (Revised), pars. 32 and 35.
Section II, Paragraph 19	T. R. 435-295, par. 16 c (1) (d) 2.
Section II, Paragraph 20	T. R. 435-220, par. 31 g; T. R. 435-55 (Revised), par. 36 a.
Section II, Paragraph 21	T. R. 435-220, par. 33; T. R. 435-55 (Revised), par. 36 b.
Section II, Paragraph 22	Rescinded.
Section II, Paragraph 23	Provisional Training Regulation 435-51, par. 1.
Section II, Paragraph 24	T. R. 435-55 (Revised), par. 35 d.



BATTERY OFFICERS' CLASS, COAST ARTILLERY SCHOOL, 1924-25

FIRST Row: Lt. J. H. Smith, Capt. W. R. Maris, Capt. A. F. Winton, Lt. H. H. Newman, Capt. J. B. Varela, Lt. F. B. Waters, Capt. P. W. Hardie, Lt. G. M. Badger, Lt. D. D. Lamson, Lt. R. D. Paterson, Lt. P. Martel, P. S., Capt. A. Mossman, Capt. J. M. Cole.
 SECOND Row: Capt. N. H. Duval, Capt. V. R. Anderson, Capt. W. C. Brady, Capt. B. F. Harmon, Lt. T. W. Munford, Capt. S. L. McCroskey, Capt. P. W. Rutledge, Capt. W. Suckville, Lt. B. C. Dailley, Lt. W. C. Katrich, Lt. R. C. Lounry, Lt. J. E. Olivares, P. S.
 THIRD Row: Lt. P. T. Gregory, Capt. F. G. Epling, Capt. A. W. Gower, Lt. V. Schmidt, Lt. E. C. Callicut, Capt. G. Blaney, Capt. F. W. Cook, Capt. P. F. Biehl, Lt. H. F. Meyers.
 FOURTH Row: Capt. H. W. Cochran, Lt. A. F. Gilmore, Lt. C. E. Brand, Capt. W. J. Gilbert, Capt. C. H. Answorth, Capt. J. H. Harrington, Capt. J. F. Stillep, Lt. M. Montero (Cuban Army), Capt. H. H. Blackwell, Capt. G. B. Welch, Lt. F. Dominguez (Cuban Army), Lt. L. A. Whitaker, Capt. R. B. Bottom, Lt. A. L.

Troubles of a Post Commander

The JOURNAL is indebted to Colonel Edward Carpenter, C. A. C., for the following copy of a letter taken from the records pertaining to the abandoned post of Fort Severn, Maryland. This letter, written November 29, 1821, by Colonel R. Jones to the Quartermaster General of the Army, impresses upon one the fact that the troubles of a Post Commander change but little with the passing years. It reads as follows:

Sir:

I have pleasure herewith to transmit receipts for clothing, etc., lately received from the Quartermaster, stationed at Philadelphia.

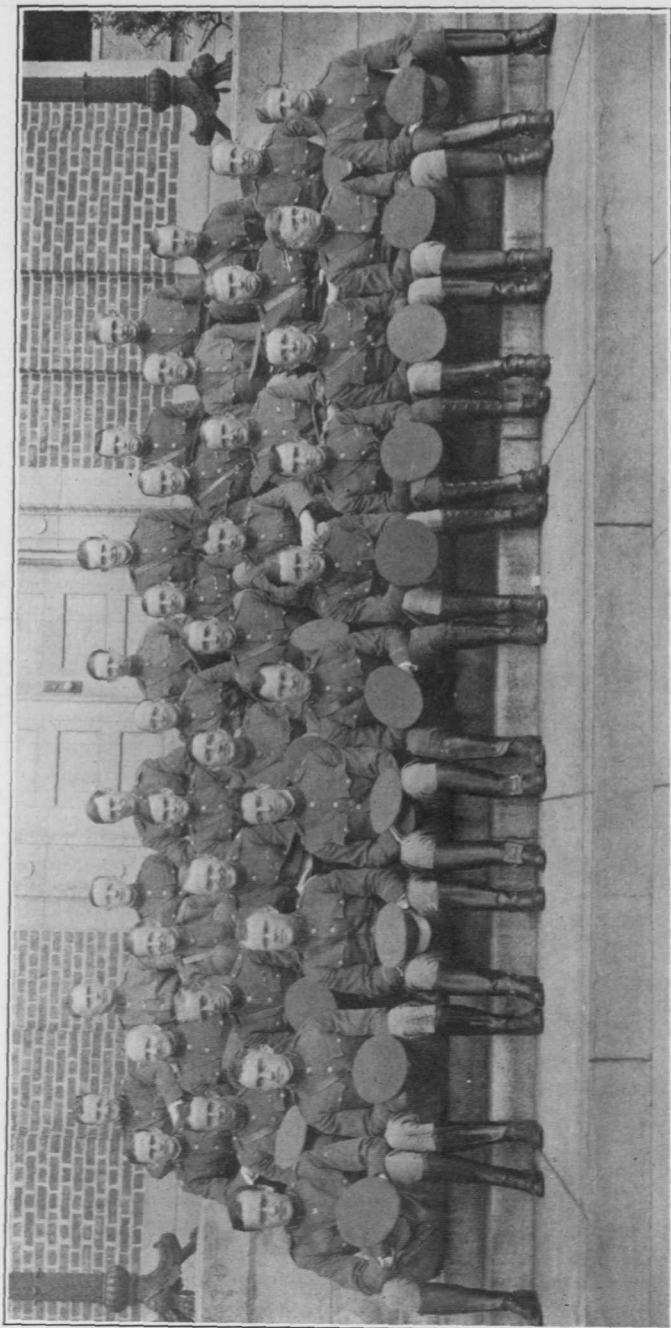
I avail myself of the occasion to make a few remarks in regard to my requisition of November 21, 1821, for a few materials, for the partial repairs of officers' quarters (particularly those I occupy) and for soldiers' bunks.

The specific designation of materials and the amplified certificate on the face of the requisition are respectfully referred to: It will therefore be seen, as it would appear on inspection, to anyone, that no repairs, for at least several years, could have been made on officers' quarters—with the exception of paint. Such is the antiquity of the building, that many of the doors are worn out, and most of the frames greatly decayed and quite loose and unstable in their positions. There are several outside doors which have no lock or key; only one with a latch, another with a bolt, and there are two which have neither lock nor bolt. The small porch, mentioned for the east side of the mansion is very indispensable; occasionally strong east winds prevail and the bleak position and exposure of the premises render the whole house open to its violence. The porch or entry absolutely so much required will guard us within from this violence, cause the entire house to be more comfortable, and preserve the door and adjacent floor from rain and premature decay.

I will mention one circumstance to show how essential it may be to have for contingent demands—a few boards and nails always on hand. The last man buried here might have been without a coffin, had not a dealer in lumber chosen to have credited the U. S. for as much as would suffice.

I have ever concurred in principle and in practice with the strictest economist, in behalf of the public weal—but I do think that if a pine table or shelf happens to be required at a permanent Post, and which must pertain thereto that the officer hardly ought to pay for the lumber required; but already have I incurred this expense, unless some future requisition could embrace the number of feet which were necessary.

It would hardly have been worth while to have made mention of this subject, but Lieutenant Fitzhugh informs me he had submitted my requisition to the authority at Washington. I had supposed, however, the meaning of the "General Instructions" on this head were so plain—the authority to "purchase," so explicit (vide 11th and 12th articles, 69th Article of Rules and Regulations) together with the strict conformity thereto of the enumerated articles required, that the Acting Assistant Quartermaster at Baltimore in the exercise of his own judgment and authority would have been fully equal to the supposed responsibility.



ADVANCED CLASS, COAST ARTILLERY SCHOOL, 1924-25

First Row: Maj. R. D. Brown, Maj. R. S. DuBois, Maj. H. L. King, Maj. A. E. Routland, Maj. H. F. Nichols, Maj. G. P. Anderson, Maj.
 F. Kemble, Maj. C. T. Marsh, Maj. W. R. McCleary, Maj. C. A. French, W. Wilson, Capt. E. Prieto (Cuban Army), Maj. M. A. Cross, Maj. E. H.
 Metzger, Maj. H. A. Mountford, Lt. Col. M. S. Crissy, Maj. C. L. Williams.
 Third Row: Maj. C. M. Wood, Maj. H. E. Pitz, Maj. T. H. Jones, Maj. J. H. Cochran, Maj. J. F. Walker, Maj. F. E. Willford, Maj. J. H.
 Lind, Maj. P. H. Offosen, Maj. H. F. Loomis.
 Fourth Row: Maj. C. M. S. Skene, Maj. E. O. Halbert, Maj. J. C. Haw, Maj. O. H. Longino, Maj. J. D. McCain, Maj. J. B. Crawford, Maj.
 R. Donovan, Capt. J. H. Wilson.

The Other Side of a Soldier's Life

By MAJOR W. K. WILSON, C. A. C.

EDITOR'S NOTE: *This is the fourth and last of a series of "five minute" talks by Major Wilson. The first three talks were entitled "Our Aim in the Military Service", "Success in the Military Service", and "Playing the Game". It is believed the subject matter of these addresses is particularly suited for use by organization commanders in short talks to their command.*

When we speak of a soldier there is a natural tendency to think of a man dressed in uniform with a rifle on his shoulder. There has also been a tendency to think of a soldier as a mere machine, and a different sort of individual from other men. This tendency is sometimes an advantage to the soldier, but usually it is a great disadvantage.

Today, I want to talk to you about the man inside the uniform, and I have chosen for my subject "The Other Side of a Soldier's Life."

In the first place, we all know that putting a uniform on a man does not make a soldier out of him in the true sense of the word. Putting a man in a locomotive engine, does not make an engineer immediately. Putting a hammer in a man's hand, does not make him a carpenter at once. Putting a paint brush in a man's hand, does not make him a qualified painter. In every profession, there must be the first step, and putting on the uniform, is but the first step in a soldier's career.

Some time ago, I talked to the Noncommissioned Officers' School on the subject, "Success in the Military Service," and I attempted to show at that time that there is no short cut to success. To succeed in the Military Service, the following are believed to be essential:

- | | |
|-----------------------|------------------|
| 1. Desire to succeed. | 6. Cheerfulness. |
| 2. Self confidence. | 7. Self control. |
| 3. Persistence | 8. Courage. |
| 4. Hard work. | 9. Honor. |
| 5. Patience. | 10. Loyalty. |

Some of you have enlisted for one reason, and some have enlisted for another reason. Perhaps there are those here today, who enlisted in order to see something of the world outside of their native towns. Perhaps there are those who enlisted in order to obtain some military experience before settling down in civil trade or profession. Then, too, there may be some here today, who have decided to follow the military service as a profession.

To those who intend to remain in the military service, let me urge you to adopt for your standard the success which I have just outlined. Work hard with success in the military service as your object.

To those who have joined the military service for the experience, but who do not intend to remain with the service, let me urge you to get as much valuable experience out of your service as you possibly can. The military service has much valuable experience to offer you, but you must remember one very important thing, and that is you are going to get out of military service in proportion to what you put into it. If you deposit one dollar in a savings bank, you will get interest on one dollar. If you deposit ten dollars, you will get interest on ten dollars. If you deposit one hundred dollars, you will get interest on one hundred dollars. In other words, your interest will depend entirely upon the amount you have deposited. Just so, the military service will give you in experience exactly in proportion to the effort you make.

My advice to you, therefore, is, whether or not you intend to stay in the military service, put forth your best efforts and you will have no cause for regret.

As I look into your faces today, I am impressed with the great possibilities which you have before you, for inside of each uniform there is a man. While man has his limitations, and while man's work is insignificant compared to the great natural works of our Creator, man has done some very wonderful things.

It was man who built the great ships that ride upon the ocean's wave. It was man who designed and built the great locomotives which pull heavy man-built trains over railroads laid by man. It was man who built our great cities. It was man who built our roads and our bridges. It was man who designed and built the submarines which enable man to travel beneath the surface of the water. It was man who designed and built the aircraft which enables man to sail among the clouds. It was man who invented the gas engine, the telephone, the telegraph, and the radio apparatus now in use. Man has given us our music, our art, and our literature.

What one man has done, another can do, and in fact, man has never been willing to limit himself to what some other man has done, but has constantly endeavored to do more.

Do you ever stop to think of the great possibilities before you? Hundreds of men with fewer opportunities than you have made marked successes of their lives.

Do not be satisfied with any success short of that which your ability demands. The responsibility for your future depends upon you. What the army wants today is for you to be more than a machine in uniform.

After all, the best man makes the best soldier.

The army wants you to be a man in every sense of the word, a man loyal to the Government whose uniform he wears, a man loyal to the principles of duty, justice, and honor—a man clear thinking and having a definite ambition to succeed.

The world is before you with much to be accomplished. There is practically no limit to what you can do. In conclusion, let me urge you whether you remain in the military service or follow civil pursuit, to keep constantly before you that high standard of duty, justice, and honor for which our Army stands.

Storage of Powder

During the past fiscal year a committee of ordnance experts on the storage of powder was appointed to study the subject of under-water storage of the reserves of smokeless powder. After careful consideration of all data pertaining to this problem, especially the experience of the French Government in connection with this class of storage, a report was submitted wherein the committee recommended that all reserves of bulk smokeless powder in excess of the amount required for new manufacture in the next two years should be stored under water, and that all smokeless powder propelling charges in excess of the number of projectiles of each caliber on hand, plus the manufacturing program for the next two years, be also stored under water. It has been found that powder deteriorates much more rapidly in dry storage than in wet. In fact, during the calendar year 1923, at the Charleston Ordnance Reserve Depot, two magazines and their contents were destroyed, presumably due to spontaneous combustion resulting from deterioration of the smokeless powder in storage in the magazine. Under-water storage of stocks of smokeless powder will, it is believed, serve to prolong

the life of the powder, and postpone the day on which it will have to be replaced by new manufacture. In addition, powder in dry storage requires careful surveillance, with the resulting expense of conducting numerous and detailed surveillance tests from time to time of samples of the powder, maintaining the magazines in which the powder is stored, plowing fire-breaks around the magazine to prevent fire hazards, etc. If the reserves of smokeless powder are stored under water this expense will be avoided, resulting in a continuous saving to the Government each year. In time these accumulated savings will exceed the actual cost of placing this powder in wet storage, in addition to the indirect saving which will be attained from the prolongation of the life of the powder.—*Annual Report of the Chief of Ordnance.*

Selection of Battery Noncommissioned Officers

EDITOR'S NOTE: Each student of the Coast Artillery School was required to prepare a statement limited to 1500 words, on the above subject. The following is an approved solution prepared by the School faculty.

A noncommissioned officer is a soldier especially selected for his character, intelligence, efficiency, and soldierly bearing to assist in the instruction, discipline, and care of the other enlisted men. Paragraph 261, Army Regulations, 1913, requires that he be carefully selected and instructed and always supported by the company commander in the proper performance of his duties.

Unlike the noncommissioned officer, a specialist is selected not as an assistant in working with other men, but as a skilled workman especially trained in some trade or occupation. But the status specialist in the Army sometimes influences the selection of suitable men for the noncommissioned grades because of the high pay offered to certain specialists. Under the Pay Act of June 10, 1922, a private first class, specialist draws more pay than a sergeant until both have had over 20 years' service, after which they draw the same. The reason for this is economic. To secure the services of men with the special skill implied by the rating, specialist first class, the Army must pay for the training these men have received prior to enlistment. The sergeant's training has been acquired after enlistment. His value, however, is rising faster than that of the specialist in the first years of their service so that their pay rates meet after 20 years' service. The high rate of pay in the early years of service cause many men who might become excellent noncommissioned officers to choose the specialist rating rather than the noncommissioned officers grade.

But above the grade of sergeant and the rating of specialist first class, both have the same outlet into the noncommissioned staff. Excepting the grade of First Sergeant, the Army has no use for a tactical or line noncommissioned officer above the grade of sergeant. Men of extraordinary special technical ability are given high pay and are called staff, technical, and master sergeants. They might equally well be called specialists, high, extra high, and highest, except for the fact that they usually have certain administrative duties, and control or command small detachments of other men. Because of this function of command they are called noncommissioned officers rather than specialists. A pure specialist up to first class rating has usually no function of control or command. He is essentially a skilled workman. This furnishes the reason for the meeting of grades and ratings at the grade of sergeant and also a basis for the selection of suitable men for each. This paper is concerned only with the selection and training of noncommissioned officers.

The whole military system is built on a responsible chain of command of which the bottom links are the noncommissioned officers. They control and are

responsible for the unit of military power, the individual soldier. Their importance, therefore, cannot be overestimated for as the functioning of the individual soldier is efficient or inefficient, so is that of the company, battalion, regiment, or Army.

The qualifications of a noncommissioned officer have been generally stated as character, intelligence, efficiency, and soldierly bearing. To some extent, the man who becomes a good noncommissioned officer brings these qualifications with him into the service. Especially is this true of character and intelligence. But efficiency, that is, as a noncommissioned officer, and soldierly bearing, can only be acquired in the actual practice of soldiering. Soldierly bearing is made up of:

- (a) Correct posture
- (b) Appearance of firmness and steadfastness
- (c) Impeccable neatness in dress.

Efficiency consists of the proper and timely performance of the duties pertaining to a noncommissioned officer and something else, intangible, yet important, the ability and the will to command. The duties pertaining to the office of noncommissioned officer are:

- (a) Sergeants, Mess, Supply, Motor, etc.
- (b) Section Leaders, and instructors in artillery.
- (c) Platoon Leaders.
- (d) Patrol Leaders.
- (e) Small arms instructors.
- (f) Drill Masters, etc.

Not all noncommissioned officers are suitable for all these duties, and efficiency can usually be obtained only in a part of them.

The selection of men of character and intelligence who can and will acquire a soldierly bearing, and who can and will become efficient in some of the duties of a noncommissioned officer is one of the most important functions of any organization commander. Mental tests will determine a man's intelligence, close observation his character and soldierly bearing, and having found the men possessed of these qualities, it is well worth while to examine them further to see if they can also develop efficiency as noncommissioned officers. This examination is the process of selecting noncommissioned officers.

It is now necessary to examine the War Department regulations on the subject of selecting and appointing noncommissioned officers. These are:

A. R. 615-5—Appointment of all noncommissioned officers except those of the Medical Department.

A. R. 615.15—Appointment of noncommissioned officers of the Medical Department.

This discussion is concerned only with the first, A. R. 615-5. This regulation requires that the candidate must be of such character as to give assurance of strength of character proportional to his responsibilities and that he must be fitted for the duties of the higher grade by reason of having had previous experience in similar work. His appointment is made upon recommendation of his organization commander and determination of qualifications by the appointing authority. These qualifications will be adjudged satisfied if the candidate shall be judged:

- (a) Proficient in the duties of the grade held.
- (b) As familiar with the duties of the higher grade as should be expected considering his opportunities.
- (c) Capable of professional development in the higher grade.

Men to be recommended for promotion can be selected in a number of ways. These are:

- (a) By competitive examination.
- (b) Corporals by competitive examination and sergeants by seniority.
- (c) By rule of thumb, that is, by observation or guesswork.
- (d) By observation and practical tryouts.

Selection by competitive examination seems at first glance to be a good method. But it is a well known fact that ability to do is seldom gauged by a written or oral examination and the noncommissioned officer's job is essentially a doing job. In plan (b) above, the selection of sergeants by seniority is a question often disputed. When possible, no doubt, the senior corporal should be promoted. The man promoted and all his comrades feel that he is entitled to the promotion by virtue of his length of service and experience. But sometimes the senior is manifestly unfit for promotion, possessing the basic qualifications or special qualifications only to a very slight degree. It is then proper to pass him over and select another, preferably the next senior who does possess the necessary qualities. Care must be taken, however, that the selection made is so just and right that the morale of the organization is not lowered by an unsuitable selection. Plan (c) can be passed over as the selection of anything, no matter how trivial, by guesswork is never satisfactory. Plan (d), however, offers all the advantages of the competitive examination method with none of its blind disadvantages. Properly combined with a good seniority rule, it will give a corps of noncommissioned officer material as good as the organization personnel affords.

In following this plan, occasions should be made to try out all men possessed of the basic qualities in command of other men in groups of appropriate size. Opportunities should be made to test them in the performance of some of the technical duties of noncommissioned officers. Sets of minimum specifications should be made up and attainments checked against them. Rating scales may be constructed and records kept of the various tryouts thus creating a list of eligibles of varying degrees and kinds of ability. When a vacancy occurs which necessitates the appointment of a noncommissioned officer, that candidate should be selected whose rating scale shows him to possess the basic qualities in satisfactory degree and the ability to perform or learn rapidly the duties of the vacant office.

Having selected the most suitable men for appointment, organization commanders must give them further training to assure their ability to carry on when the entire duty of the vacant office has been assumed. In general all training falls under two classifications:

- (a) Training by intention.
- (b) Training by absorption.

Training by absorption consists in the acquirement of knowledge and skill by the process of associating with those who have these possessions and learning gradually their knowledge and to copy their skill. This method often produces exceptional men, but in the long run it is wasteful of time and uncertain in its results. Too much depends on the initiative and innate absorbing qualities of the learner.

Training by intention may be carried on in a number of different ways. These are:

- (a) Schools.
- (b) Schools combined with practical work.

(c) Practical work combined with directed effort on the part of the organization commander.

(d) Combination of (a) and (c).

Schools alone will seldom train a man to be proficient in anything except scholastic work. A college graduate is worth a very small salary to the first concern which hires him. Schools combined with practical work have demonstrated their ability to turn out a better trained product than the school alone. If the practical work be coordinated with that of the school as contemplated in plan (d) above, and proper and timely assistance be given in solving the daily problems, the best possible training will result. In practice, in a company or battery, school work will usually be at a minimum. Time does not permit of a very extensive curriculum. The press of daily duties is too heavy. School work may therefore take various forms such as individual instruction, courses of reading, problems bearing on the daily work, etc. Some theoretical instruction (school work) however, should be given. It must not be omitted altogether.

The details of training under plan (d) must be approached by a thorough analysis of the instruction to be given. This instruction falls in two classes:

(a) Information units (things to know).

(b) Unit operations (things to do).

These units should be listed and checked as the learner acquires ability and knowledge in his job. It will be found that the information units can often be taught in the school part of the training while the unit operations come naturally in the performance of daily duties. Thus, when the time of actual appointment comes, a well trained man should be immediately available.

The discussion just completed of the methods of selecting and training non-commissioned officers crystallizes itself into an outline of the best method, or the method which I would use in the selection and training of noncommissioned officers in my battery. This outline is as follows:

I. Selection.

1. Mental tests for intelligence.
2. Observation for character and soldierly bearing.
3. Tryouts for efficiency.
 - (a) Make up minimum specifications.
 - (b) Construct rating scales.
4. Consider seniority, availability, desires of the men concerned as to specialist ratings, etc.
5. Select most suitable and available man.

II. Training.

1. Work out the unit operations and information units of the job.
2. Put the candidate to work.
3. Help him analyze his work.
4. Give him such schooling in the information units of the job as time and opportunity permit.

MILITARY NOTES

furnished by

THE MILITARY INTELLIGENCE DIVISION, G. S.

Great Britain

DISTRIBUTION OF BRITISH REGULAR FORCES ON JANUARY 1, 1925—*Regular Army, including British Army Colonial Units and Indian Army Troops Borrowed*

	Officers	Men	Total
Great Britain	7,125	102,138	109,263
Northern Ireland District	300	4,490	4,790
South Irish Coast Defenses	66	791	857
Rhine	411	8,223	8,634
Egypt	505	10,679	11,184
Sudan	88	2,265	2,713
Palestine	10	111	121
(Including British troops administered by the Air Ministry and excluding Indian Army troops borrowed by the Air Ministry.)			
Iraq	68	1,583	1,651
Cyprus	6	108	114
Africa, West	21	231	252
Bermuda	34	516	550
Ceylon	18	239	257
China, North	35	939	974
China, South	83	1,340	1,423
China, South	15*	769	784
Gibraltar	104	1,902	2,006
Jamaica	45	609	654
Malta	119	1,627	1,746
Mauritius	11	119	130
Straits Settlements	67	1,161	1,228
Miscellaneous	276	443	719
India and Aden	3,389	58,005	61,394
Colonial Units of British Regular Army	64	2,207	2,271

*Indian troops borrowed.

Spain

NEW ORGANIZATION OF THE FOREIGN LEGION—Dario Oficial No. 37 dated February 17, 1925, publishes the new organization of the Foreign Legion, which in the future will be called "Tercio de Marruecos." Very few foreigners, indeed, are now in the ranks of this organization, more than 95 per cent of its members are Spaniards who volunteer for service in this fighting unit.

The "Tercio de Marruecos" will consist of one squadron of cavalry (Lancers), two legions of four "Banderas" (battalions) each, in arms, and one battalion and one troop of cavalry in depot.

The prescribed strength of the units is as follows:

Prescribed strength of "Legion"—One lieutenant colonel, four majors, 18 captains, 68 lieutenants, four captain doctors, four lieutenant doctors, one chap-

lain, four veterinarians. Total, 104 officers, 24 contract employees, 3321 enlisted, 519 animals.

Prescribed strength of "Bandera" (BATTALION)—One major, four captains, 16 lieutenants, one captain doctor, one lieutenant doctor. Total, 23 officers, six contract employees, 807 enlisted, 123 animals.

Prescribed strength of the Cavalry Squadron (Lancers, armed also with carbine).—One captain, four lieutenants, one lieutenant doctor, one veterinarian. Total, seven officers, one contract employee, 159 enlisted, 169 animals. (Squadron divided into four troops).

The total strength prescribed for the "Tercio de Marruecos" is as follows:

	Officers	Contract Empl.	Enlisted	Animals
Headquarters	12	1	75	7
1 Cavalry Squadron (Lancers).....	7	1	159	169
2 Legions in arms.....	208	48	6642	1038
1 Bandera (depot).....	23	6	807	123
1 Cavalry Troop (depot).....	1	---	33	33
Totals.....	251	56	7716	1370

The above 251 officers are: One colonel (Lieutenant Colonel Franco just promoted to colonel), two lieutenant colonels, 10 majors, 45 captains, 161 lieutenants, one band leader, one major doctor, nine captain doctors, 10 lieutenant doctors, two chaplains, nine veterinarians.

The Ministry of War is authorized to increase by 15 per cent the above prescribed strength of the "Tercio de Marruecos" in case of war or very special circumstances.

Czecho-Slovakia

ARMY SKI COMPETITION—Interest in the use of skis in the American Army was greatly stimulated as a result of the intensive training of infantry units at Fort Snelling a year or two ago.

The following description of the recent Czechoslovakian military ski competition in northeast Bohemia should prove of interest to those who followed our own efforts along this line.

The competitions were held daily from February 4th to 8th inclusive, as follows:

February 4—30-kilometer competition, with shooting, for patrols of 3 men.

February 6—8-kilometer obstacle race.

February 7—18-kilometer race.

February 8—Jumping.

Officers and men each form a special category; the champion receives a trophy which he defends in the next annual competition.

The starting point and goal are often identical points. The track is two-thirds on level ground and one-third on rolling terrain. It is kept secret from the competitors until the last moment. The course is marked by poles on which are red markers.

Control patrols are posted at different points; they register the number and time of every passing competitor and indicate the direction; they are forbidden to speak to the competitors.

Competitors are forbidden to use any sort of help (holds, wedges, etc.) and those who give up the race must report to the next control patrol. Competitors

must be at the start at least five minutes before the starting time; the starting intervals, in distance runs, are from one-half to two minutes; the starting order is decided by lot. Short cuts disqualify the competitor.

In obstacle races two-thirds of the course is down-hill and one-third hilly and level; it is plotted in such a way that the competitor is constantly changing his direction. Omission of an obstacle is cause for disqualification. Competitors wear "patrol equipment," that is, carbine, belt with two cartridge pouches containing 30 rounds, bayonet, and haversack.

The 30-kilometer race is for three men ski-patrols, equipment as in preceding paragraph, besides repair parts for competitors. Each patrol must start, proceed and arrive as a body; scattering of members is cause for disqualification. They can help each other as much as they desire. During this race each patrol shoots three times; the targets are falling figures in groups of 13: "head and shoulder" and "head" figures. The ski-patrol fires 30 shots (every man 10) at every target group—a total of 90 shots during the whole run. Cartridges unused are counted as credits if all target figures have been brought down. Any position, with or without rest, is permitted the shooters and an officer is stationed at every target to check up on punctual observance of shooting discipline.

In the jumping competition every competitor jumps three times. Every jump is judged separately with regard to style and length.

The umpires are Czechoslovak officers and men, ski-experts and qualified members of civilian ski clubs.

Only active officers and men are admitted to this competition, but the Ministry of National Defense may permit exceptions to this rule.

ANTI-AIRCRAFT ARTILLERY—In peace time the Czechoslovak Antiaircraft Artillery is organized into three regiments and every regiment consists of three groups; the first and second groups are artillery groups, each with two batteries, the third is "en cadre"; the third group is a searchlight group having two searchlight companies.

The gun in use at present is a 9-cm. D/45 Model 12/20 antiaircraft cannon. In 1925 the 8.35-cm. D/55 Model 22 will be introduced. This model was tested out during 1923-24.

The 9-cm. D/45 Model 12/20 is a gun with sliding barrel, vertical wedge breech action, liquid brake and running-out spring; the gun's slide is constant. The barrel is a mantel barrel of 45-caliber length provided with a right, constant bore. The gun carriage consists of an upper and lower part; the lower part has a pivot and a ball-bearing in which a vertical pivot is set which connects the lower with the upper part of the carriage. The lower part of the carriage is fastened to a wooden support which is embedded in a concrete block.

Russia

MINIATURE ARTILLERY RANGE—The following very interesting description of a miniature artillery range in use at the Odessa Heavy Artillery School may present some new ideas in artillery training.

Miniature targets representing trains, railway stations, tanks, farm houses, batteries, etc., are constructed on a scale of 1/60 natural size in an area of 1200 square arshines (720 square yards). The area is divided up by stakes with labels which indicate the distances from the targets, tens (10 paces) and these run from 40 to 160. Command and auxiliary posts are set up near the edge of the range. Near these are the guns, fitted with panoramic sights. In front of

this, on the body of the gun is a white circle 10.5 inches high, and a white plate or pointer is attached at the muzzle of the gun. The general working of the gun does not necessitate any special training in laying so that, on the order of the Commander, the layer may give the gun the necessary deflection and on the command "Right" or "Left", may alter this, making use of the panorama and the datum point. Having received the target designation from the instructor, normal procedure is as follows: the initial corrections are obtained, the battery is trained on the target, elevation and lateral deflection are obtained, sights are adjusted, base is measured, and adjustment for placing the guns is calculated both for direct and indirect laying. The instructor in charge of practice and his assistants take up their positions at the targets and being close to the battery can hear all orders and observe with binoculars the exact training of the gun. This presents no difficulty as a white circle near the sight and the white patch or pointer on the muzzle show a direct line to the breech (Russian "otvor"). The instructor who indicates the supposed shell burst, stands in prolongation of the breech, that is to say, on the line of site. On hearing the order to lay the gun, he takes post in the rear of the breech, and moves forward or backward until a leaf on the breech coincides with the line on the label on which is given the range ordered.

On the order to fire, and allowing a short time for the flight of the shell, the "indicator" taking note of the scale, raises a small rod with a tuft of wadding at the end to indicate bursting shrapnel or throws down a small clod of earth to show the burst of the shell. He then moves along the base of the designated line of fire, to a flank of the point on which the gun is actually trained, observing this through binoculars, and it is possible for him to plot the actual bursts by means of a graticule.

The indicator must clearly hear and understand the words of command throughout the ranging and must accurately estimate by means of the "leaf" the training of the gun.

The gun crews work with binoculars, as with the naked eye the stereoscopic effect obtained by the panorama sight is lost.

Japan

MILITARY DOGS—The training of the so-called military dogs at the Infantry School practiced during the past six years for the Imperial Army has been attended with such reassuring effect, according to the authorities concerned, that their latest decision is to establish an independent Dog Training Corps after the example of the Pigeon Training Corps at Nakano.

About a dozen dogs of the best stock were imported from France and Germany soon after the great World War, and have been properly trained in all sorts of field service. These dogs will be divided into several groups, each group to be composed of a number of dogs to be shortly imported for the purpose, so that the trained ones may act as guides.

In the coming military maneuvers, these dogs will be employed by the Infantry School Corps in charge of them in order to test their capacities and to find for what line of field service each of the different breeds is best fitted.

GRAND MANEUVERS IN 1925—The Japanese War Department has notified the authorities of the Miyagi Prefectural Office at Sendai (north of Yokohama) that that it has been decided to hold the army grand special maneuvers for 1925 in the Miyagi Prefecture between the middle and end of October. It is reported that the Imperial Grand Division from Tokyo, the 7th Division from Asahigawa,

the 8th Division from Hirosaki, several army air units and a part of the navy will participate. It is announced that the purpose of this year's maneuvers will be to train troops in the defense against an enemy moving south from northern Japan.

NEW TANK COMPANIES—Japanese papers recently announced that the previous plans contained in the army reform bill for the creation of four tank companies had been modified for financial reasons and it is now decided to organize only two companies at a cost of 3,000,000 yen. The two tank companies will have forty tanks of a small and medium size type which will be imported from abroad.

Turkey

NEW MILITARY CAP—A new military cap has recently been adopted for the Turkish Army, which is of general interest due to the fact that for the first time a visor is to be worn. This innovation is significant for, hitherto, Moslem tradition has forbidden any form of headdress which would prevent the wearer touching the ground with his forehead when he prays.

An inexorable law of nature demands physical fitness as a price of enduring existence for humans as well as for the animal world. If nations allow their citizens to degenerate to purely industrial standards of physique, other less cultured but more natural peoples who retain a military standard of physical development will scarcely refrain from taking the opportunity to overturn such a one-sided civilization. History presents many examples of this process. The best of civilian physical trainers must recognize that their standards are modeled after the standards of the military profession.

This by-product of physical training would alone be sufficient to justify our national defense program. Nothing would be better for our young men than that all of them should be required to spend a short period each year in training, receiving the full benefits of physical education and acquiring the habits of self-development that would bring them individually countless returns throughout their lives.—*Annual Report of the Secretary of War.*

COAST ARTILLERY BOARD NOTES

Communications relating to the development or improvement in methods or materiel for the Coast Artillery will be welcome from any member of the Corps or of the service at large. These communications, with models or drawings of devices proposed, may be sent direct to the Coast Artillery Board, Fort Monroe, Virginia, and will receive careful consideration.—R. S. ABBERNETHY, Colonel, C. A. C., President Coast Artillery Board.

New Projects Initiated During the Month of March

Project No. 331, Form for Solution of Trial Shot Problem (A. A.).—This form was prepared by the 62nd Coast Artillery and submitted to the Coast Artillery Board by the Chief of Coast Artillery for recommendation. After study, a few minor changes were made and the forms issued to the 61st, 62nd and 63rd Coast Artillery Regiments for service tests during the coming target practice season.

Project No. 332, Telemeter Coincident with Altitude Attachment (Societe d'Optique et de Mecanique de Haute Precision).—A recommendation has been submitted to the Chief of Coast Artillery that an instrument of this type be purchased and sent to Fort Monroe for test in comparison with the Stereoscopic Telemeter (Societe Optique et Precision de Levallois) (C. A. B. Project No. 219) and Navy Type B. & L. Coincidence Telemeter.

Project No. 333, Test of 155-mm. Trench Mortar Materiel, Model 1920-E.—Materiel is at Fort Eustis. To be tested during the coming summer.

Project No. 334, Ballistic Correction Charts for 12-inch Mortars Using Base Increment Charges.—Complete 12-inch mortar firing tables giving drift, crosswind and range correction values have not yet been supplied for the base increment type powder charge, but they have already been supplied for the new aliquot part type powder charge and the values placed in the latest approved range elevation, deflection and range correction board charts. Some confusion therefore exists at batteries which are supplied with base increment type powder charges and aliquot part type charts and scales. In this project the Coast Artillery Board outlined a method by which this confusion can be eliminated.

Project No. 335, Study of Target Practice Reports of Panama Coast Artillery District for 1923 and 1924.—These reports were forwarded to the Board by the Chief of Coast Artillery for study and comment, special attention to be given to the following points:

- a. The reporting of aerial spots by "Polar Coordinates."
- b. The value of "Fire Adjustment Boards."
- c. The separation of corrections of the moment from "Muzzle velocity corrections."

Completed Projects

Project No. 87, Deflection Board Experimental (All Types Artillery).

(NOTE: Paragraphs 1 to 3i inclusive pertain to Frankford Arsenal design of deflection board, Model 1923-E and are omitted for lack of space).

3j. When the 1923-E Deflection Board was designed in 1922, it appeared that a universal deflection board should have provisions as follows:

	<i>Remarks on Provisions of 1923 Board</i>	<i>Comment in view of present and probable future conditions</i>
(1) Case II and Case III firing.	Acceptable.	Still necessary.
(2) Portable, compact, rugged.	Too heavy.	Still necessary. Weight should not exceed 60 lbs.
(3) Carrying case or box.	None provided.	Should be provided.
(4) Minimum cost.	Quite expensive.	It is hoped a satisfactory, less expensive device is obtainable.
(5) Cross wind and drift corrections.	Acceptable.	Still necessary.
a. Length of chart.	Not sufficient.	Should be 100".
b. Width of chart.	Satisfactory, for scale 1 inch = 1°.	A scale of 1" = 1° is satisfactory. See comment, par. 3h (2) and par. 5.
(6) Group arbitrary corrections.	Satisfactory, except operation of slide.	Still necessary. Minimum correction should be 3° left or right. See par. 5.
(7) Corrected azimuths in terms of azimuths.	Satisfactory.	Still necessary.
(8) Group ballistic corrections, also to be used for rotational corrections.	Group ballistic corrections satisfactory. Rotational correction unsatisfactory. Operation of slide unsatisfactory.	Group ballistic corrections not essential. Rotational correction is essential and should be positive in action and obtained from curves. See comment par. g (1). 4 inches of chart width required. See par. 5.
(9) Corrections for individual guns when guns of a group are widely separated.	Unsatisfactory.	Not considered necessary, but no objection to it. See comment, par. 3d.
(10) Deflections in terms of panoramic sight readings when sight is laid on aiming point.	Satisfactory.	No longer necessary.
(11) Provisions for utilizing both mils and degrees.	Satisfactory.	No longer necessary, but readily obtainable with deflection boards described in pars. 4 and 5 following, should future conditions require it.

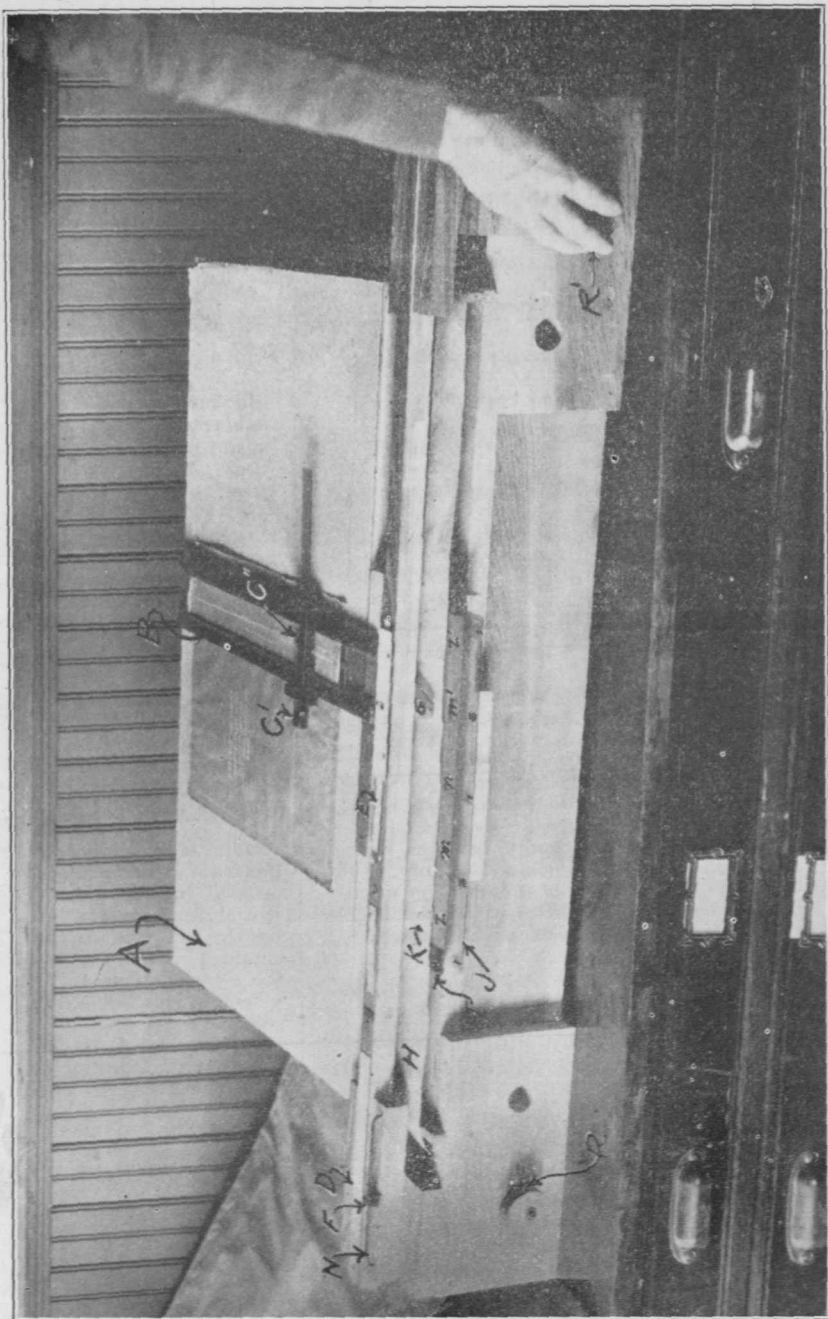


FIG. 1

(2) Since 1922 continued study of the deflection board problem has indicated the desirability of the following provisions in addition to those indicated in column 3 above as being desirable in a universal deflection board: provision for interpolated corrected azimuths for 10 or 15-second intervals and provision for predicting azimuths when occasionally setforward point azimuths are not determined on the plotting board. The desirability of these provisions as well as the reasons advanced in the comments of paragraph *h* (1) make the use of the azimuth tapes, paragraphs 4 and 5, desirable instead of azimuth rollers or cylinders. Having all these considerations in view, the Coast Artillery Board has developed the deflection boards described in paragraphs 4 and 5. The deflection board described in paragraph 4 may be made locally by organizations and could be made at the arsenal inexpensively, cloth azimuth tapes, charts and drawings to be furnished by the Coast Artillery Board, pending manufacture of the final standard arsenal designed device. The deflection board described in paragraph 5 following, has all necessary elements and is suggested for consideration by the Ordnance Department in arriving at the design of a universal deflection board for future arsenal production.

k. It is the opinion of the Coast Artillery Board that the Model 1923-E Deflection Board, under present conditions, is not acceptable as a universal deflection board. As shown above, present conditions are considerably different and offer fewer complications than those the 1923-E Board were designed to meet. Had conditions not changed since 1922, the 1923-E Board probably could be made satisfactory. As conditions are now it is the opinion of the Coast Artillery Board that the 1923-E Deflection Board should not become the future standard type. Its development has served a most useful purpose and the 1923-E Board has justified itself by furnishing the means for determining what it is believed will be a suitable standard universal deflection board for the future.

4. *a.* In connection with the development of a universal deflection board, the Coast Artillery Board has designed a deflection board which meets the requirements indicated in paragraph *j* (1) and (2). A photograph of the board is shown in Figure 1. It can be improvised locally from drawings, charts and cloth azimuth tapes to be furnished by the Coast Artillery Board. It could be constructed at the arsenal comparatively inexpensively, using wood. Cloth azimuth tapes will be satisfactory. It is believed that the board will furnish a basis for the final universal deflection board designed according to the suggestions given in paragraph 5 and pending the development of the standard board could be made at arsenals and issued to batteries not now equipped with suitable deflection boards. *A complete description including the method of operation will be furnished upon request to the Coast Artillery Board.*

* * * * *

It will be noted that whenever zones are changed or whenever the combined wind and drift charts and rotational charts on the board are not correct for particular ranges, it is necessary to change both the combined wind and drift charts and the rotational charts. This is done very quickly and certainly can be done more quickly than the range discs now being placed on certain armament can be shifted. The necessity for changing charts from time to time is considered the most undesirable feature of this particular deflection board and should be eliminated if possible. Future developments will probably include data transmission devices requiring an elevation disc in degrees and hundredths so there need be no delay at the guns as is now the case with 12-inch mortars, when changing zones and should be none because of the deflection board or other fire control devices.

A suggestion for eliminating the defect is made in the deflection board suggested in paragraph 5 following, but the Coast Artillery Board can make no suggestion for eliminating the defect on the board shown in Figure 1.

* * * * *

(4) The Coast Artillery Board believes that deflection boards as shown in Figure 1 of arsenal construction can be made very cheaply and suggests that some of these boards be constructed pending development of the final arsenal type. The Coast Artillery Board especially desires to secure two of these boards for use at Battery Pennington and suggests that the Militia Bureau may find it economical to obtain some of them equipped with mil units in connection with training of 155-mm. G. P. F. organizations. If several of these boards were made at the arsenal and issued to the service it would serve the useful purpose of service tests in addition to those reported in Coast Artillery Board Project No. 316, pending development and issue of a standard Ordnance device. It would be an economical means for temporarily equipping long range batteries not now provided with deflection boards. It is believed this procedure is favored by the Ordnance Department.

(5) The Coast Artillery Board is of the opinion that the above described board would be entirely satisfactory for the future standard device if the wind and drift charts and rotational charts could be placed on rollers capable of a simultaneous movement, but is unable to suggest a means for accomplishing this. The result is accomplished in the device described in paragraph 5.

(6) Pending manufacture and issue of a standard universal deflection board it is suggested that regular organizations not now equipped with suitable deflection boards be authorized to improvise the deflection board shown in Figure 1 from drawings, azimuth tapes and charts to be furnished by the Coast Artillery Board. Many gun batteries are now furnished more than one type of projectile for which appropriate scales for the gun deflection board are not issued. Typical cases are the 14-inch batteries in Panama which are supplied with 1660, 1400 and 1560-pound projectiles. The Commanding Officer, Coast Defenses of Balboa, recently inquired whether appropriate deflection board scales could be furnished to care for these three projectiles. The Coast Artillery Board cannot furnish appropriate scales for the gun deflection board and the simplest temporary solution for the problem seems to be improvisation of the deflection board shown in Figure 1 for which cross wind and drift curves for all 14-inch projectiles can be supplied.

5. Reference is made to Figure 2, attached. This photograph shows a model of deflection board now ready for shipment to Frankford Arsenal.

* * * * *

6. *a. A device for determining deflection board reference numbers for correcting for angular travel of target during the time of flight of the projectile in Case II Firing.*—Reference is made to Figure 3. This device is not essential to the operation of the deflection boards discussed in paragraph 4 and 5 above, but is very convenient in determining the setting of the azimuth tape with reference to the set pointer G in order to correct for the angular travel of target during the time of flight of the projectile in Case II firing. All data for operating this device is secured by the operator, who might well be the wind component operator, from data called out in the plotting room for other purposes. It is to be noted that no device has as yet been furnished for use in Case II firing for determining deflection board reference numbers to correct for angular travel of the target during the time of flight of the projectile. Consequently this phase of

Case II firing has in many cases not been satisfactory. Many different devices have been improvised by battery commanders to solve this angular travel problem, but most of them have been very crude and generally speaking their operation has added considerably to the amount of conversation in the plotting room. It is believed that a standard device for determining reference numbers for angular travel during time of flight should be developed and issued as standard equipment to all batteries using Case II firing, and the fire control methods should contemplate corrections for angular travel being made very frequently instead of infrequently as is now the general practice. *The description and method of operation of this device can be had upon request to the Coast Artillery Board.*

* * * * *

8. It appears to the Coast Artillery Board that deflection boards similar to those described above should be made available for 16-inch howitzers, 16-inch guns, 14-inch guns, long range 12-inch guns, 155-mm. G. P. F.'s and railway arma-

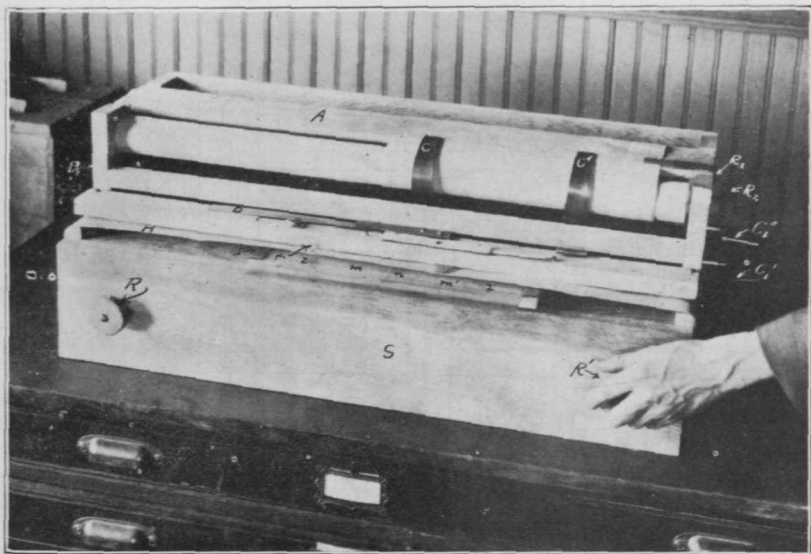


FIG. 2

ment as early as practicable. Pending issue of deflection boards of arsenal manufacture, it is believed that organizations should be authorized to improvise and use the deflection board described in paragraph 4 above. With this in view, it is believed that a description of the board of paragraph 4 should be published in the COAST ARTILLERY JOURNAL.

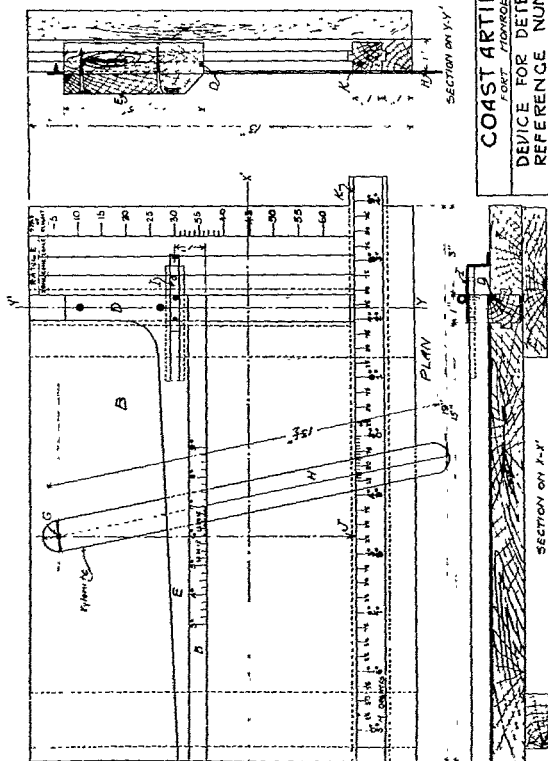
IV—CONCLUSIONS.

9. *a.* That the deflection board, Model 1923-E has served a useful purpose in determining the future design of universal deflection boards, but that no more deflection boards, Model 1923-E, should be manufactured, and that development of a universal deflection board should be along the lines of deflection boards described in paragraphs 4 and 5 above.



TO BE USED WITH SCALE IN INCHES.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100



COAST ARTILLEY BOARD
 FOR DETERMINING DEFLECTION
 REFERENCE NUMBERS FOR ANGULAR
 TRAVEL OF TARGET DURING TIME OF FLIGHT

7 A	7 B	7 C	7 D	7 E	7 F	7 G	7 H	7 I	7 J	7 K	7 L	7 M	7 N	7 O	7 P	7 Q	7 R	7 S	7 T	7 U	7 V	7 W	7 X	7 Y	7 Z	7 AA	7 AB	7 AC	7 AD	7 AE	7 AF	7 AG	7 AH	7 AI	7 AJ	7 AK	7 AL	7 AM	7 AN	7 AO	7 AP	7 AQ	7 AR	7 AS	7 AT	7 AU	7 AV	7 AW	7 AX	7 AY	7 AZ	7 BA	7 BB	7 BC	7 BD	7 BE	7 BF	7 BG	7 BH	7 BI	7 BJ	7 BK	7 BL	7 BM	7 BN	7 BO	7 BP	7 BQ	7 BR	7 BS	7 BT	7 BU	7 BV	7 BW	7 BX	7 BY	7 BZ	7 CA	7 CB	7 CC	7 CD	7 CE	7 CF	7 CG	7 CH	7 CI	7 CJ	7 CK	7 CL	7 CM	7 CN	7 CO	7 CP	7 CQ	7 CR	7 CS	7 CT	7 CU	7 CV	7 CW	7 CX	7 CY	7 CZ	7 DA	7 DB	7 DC	7 DD	7 DE	7 DF	7 DG	7 DH	7 DI	7 DJ	7 DK	7 DL	7 DM	7 DN	7 DO	7 DP	7 DQ	7 DR	7 DS	7 DT	7 DU	7 DV	7 DW	7 DX	7 DY	7 DZ	7 EA	7 EB	7 EC	7 ED	7 EE	7 EF	7 EG	7 EH	7 EI	7 EJ	7 EK	7 EL	7 EM	7 EN	7 EO	7 EP	7 EQ	7 ER	7 ES	7 ET	7 EU	7 EV	7 EW	7 EX	7 EY	7 EZ	7 FA	7 FB	7 FC	7 FD	7 FE	7 FF	7 FG	7 FH	7 FI	7 FJ	7 FK	7 FL	7 FM	7 FN	7 FO	7 FP	7 FQ	7 FR	7 FS	7 FT	7 FU	7 FV	7 FW	7 FX	7 FY	7 FZ	7 GA	7 GB	7 GC	7 GD	7 GE	7 GF	7 GG	7 GH	7 GI	7 GJ	7 GK	7 GL	7 GM	7 GN	7 GO	7 GP	7 GQ	7 GR	7 GS	7 GT	7 GU	7 GV	7 GW	7 GX	7 GY	7 GZ	7 HA	7 HB	7 HC	7 HD	7 HE	7 HF	7 HG	7 HH	7 HI	7 HJ	7 HK	7 HL	7 HM	7 HN	7 HO	7 HP	7 HQ	7 HR	7 HS	7 HT	7 HU	7 HV	7 HW	7 HX	7 HY	7 HZ	7 IA	7 IB	7 IC	7 ID	7 IE	7 IF	7 IG	7 IH	7 II	7 IJ	7 IK	7 IL	7 IM	7 IN	7 IO	7 IP	7 IQ	7 IR	7 IS	7 IT	7 IU	7 IV	7 IW	7 IX	7 IY	7 IZ	7 JA	7 JB	7 JC	7 JD	7 JE	7 JF	7 JG	7 JH	7 JI	7 JJ	7 JK	7 JL	7 JM	7 JN	7 JO	7 JP	7 JQ	7 JR	7 JS	7 JT	7 JU	7 JV	7 JW	7 JX	7 JY	7 JZ	7 KA	7 KB	7 KC	7 KD	7 KE	7 KF	7 KG	7 KH	7 KI	7 KJ	7 KK	7 KL	7 KM	7 KN	7 KO	7 KP	7 KQ	7 KR	7 KS	7 KT	7 KU	7 KV	7 KW	7 KX	7 KY	7 KZ	7 LA	7 LB	7 LC	7 LD	7 LE	7 LF	7 LG	7 LH	7 LI	7 LJ	7 LK	7 LL	7 LM	7 LN	7 LO	7 LP	7 LQ	7 LR	7 LS	7 LT	7 LU	7 LV	7 LW	7 LX	7 LY	7 LZ	7 MA	7 MB	7 MC	7 MD	7 ME	7 MF	7 MG	7 MH	7 MI	7 MJ	7 MK	7 ML	7 MM	7 MN	7 MO	7 MP	7 MQ	7 MR	7 MS	7 MT	7 MU	7 MV	7 MW	7 MX	7 MY	7 MZ	7 NA	7 NB	7 NC	7 ND	7 NE	7 NF	7 NG	7 NH	7 NI	7 NJ	7 NK	7 NL	7 NM	7 NN	7 NO	7 NP	7 NQ	7 NR	7 NS	7 NT	7 NU	7 NV	7 NW	7 NX	7 NY	7 NZ	7 OA	7 OB	7 OC	7 OD	7 OE	7 OF	7 OG	7 OH	7 OI	7 OJ	7 OK	7 OL	7 OM	7 ON	7 OO	7 OP	7 OQ	7 OR	7 OS	7 OT	7 OU	7 OV	7 OW	7 OX	7 OY	7 OZ	7 PA	7 PB	7 PC	7 PD	7 PE	7 PF	7 PG	7 PH	7 PI	7 PJ	7 PK	7 PL	7 PM	7 PN	7 PO	7 PP	7 PQ	7 PR	7 PS	7 PT	7 PU	7 PV	7 PW	7 PX	7 PY	7 PZ	7 QA	7 QB	7 QC	7 QD	7 QE	7 QF	7 QG	7 QH	7 QI	7 QJ	7 QK	7 QL	7 QM	7 QN	7 QO	7 QP	7 QQ	7 QR	7 QS	7 QT	7 QU	7 QV	7 QW	7 QX	7 QY	7 QZ	7 RA	7 RB	7 RC	7 RD	7 RE	7 RF	7 RG	7 RH	7 RI	7 RJ	7 RK	7 RL	7 RM	7 RN	7 RO	7 RP	7 RQ	7 RR	7 RS	7 RT	7 RU	7 RV	7 RW	7 RX	7 RY	7 RZ	7 SA	7 SB	7 SC	7 SD	7 SE	7 SF	7 SG	7 SH	7 SI	7 SJ	7 SK	7 SL	7 SM	7 SN	7 SO	7 SP	7 SQ	7 SR	7 SS	7 ST	7 SU	7 SV	7 SW	7 SX	7 SY	7 SZ	7 TA	7 TB	7 TC	7 TD	7 TE	7 TF	7 TG	7 TH	7 TI	7 TJ	7 TK	7 TL	7 TM	7 TN	7 TO	7 TP	7 TQ	7 TR	7 TS	7 TU	7 TV	7 TW	7 TX	7 TY	7 TZ	7 UA	7 UB	7 UC	7 UD	7 UE	7 UF	7 UG	7 UH	7 UI	7 UJ	7 UK	7 UL	7 UM	7 UN	7 UO	7 UP	7 UQ	7 UR	7 US	7 UT	7 UY	7 UZ	7 VA	7 VB	7 VC	7 VD	7 VE	7 VF	7 VG	7 VH	7 VI	7 VJ	7 VK	7 VL	7 VM	7 VN	7 VO	7 VP	7 VQ	7 VR	7 VS	7 VT	7 VU	7 VV	7 VW	7 VX	7 VY	7 VZ	7 WA	7 WB	7 WC	7 WD	7 WE	7 WF	7 WG	7 WH	7 WI	7 WJ	7 WK	7 WL	7 WM	7 WN	7 WO	7 WP	7 WQ	7 WR	7 WS	7 WT	7 WU	7 WV	7 WW	7 WX	7 WY	7 WZ	7 XA	7 XB	7 XC	7 XD	7 XE	7 XF	7 XG	7 XH	7 XI	7 XJ	7 XK	7 XL	7 XM	7 XN	7 XO	7 XP	7 XQ	7 XR	7 XS	7 XT	7 XU	7 XV	7 XW	7 XX	7 XY	7 XZ	7 YA	7 YB	7 YC	7 YD	7 YE	7 YF	7 YG	7 YH	7 YI	7 YJ	7 YK	7 YL	7 YM	7 YN	7 YO	7 YP	7 YQ	7 YR	7 YS	7 YT	7 YU	7 YV	7 YW	7 YX	7 YY	7 YZ	7 ZA	7 ZB	7 ZC	7 ZD	7 ZE	7 ZF	7 ZG	7 ZH	7 ZI	7 ZJ	7 ZK	7 ZL	7 ZM	7 ZN	7 ZO	7 ZP	7 ZQ	7 ZR	7 ZS	7 ZT	7 ZU	7 ZV	7 ZW	7 ZX	7 ZY	7 ZZ
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Fig. 8

V—RECOMMENDATIONS.

10. It is recommended:

a. That no more Mortar Deflection Boards, Model 1906, nor gun deflection boards, be manufactured.

b. That a limited number of the deflection boards described in paragraph 4 above be manufactured at the arsenal and furnished for use at long range batteries, now being placed in service, pending issue of the final standard device. It is particularly desirable to furnish two of the boards to Battery Pennington, two to the 51st Coast Artillery and two to the 52nd Coast Artillery. This procedure will not only satisfactorily equip the batteries concerned pending the manufacture of a future standard deflection board, but will serve to give additional service tests of the principles of the proposed standard device and expedite action on it when furnished for test.

c. That regular organizations be authorized, but not required to improvise the deflection board described in paragraph 4 above; drawings, charts and azimuth tapes to be furnished by the Coast Artillery Board.

d. That a description of the deflection board described in paragraph 4, and of the angular travel correction device described in paragraph 6, with the action of the Chief of Coast Artillery on this project, be published in the COAST ARTILLERY JOURNAL.

e. That the Ordnance Department manufacture for service test at least one deflection board similar to that described in paragraph 5 and based upon considerations discussed in paragraphs 3, 4 and 5.

f. That an angular travel correction device similar to that described in paragraph 6 be manufactured for service tests with a view to issue as standard equipment for armament using Case II firing in connection with the standard deflection board, paragraph 7 e. That pending issue of a standard device organizations be authorized to improvise them for use with improvised deflection board described in paragraph 4 above.

g. That the Coast Artillery Board be authorized to ship by express to Frankford Arsenal a model of the deflection board described in paragraph 4 above and a model of the deflection board described in paragraph 5 above.

h. That arrangements be made to permit a member of the Coast Artillery Board to visit Frankford Arsenal for conference when arsenal studies of the suggestions in this project have reached a stage where a conference would be helpful. This will be made the subject of a separate letter.

VI—ACTION BY CHIEF OF COAST ARTILLERY.

665/AH-5

First Indorsement

War Department, O. C. C. A., March 12, 1925—To Chief of Ordnance:

1. The recommendations contained in the attached copy of Report of Proceedings of the Coast Artillery Board on Project No. 87, Deflection Board, Experimental (all types of Artillery), are concurred in.

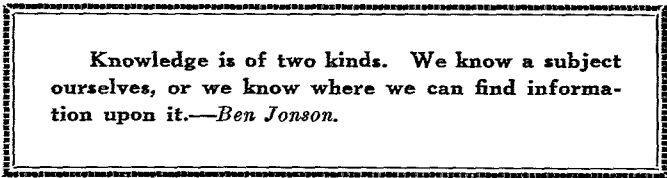
2. It is especially desired to carry into effect the recommendations contained in paragraph 10 (b) under the heading "V Recommendations" of the proceedings provided funds can be made available. It is, therefore, requested that you furnish this office an estimate of the funds required to manufacture the six boards in question. In order to keep down the cost of manufacture, it is suggested that these boards be made quite similar to the model submitted with only such refinements as are absolutely necessary. Some drag arrangement such as proposed in paragraph 4f (1), page 12, of the attached proceedings, should be provided for.

3. It is requested that an estimate of the cost of manufacture of one board, as proposed in paragraph 10 (e), under the heading "V Recommendations" be furnished and that this office be informed as to when earliest delivery of such a board might be expected.

4. It is also requested that an estimate of the cost of manufacture of an angular travel correction device similar to that described in paragraph 6 be furnished.

5. It is understood that the Chief of Ordnance will be glad to have the models, referred to in paragraph 10 (g), under the heading "V Recommendations", shipped to Frankford Arsenal and the Coast Artillery Board has been so informed and directed to make the shipment.

6. It is requested that this office be notified when the studies resulting from this project have reached a stage where a conference between a member of the Coast Artillery Board and the authorities at Frankford Arsenal would be desirable and of benefit.



Knowledge is of two kinds. We know a subject ourselves, or we know where we can find information upon it.—*Ben Jonson.*

BOOK REVIEWS

War Work. Published by the Historical Section of the German Government's Record Office.

Numbers 21 and 22 of the *Militär-Wochenblatt* for 1924 contain a very interesting and informative article by Major General D. von Borries of the former German army, giving a synoptical review and outline of the character and scope of a work on the World War being prepared and published under the auspices of the historical section of the Record Office or "Bureau of Archives" of the German government. Two volumes have made their appearance and it is stated that a third will be issued in the autumn of 1925 and a fourth about one year later and thereafter at approximately one-year intervals until the work is completed.

The first volume gives in its introductory, an outline of Germany's situation and condition immediately preceding the war and of circumstances that led to its outbreak. This is followed by a presentation of mobilization measures and activities by Germany and its allied nationalities. Chapters following are headed: "Mobilization of Our Western Opponents", "Historical Development of Ideas for the West Front", "The Plan of Campaign for 1914", "The Approach March to the Western Frontier", and then come accounts of the initial campaign through Belgium and northern France and the "Boundary" battles incident thereto, up to movements immediately preceding the battles on the Marne. The battle of the Marne itself is to be taken up in Volume 3, to appear the latter part of 1926.

The second volume, now out, takes up the German-Russian campaigns and battles in East Prussia, including an account of the mobilization of the German and Russian forces in that region and the battles of Gumbinnen, Tannenberg and those among the Masurian Lakes in the latter part of September, 1914. The fourth volume, due in the fall of 1926, will cover the German campaigns and battles conducted in part independently and in part in connection with their Austro-Hungarian allies during the year 1915 in the East.

The editors of the work state that the work of arranging and collecting the material for it was begun and carried on during the war and subsequently by the historical section of the former Great General Staff of the German Army and was continued by that organization until it was dissolved by the Treaty of Versailles, when it was transferred to a board of civilian experts working under the direction and supervision of the National Bureau of Records of the present German government. It is stated that the work is well provided with explanatory charts and maps in the body of the text and in the way of accompanying appendages for which provision has been made.

The work is claimed to be strictly military, free from discussion and comment on controversial political subjects and confined to an accurate and truthful relation of events and incidents of the war, based upon careful selection and sifting of information obtained from written and verbal statements of partici-

pants on both sides, supplemented by personal conferences and discussions with prominent personalities on mooted points, from all available official records and from every possible source that gave promise of reliable information that would throw light on the subject. Promise is held out of a supplementary volume, to appear in the near future, that will give an account of the general condition and characteristics of the German army as it was at the outbreak of the war and of its strength, armament, organization and equipment.

The range of the World War was so great that only large bodies of troops, armies, army corps and divisions could be given consideration in this work. In this respect the "War Work" differs from war histories heretofore prepared and issued by the historical section of the German General Staff. Those took cognizance of acts of companies, squadrons, batteries and even of isolated patrols; such actions had to be excluded because to have included them would have brought the work to immeasurable dimensions. Besides the activities of smaller units have been and are still being given publicity by publications issued under the auspices and direction of the governments of the separate states of the German republic and to a larger extent by regimental, battery, squadron and other minor units that took part in the war.

The editorial direction of this work has aimed to present in a grand general outline the operations and accomplishments of the higher leaders and of the fighting actions of the troops. The prominent significance of leadership personality is brought out in its proper light; peculiarities of character are handled with discretion; nothing is hushed up, evaded or kept secret. Rigid truthfulness, without bias or prejudice is aimed at. The fateful effects of acts of individual leaders or of their failure to act appears in full illumination. The form chosen is that of permitting leaders to appear by the records they themselves made, thus leaving it to the leader to shape his judgment. Reverses and failures on the part of troops are not suppressed. It is specially emphasized that the "War Work" is not a critique of the acts of individuals; controversial criticisms are avoided. The pros and cons of circumstances and situations are stated and, as above noted, criticisms are left to the reader. But in that connection the editors make significant allusion to a remark of the former Field Marshal General, the elder von Moltke, when he says: "A good criticism must not take, as the measure of its judgment, the later course of things nor of circumstances as they appear later on, *but must inquire: what could the directors of events know about them when they were called upon to act.*" That line of direction has been followed in the work, not only in presenting the decisions of leaders but in comments thereon. This has resulted in not amalgamating the German war activities with their relations to those of the enemy; *the reader learns about the enemy only that which the German leader knew or surmised about him at that instant or time.* Reports referring to the enemy are given in special separate paragraphs that are appended to the German conduct of the war. The activities of subordinate leaders, when brought in, are also kept separate in a similar manner.

In further reference to the subject of passing judgment and criticism, it is emphasized that this "War Work" is not of a critical character. That has been purposely avoided. It is admitted that the objective sought for is not complete and cannot be so. Wherever, in reviews of conclusions on detailed operations the pros and cons are discussed, judgments of actions may be discerned by the reader though such judgment is not expressed. In addition, the Bureau of Records takes the stand that the time for conclusive criticism has not yet arrived. There are still numerous notations made by personalities who occupied positions

of leadership the use of which have not been made freely available, neither have the enemy's records been yet fully disclosed.

From the outline of General von Borries' review herein above given and from a number of salient extracts contained in and discussed and commented upon in his article, it is quite evident that this "War Work" will be of great interest and value to every student and even to the casual reader of the history of the World War, and no doubt more informative in aiding to give to such readers a true picture of that war than were many of the "Recollections", "Memoirs", "Personal Experiences", and "Histories" of the war that have been written by more or less prominent participants and non-participants in the war.

It is to be hoped that the whole or at least some salient portions of this work will in future be available in English translation to readers not familiar with the German language.

Economics of Motor Transportation. By George W. Grupp. D. Appleton & Co., New York. 1924. 6"x 9". 414 pages, with index. Price, \$4.00.

This volume treats of the economic features of the utilization of the newest comer in the field of transportation—the motor truck. The book is filled with statistics, tables and formulae and analyzes separately each of the economic features of motor transportation. Some of the questions treated at length are: when to use the horse, railroad or motor truck; the selection of motor truck equipment suitable to the special needs of the operator; the organization and administration of a large fleet of trucks; truck operation; loading and unloading; roads and routing; maintenance and inspection. The volume contains a well arranged chapter giving a compilation of all States' laws affecting motor trucks. Altogether a reference of the highest character for the student of transportation economics.

Why Defend the Nation? By Colonel Frank D. Ely. Laird and Lee, Inc., Chicago. 5½"x 7¾". 94 pp. \$1.00.

Colonel Ely's work is interesting, instructive, clear, and brief. In it he treats a subject of vital interest to every American citizen. This he has done in a most enlightening manner. Three appendices, one being an address delivered by the Secretary of War before the Boston Chamber of Commerce, make a valuable addition to the book.

He has dedicated it to The American Boy and it is hoped that before these boys have reached the age of manhood they will have studied and digested the thoughts brought out by Colonel Ely. Such procedure would insure our future safety. However, this must be permanent insurance and it is essential that all of us appreciate the fact *now*. Read it yourself and see that your friends read it, too.

America's Place in the World. By Herbert Adams Gibbons. The Century Co., publishers. 223 pages. Price, \$2.00.

The American is very likely to decide for himself matters of national import entirely without regard to considerations of history and precedent and the logical deductions to be made therefrom. The League of Nations, for example. We are protagonists thereof or we are disbelievers, but too few of us can justify our stand by any reasoning other than personal prejudice.

Mr. Gibbons, it is true, does not appear to be without strong personal feeling in his treatment of national questions, but his conclusions are based on a logical

consideration of pertinent facts from the past, briefly and admirably presented. "America's Place in the World" is very readable and presents without embellishment or a great waving of the flag, those national and international questions that every citizen should be considering in this day of world turmoil. Whether Mr. Gibbons convinces the reader or whether he fails to do so, he performs a great service in presenting so concisely, for the reader's benefit, the enormous political and historical field which he covers.

Intimate Character Sketches of Abraham Lincoln. By Henry B. Rankin. J. P. Lippincott Co., Philadelphia. 1924. 5½"x 8½". 344 pp. \$3.00.

Fifty-eight years after Lincoln's untimely death, Mr. Rankin has written this series of twenty-three sketches. The author, who had the privilege of knowing Mr. Lincoln, was, for several years, a law student in the office of Lincoln and Herndon and, as such, had many opportunities to observe both members of the firm. In his work he gives many interesting word pictures of the junior member.

It is to be regretted that Mr. Rankin postponed the writing of his book until such a late date.

The sketches are most interesting and from them the reader will obtain not only an insight into the character of Lincoln but also pictures of Mrs. Lincoln and Mr. Herndon as well as a view of the politics of the times.

Several heretofore unpublished photographs are added.

The physical configuration of the earth has separated us from all the Old World, but the common brotherhood of man, the highest law of all our being, has united us by inseparable bonds with all humanity. Our country represents nothing but peaceful intentions toward all the earth, but it ought not to fail to maintain such a military force as comports with the dignity and security of a great people. It ought to be a balanced force, intensely modern, capable of defense by sea and land, beneath the surface and in the air. But it should be so conducted that all the world may see in it not a menace but an instrument of security and peace.—*Inauguration Address of President Coolidge.*



MAJOR GENERAL ARTHUR MURRAY
Chief of Coast Artillery, 1907-1911