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EDITED BY
WILLIAM C. HOUGHTON
MAJOR, FIELD ARTILLERY, UNITED STATES ARMY

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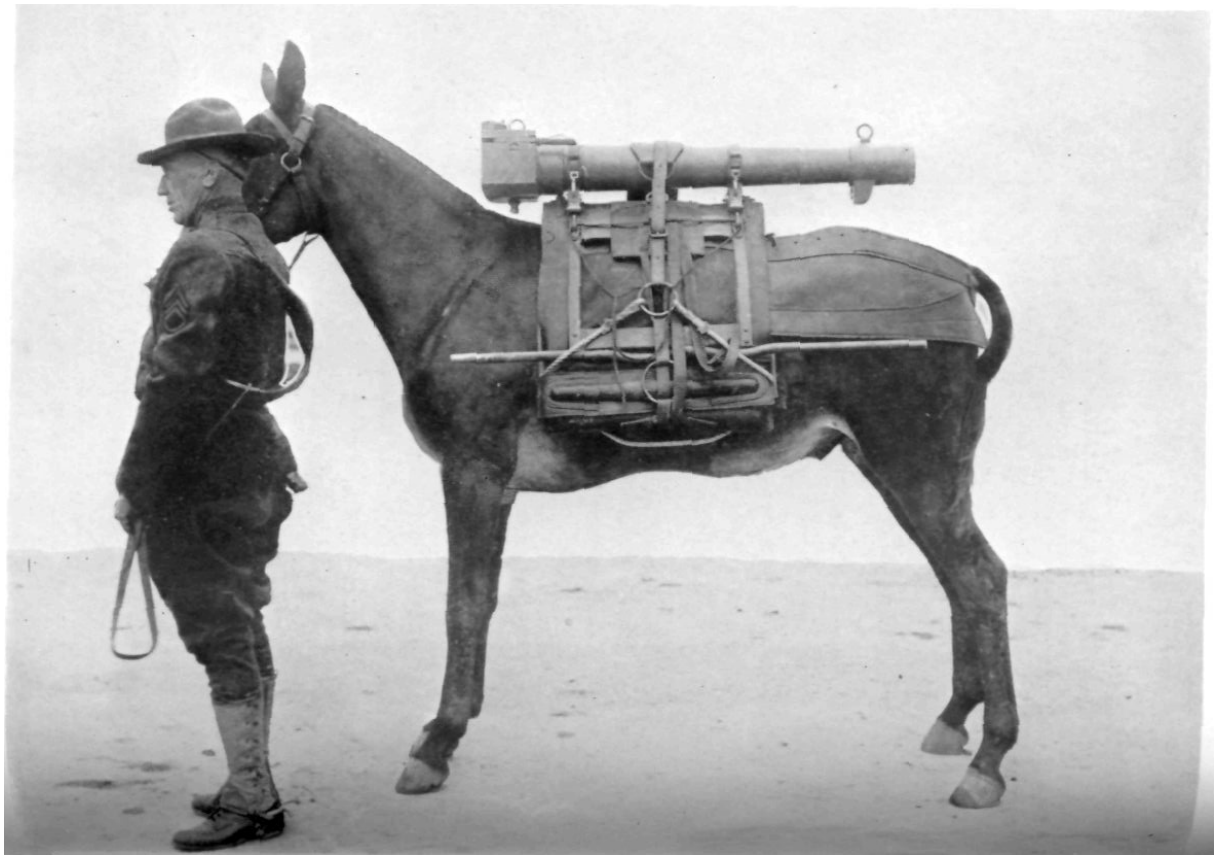

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THE MOUNTAIN BATTERY SONG

Fall in, fall in, attention, you red-legged mountaineers,
With your gun and pack and box of tack, non-coms and cannoneers;
Baptized in Mindanao beside the Sulu Sea,
With a tow and a tow and a tow, row, row, from a mountain battery;
With a tow and a tow and a tow, row, row, from a mountain battery.

I'd rather be a soldier with a mule and a mountain gun,
Than a knight of old with spurs of gold, a Roman, Greek or Hun;
For when there's something doing, they always send for me,
To start the row with a tow, row, row, from a mountain battery;
To start the row with a tow, row, row, from a mountain battery.

Here's to pack and aparejo, to cradle, gun and trail;
To the darned old fool, the battery mule, that's never known to fail.
Then lift your glasses high and drink this toast with me:
Here's a how, and a how, and a how, how, how, to a mountain battery;
Here's a how, and a how, and a how, how, how, to the mountain battery.

HORSES, TRACTORS AND SELF-PROPELLED MOUNTS

A REPORT OF COMPARATIVE TESTS OF 75-MM. GUN—105-MM. HOWITZER MOTOR CARRIAGE, MODEL 1921 (CHRISTIE), AND 75-MM. GUN—105-MM. HOWITZER MOTOR CARRIAGE, MODEL 1920 (HOLT MARK VI), IN COMPARISON WITH EACH OTHER AND WITH HORSE-DRAWN AND TRACTOR-DRAWN DIVISIONAL GUNS

THE FIELD ARTILLERY BOARD PREPARED THIS REPORT, CONDUCTING TESTS FROM JANUARY TO JUNE OF THIS YEAR. THE OBJECTS SOUGHT WERE TO DETERMINE THE TACTICAL USEFULNESS, IF ANY, OF SELF-PROPELLED MOUNTS FOR LIGHT GUNS AND HOWITZERS; TO DETERMINE THE COMPARATIVE ADVANTAGES OF THE HOLT MARE VI AND THE CHRISTIE PRINCIPLES OF DESIGN; A COMPARATIVE STUDY OF THE SELF-PROPELLED TYPE AND HORSE-DRAWN FIELD ARTILLERY; AND A COMPARATIVE STUDY OF THE SELF-PROPELLED TYPE AND TRACTOR-DRAWN FIELD ARTILLERY.

THE mobility and tactical tests covered by this report, being largely comparative in purpose, were carried on simultaneously with the Christie and the Mark VI, Holt mounts, which were run over the same routes and were called on for the same tasks, except where failure of one or the other of these mounts during, or prior to a test, rendered it necessary to eliminate it from that particular test. In this connection, it seems proper to invite attention to the fact that, as shown in the individual reports transmitted herewith, such failures manifested themselves more often in the Christie than in the Holt Mark VI.

In the conduct of these tests and in the preparation of its report, the Board gave, it is believed, all due consideration to the fact that both of these self-propelled mounts were in a partly worn-out condition when received at this post; and that both required extensive repairs in the Ordnance shops before tests could be begun. Further, in the conduct of the tests, the Board has followed so far as available facilities and the limitations of the vehicles would permit, the test programme originally prepared and submitted to the Chief of Field Artillery. This programme, the Board has regarded as the approved scheme of test as it was never directed to be departed from except in one minor particular.

Also, in its study of this subject, the Board has made every effort to arrive at what may be called the genesis of the idea of self-propelled mounts in the American service, to the end that it might the more intelligently consider and comprehend the reasons for the design and development of such mounts as given in the proceedings

of the Calibre Board. In its study of this feature of its problem, the Field Artillery Board has found nothing that seemed so detailed, authoritative, or conclusive as two papers prepared by Lieutenant Colonel A. M. Chase, Ordnance Department, and transmitted, under date of March 19, 1919, from the Office, Chief Ordnance Officer, Hdqrs. S.O.S., A.E.F., to the Chief of Ordnance, Washington, D. C. The first of these papers is a lecture delivered at the Army Centre of Artillery Studies at Treves, March 8, 1919, and the second is a supplementary paper covering more fully "the points raised in the discussion of the S.P.C.G.M. (self-propelled caterpillar gun mount) which took place during the reading of the first paper." Appended to the supplementary paper is one prepared by General St. Claire Deville, Inspector General of Artillery, French Army.

Insofar as they relate to self-propelled mounts and tractorized artillery, rather than to motor transport in general, the Board must later take occasions to consider the above-mentioned papers at some length; since, to a much greater extent than anything else it could find, they at least seem, as already stated, to contain the genesis of the idea. To what extent, if any, these papers, or the views they set forth, may have influenced the recommendations of the Calibre Board, it is beyond the province of the Field Artillery Board to speculate. Any consideration of the exact purpose for which they were originally prepared is foreign to the issue presented to the Field Artillery Board. It seems proper, if not essential, however, that the Board should set forth at this time its view that these papers, more particularly perhaps those of Colonel Chase, are remarkably able pieces of special pleading, in which it is attempted to arrive at a solution of most important and difficult problems by a too hasty process of reasoning, based upon a consideration of only half truths, and of impressions and opinions of questionable value that are considered as established facts. While there are in these papers much that is true and much that is able, they contain many tactical deductions, direct or inferential, with which the Board is entirely unable to concur.

These preliminary considerations of the views, plans and methods of the Board, have seemed to it more or less essential to a proper appreciation of the body of the report.

It was the purpose of the Board, in accordance with what may be considered the approved test programme to have its tests cover:

1. Critical examination of carriages.
2. Mobility tests.
3. Tactical tests.

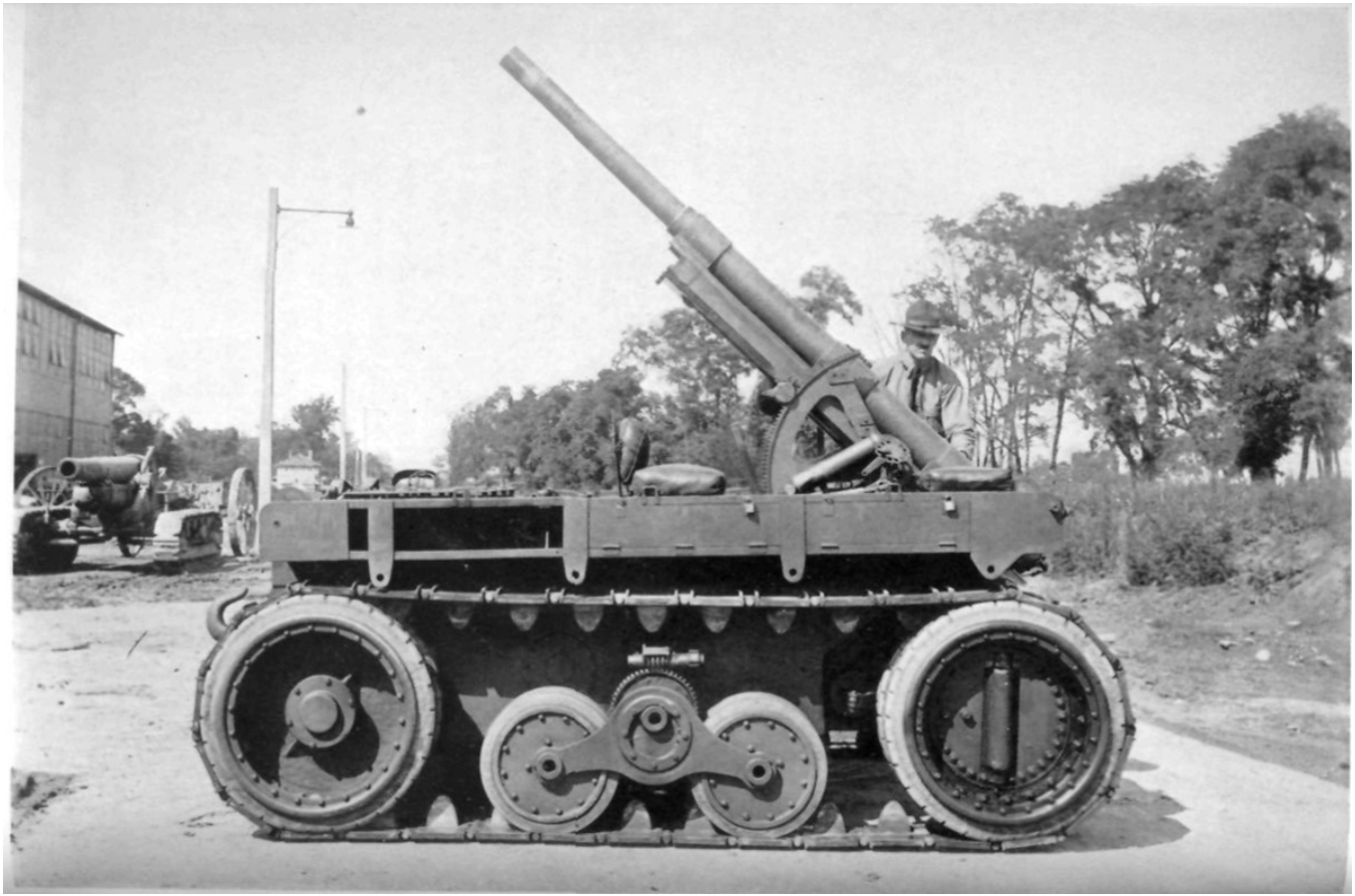
The critical examination of carriages, being covered at length in the individual reports, are best omitted from this paper. The mobility and tactical tests, conducted in part separately and in part simultaneously, were designed to throw light especially upon the following points under the *mobility heading:*

(*a*) Ability to hold road.
(*b*) Noise and visibility.
(*c*) Comfort of crew.
(*d*) Time to change from wheels to track and *vice versa* (Christie).
(*e*) Effect of barbed wire and obstacles on Christie tires.
(*f*) Condition of Christie tires after running on track.
(*g*) Ability to run at low speeds.
(*h*) Ability to run at side of road.
(*i*) Stopping and backing.
(*j*) Ability of Christie to manœuvre in either direction.
(*k*) Action in passing road blocks.
(*l*) Comparative distances and time involved.
(*m*) Time required to harness and bring up teams.

(*a*) In initial tests to determine the ability of these self-propelled mounts to travel at considerable speeds over good roads, it developed, incidentally, that the Christie would not hold the road when on wheels. The separate report on the Christie states in this connection: "Twenty miles were travelled over concrete, gravel and sand-clay surfaced roads. The Christie mount operated well without tracks over concrete and gravel-surfaced roads. In passing over soft places, the centre wheels, although raised to their highest point, would strike the ground and thus cause difficulty in steering. On clay roads which are considered as improved roads in this section of the country, the wheels broke through the surface to such an extent that it was impossible to operate without tracks. It was not possible to turn out to one side on the surfaced roads with the Christie mount, as the wheels would bury on the side of the road bed. A nine-ton vehicle on wheels is clearly not fit for operation over anything but good macadam or concrete roads, or sand-clay roads in very dry seasons of the year. Even then it has to 'hog' the greater part of the available space except on very broad boulevards."

On the twenty-mile run referred to the Mark VI mount failed to cover quite half the distance, but operated satisfactorily while it operated at all. On a subsequent date a test was conducted expressly to determine the road holding ability of these mounts. The Christie slid off into the ditch when attempting to pass another vehicle stalled in the middle of the road. The Mark VI passed the

HOLT SELF-PROPELLED MOUNT



CHRISTIE SELF-PROPELLED MOUNT

stalled vehicle without trouble and towed the Christie out of its difficulties. In this connection, it should be stated that accompanying motor cars also turned the stalled vehicle without trouble.

(*b*) With tracks removed, the Christie makes no more noise than an ordinary truck. With tracks installed, the Mark VI and the Christie are both equally noisy, though possibly no more noisy than an ordinary five or ten-ton tractor. Neither could possibly operate on a still night within 2500 yards of a listener without being heard. It is much to be regretted that neither of these vehicles can be included in a sound-ranging test now in contemplation by the Field Artillery Board.

So far as visibility is concerned, it was not possible to conduct any satisfactory tests as no facilities were available for taking aerial photographs. So far as terrestrial observation alone is concerned, tests indicated that the Mark VI and Christie mounts are equally visible, that both have *less* visibility than a horse-drawn and more visibility than a small tractor-drawn gun. This assumes that the mounts are not giving off smoke when being observed. It should be noted, however, that both mounts usually *do* give off a very excessive amount of smoke.

(*c*) So far as the comfort of crew is concerned, it is a measure of the relative discomfort and not of comfort that must be considered. There is no comfort with either mount. The Mark VI occasions less discomfort than does the Christie. On neither mount is any provision made for a gun detachment. Neither the human frame nor the ammunition are designed to withstand the heat generated by either machine. Men will of necessity pay the penalty of burned clothing and blistered tissue; powder, from great increase in temperature will possibly develop dangerously high velocities. In this connection, attention is invited to the fact that there is no reason to suppose that ammunition boxes would remain in place on either mount when going over bad country.

(*d*) The log reports attached to individual reports show that from 45 minutes to one hour are required for changing from wheels to tracks if operating personnel—two men—do the work. If extra men are carried, which necessitates additional vehicles, the time required may be reduced. The Holt being on tracks at all times does not have this fault. It must be understood that unless the Christie be on reasonably hard and level ground, it is practically impossible to effect the change from wheels to tracks at all. The necessity for the change must be foreseen; and it must be effected on favorable ground and before it becomes necessary.

(*e*) and (*f*) The effect of barbed wire and obstacles on Christie tires was not tested. The vehicle could not be operated

enough to produce any appreciable wear on the tires or get it to where suitable obstacles, as shell holes, could be found. The rubber pads on track shoes of the Mark VI, Holt were practically all worn off when the vehicle was received here from Fort Sill.

(*g*) and (*h*) The ability of these mounts to run at low speeds and at the side of road was thoroughly tested in two runs designed primarily to determine their possibilities, first, as part of a column (Infantry) moving over a route requiring detours; and second, their tactical possibilities in running a considerable distance over good roads and then moving a short distance across country to position. In the first test, they were accompanied by a horse-drawn section, and by Holt T-35's and Fordson's, each pulling one-axle loads. The divisional tractors were not in condition to participate in this test. In the second test they were accompanied by trucks carrying 75-mm. guns and caissons, Fordson and T-35 tractors and pulling water carts, and other trailers. In the first test, it was contemplated to march at from two to two and one-half miles per hour for five hours, with ten minutes halts per hour; occasionally turning off the road for greater or less distances to simulate the making of longer or shortage detours around road blocks from varying causes. In this test, both the Mark VI and the Christie failed absolutely; the latter going out of the test at the first detour. Both overheated to a crippling extent as a result of the low speed. The light tractors functioned much better than did the Mark VI; but all proved distinctly inferior in mobility and certainty of action off the roads to the horse-drawn section. In the second test, it was contemplated to run these mounts on roads, in general, very good for this section of the country, for a distance of some fifty miles and then operate them across country to selected positions. Both the Mark VI and the Christie failed absolutely on this test; also one was about as bad as the other. Overheating and mechanical difficulties were responsible for the failures. These self-propelled mounts took practically all day to make 30, and six hours to make 24 miles. It should be distinctly pointed out that no restrictions were placed upon the speed at which they were to travel; and that an entire regiment of horse-drawn artillery, with its trains, could have made the entire 30 miles, the good roads being considered, in not much over six hours; and this without damage to matériel or animals in good condition. It should also be pointed out that on the following day, when attempting to make the return trip, neither self-propelled mount succeeded in getting back to the post. The Mark VI made a total of 18 miles on the return trip while the Christie was able to make only one. Both finally had to be towed

back by tractors. The trucks, carrying light tractors, 75-mm. guns and caissons, and pulling trailers, made the entire distance without trouble; and, when released from the self-propelled mounts, at a good speed.

(*i*) and (*j*) Both self-propelled mounts were entirely satisfactory in stopping and backing. The Christie, if anything, travelled more satisfactorily when in reverse than when going forward.

(*k*) The remarks under previous headings seem sufficient to demonstrate that in the matter of passing road blocks, the Mark VI is inferior to the horse-drawn gun; and that the Christie mount is possessed of only very limited power in this respect.

(*l*) No comparative records were kept under this heading; since, under it, the Christie mount was hopelessly outclassed by the Holt Mark VI, which was, in its turn, almost as badly outclassed, so far as certainty of performance is concerned, by a horse-drawn section.

(*m*) In view of the general unreliability of the motors of both self-propelled mounts, it seemed useless to make any records under this heading. The time required to harness teams and bring them up will depend largely upon the distance by which they are separated from the guns. The time required to start a cold motor—unless it be too cold—does not differ materially from the time required to harness the teams. If, however, the motors be overheated, which after any great amount of difficult going they ordinarily were, it is usually impossible to start them at all until after they cool. This not infrequently took an hour or more; and sometimes it was necessary to start them with another tractor.

Under the *tactical heading*, the mobility and tactical tests, which as before stated were conducted in part separately and in part simultaneously, were designed to throw light especially upon the following points:

(*a*) Use as accompanying guns.
(*b*) Use as reënforcing artillery.
(*c*) Use as roving guns.
(*d*) Use as divisional batteries.
(*e*) Visibility of trails in air photographs.
(*f*) Visibility and defilade required in each case (day and night).
(*g*) Ability to march with infantry.
(*h*) Ammunition supply and replacement.
(*i*) Gas and oil supply and replacement.
(*j*) Ease in transport by rail and water.

In addition to many other tests and requirements, which lack of facilities or total unsuitability of the mounts prevented the Board from carrying out, there may be added to the above list.

(*k*) At the conclusion of *g* under mobility heading assume a tactical situation which will require a daylight change of position with observers in assumed enemy O.P.'s reporting everything seen or heard. Same problem to be assumed and executed at night, motors being cold at the start, sections to move forward to assumed advanced positions over obstacles such as shell holes, trenches, wire or accidents of the terrain, limbers and tractors being in proper tactical positions at start of test.

(*l*) Test comparative ability to change front of firing battery by hand and with self-propelled mounts, motors of the latter being cold.

(*m*) Assume a tank problem requiring the occupation of a position from readiness. Motor mounts, tractor-drawn and horse-drawn guns to solve same problem in turn (actual firing).

(*n*) Each motor mount being disabled, mired and ditched, test ability of the other mount to get it out of difficulty and into position.

(*a*), (*b*), (*c*) and (*d*). These headings will be discussed at length subsequently.

(*e*) No air photos were taken because facilities were not available. The Christie and the Mark VI, Holt make tracks in the sandy soil of this locality that have about the same visibility as those made by a five-ton tractor.

(*f*) No material difference as to visibility or of defilade required by the two self-propelled mounts.

(*g*) Covered under mobility heading.

(*h*) No tests of ammunition supply and replacement or (*i*) of gasoline supply and replacement were made. Neither vehicle provides any practicable means for carrying ammunition; no means of carrying or replacing ammunition were available that were in any way suited for employment with a mount of this description. The gasoline and oil consumption of both vehicles is enormous per gun mile. The supply of each carried on the vehicle is insufficient for any continued operation.

(*j*) No tests were made under this heading. Both mounts, so far as ease of rail and water transportation is concerned, may be regarded as the equivalent of a ten-ton tractor.

(*k*) At the conclusion of test (*g*) under the mobility heading,

neither mount was considered in condition to be run further without a more or less extensive overhaul. Incidental tests of the ability of these mounts in the passage of obstacles were made from time to time during the conduct of other tests. In no case was it possible to get either mount to so function as to pass a series of obstacles in any one test. At no time was it possible to get either to run sufficiently long to reach a locality in which there were shell holes of any size. In the passing of obstacles, the various means of transport should be rated as follows: 1st, horse-drawn; 2nd, tractor-drawn; 3rd, Holt Mark VI; 4th, Christie.

(*l*) This test was not made as its result would have depended entirely upon local conditions as to have rendered it valueless. With guns on hard ground, front can probably be changed more rapidly by hand than with self-propelled mounts when cold motors have to be started. Frequently, there is great difficulty in starting motors. In such a case, even in bad ground, the change of front by hand would be more rapid. On the other hand, if motors start at once the change can be more rapidly effected by the self-propelled mount. A change of front of the self-propelled mount itself by hand cannot be effected at all.

(*m*) In the tank problem, neither of the self-propelled mounts arrived at the designated position due to mechanical difficulties. The horse and tractor-drawn guns arrived at the position and indulged in simulated but not actual firing.

(*n*) In a test of crossing a swamp, both the Mark VI and the Christie were mired in succession. The Christie mount, working, however, from solid ground, pulled the Mark VI out of its difficulties. When the Christie mired in the same swamp, the Mark VI was entirely unable to do anything with it. It should be stated, however, that the Christie was far worse mired than was the Mark VI; so badly mired, indeed, that for a time it was doubtful if two ten-ton tractors were going to be able to extricate it. When it was finally extricated no difficulty was experienced in removing its tracks.

The various tests conducted and the result thereof having been described in what, for this purpose, is believed sufficient detail, it is now time to answer the queries propounded in (*a*), (*b*), (*c*) and (*d*) under the heading of tactical tests. It must be understood that the answers given refer to the particular self-propelled mounts submitted for tests; and are based, for these mounts, on the results of the tests and experiments conducted by the Board; and not upon any previous tests, or deductions drawn therefrom, conducted by any other Board or individual at some different place.

(*a*) Use as accompanying guns. On the answer to this question must depend the answer to various others. If, for reasons of unreliability, a single self-propelled mount is unsuitable for use as an accompanying gun, it seems evident that many self-propelled mounts are unsuitable as reënforcing artillery and for use in strictly divisional batteries. Anything unsuitable for use in numbers to constitute divisional batteries must be unsuitable for use in smaller numbers as roving guns, since such guns must come from the divisional batteries. This method of reasoning manifestly, and purposely, disregards the evident fact that certainty and reliability of mobility is absolutely essential in any roving gun even though such gun may not require quite the mobility of the true accompanying one.

It is believed that what has already been set forth shows conclusively for these mounts that:

1st. They provide no means of carrying either gun detachments or ammunition.

2nd. They cannot be depended upon, even on good roads and without restriction as to speed, to cover a very reasonable distance in anything short of a very unreasonable time.

3rd. That they cannot travel at slow speeds.

4th. That in the matter of negotiating obstacles, they are inferior to horse-drawn guns.

5th. That they are very noisy.

6th. That they cannot possibly be man-handled.

7th. That they are always hard and frequently practically impossible to start without the assistance of another motor vehicle.

8th. That, mechanically speaking, they are entirely unreliable.

In view of all these objections, the conclusion, in the mind of the Board, is inevitable that the self-propelled mounts submitted for test are *entirely without value as accompanying guns.*

(*b*) Use as reënforcing artillery. As any other method of transporting guns seems to be much more reliable it is not considered that these self-propelled mounts have any value as supporting weapons.

(*c*) Use as roving guns. It is not considered that they have any material value for this purpose. The same reasons that make them useless as accompanying guns apply with nearly equal force to their use as roving guns.

(*d*) Use as divisional guns. The unreliability of these mounts, in the form, not the condition, in which they were submitted for test, is so marked that the substitution of them for horse or even tractor-drawn

divisional artillery, would be an act of most doubtful wisdom, likely to entail *most serious, not to say disastrous consequences, under average conditions of war*.

It would seem that the Field Artillery Board would now be quite justified in coming to its conclusions and making its recommendations without further study of the matter. However, there can be no harm, while there may possibly be some advantage, in considering at some length some of the statements made and deductions drawn in the papers of Colonel Chase already referred to, and in the reports of a very differently constituted Field Artillery Board formerly sitting at Fort Sill, which, at a previous date, gave much consideration to the subject of self-propelled mounts as represented by the Holt Mark VII. This machine, while not submitted for test to the present Field Artillery Board, was in its possession, and was incidentally frequently run and compared with the Christie and the Holt Mark VI. The Board also invites attention in this connection to memoranda from Major Pennell and Captain Michener, Field Artillery. The mounts referred to in these memoranda are the Christie and the Mark VI, Holt.

In his lecture at Treves, Lieutenant Colonel Chase states: "Finally we find specialization carried to the extent of construction of entirely new vehicles such as the caterpillar gun mounts which are self-propelled gun carriages on caterpillar tracks—an entirely new combination of existing units but composed of gun and tractor units of design tried and proved and not introducing any new fundamental problems requiring long experimental development."

It should be noted that the units making up the combination, if taken from existing commercial or military models that have been tested, require no experimental development as units, but that the combination of these units does require experimental development in order to obtain a balanced and workable machine. In fact, from the results obtained with the Christie and the Mark VI, Holt, the Board is of the opinion that long experimental development will be required.

On page 5 of the same lecture is found the following: "The horse is an expensive machine to transport. He eats when idle and he can't be packed in the hold of a vessel. He is susceptible to changes in climate." With the first statement, no one will take issue. It should be noted, however, that while the horse undoubtedly "eats when idle," the self-propelled mount, or any other form of tractor, or for that matter truck, does not work at all when it is not fed gasoline, oil, water, etc., including an enormous number of spare parts

and replacements. It is also true that a man eats when idle, and that to date no mechanical device has been invented which takes his place as a fighting machine. The statement that a horse cannot be packed in the hold of a vessel is not entirely correct and, even if it were, it should be contrasted with the fact that the condition of tractors after having been packed in the hold of a vessel with other cargo leaves much to be desired, to put it very mildly indeed. The Board has reason to suppose that the opinions of field officers of long experience, who have within the last three years accompanied motorized artillery to the Hawaiian Islands, might throw some interesting light upon this subject. The statement that the horse "is susceptible to changes in climate" affords much food for reflection to every officer of field, not to say war experience, who has ever been responsible for the proper functioning of any number of tractors in the hand of troops, even in garrison, during cold weather.

Continuing the quotation from the lecture cited, we find again on page 5 the following: "An idea of the great saving in ship tonnage and freight cars by the use of motor equipment can be had from the following: Take, for example, a 155-howitzer regiment, assume that the mobile equipment exclusive of the guns, small arms and individual equipment is to be transported. Assume that the forage for thirty days' operation is also to be carried, then consider the same outfit motorized and carrying gasoline, oil, etc., sufficient to run the same distance as the horses would cover in thirty days. This assumption is for comparison only as the motorized outfit can actually travel from two to four times the distance possible for the horsed regiment.

"The horsed regiment will require 13,010 ship tons. The motorized regiment 3767 ship tons. The great difference is caused by the impossibility of utilizing the ship economically when horses are carried, whereas, the tractors, etc., can be packed in solid with other supplies. Compared on a basis of freight cars, French type, the horsed regiment will occupy 308 cars, whereas the motorized regiment will need 128. From these figures, the advantages of motorization, so far as economizing ship and rail facilities, is apparent."

There is so much about the above quotation that is self-evident that it is not entirely clear to the Board why the statements were ever made. However, they give occasion for certain comments rather pertinent to the issue. It is not clear why Colonel Chase excludes guns, small arms and individual equipment from the matériel to be transported. The chief, and in this connection, by far the most valid advantage of the motorized regiment which he visualizes, lies in the fact that, because of the smaller tonnage required, it can be more readily transported as a complete and thoroughly equipped

combat unit, ready to take the field the moment it lands, without having to wait for horses, guns, etc., that may be separated by days or miles from the personnel. This fact he seems to have overlooked; or at least, he makes no mention of it. It is not clear why thirty days' forage or thirty days' gasoline and oil, not to mention spare parts, should be included in the cargoes. The forage would more usually be found in the country in which operations were conducted; and the gas and oil, if not found there, would ordinarily find their way into tank ships designed to handle such supplies in bulk and in the most efficient manner. In any case, neither the horsed nor the motorized command could carry supplies for any such period. If a "motorized outfit" is to be considered as a command equipped with tractors, it will certainly be surprising to officers of long experience with such commands to find one that will make sixty miles a day for thirty days. This assumes that the horsed regiment will average only fifteen miles per day.

The importance of the above quotations, however, lies not in any light which they throw on the relative merits of horse-drawn and tractor-drawn or carried light guns. This question is one which the Board is not directly discussing in this particular connection. The quotation is made and commented upon because it rather voices an idea, which seems to be growing, to the effect that it is ease and cheapness of production and transportation which must regulate the type of weapon to be used in war, and not the relative efficiency of the various weapons and equipments available. The Board intentionally goes out of its way to make the following points and sound the warning which they contain, *vis.:*

1st. While war has its economic aspect it is not an economical measure.

2nd. It is the equipment which is best suited to the work, and not that which is the cheapest or easiest to produce and transport, which in the end gives the best results.

3rd. The using services, that is the men who actually do the fighting, are the ones who in the end will force the producing and transportation authorities to so adjust their production and transportation problems as to furnish that which is the most efficient. They will not permit convenience of production and transportation to reign paramount over their views as to what is best suited for the work they have to do, and in which they give their lives.

It is useless to advance very minor advantages for any new type of equipment until it has demonstrated that it is superior for the purpose for which it is intended to that which is already available.

Continuing to quote from Colonel Chase's most interesting and instructive lecture, the Board finds the following: "The caterpillar tractor has positively demonstrated its ability to cross terrain impossible for horsed vehicles to negotiate." The Board is somewhat at a loss to know where, when, how and under what circumstances anything of the kind was ever demonstrated, conclusively or otherwise. The statement is certainly at variance with the results of any tests conducted by the Board, and consequently the Board ventures to question the conclusiveness of the demonstration.

In his next paragraph, Colonel Chase states that: "Tests in very muddy terrain, as well as the experience with caterpillar tractors at the front, absolutely demonstrated the superiority of the motorized equipment over that of the horsed." Since Colonel Chase makes this assertion, the Board will not venture to deny that something of the kind may have been demonstrated under some special and unusual conditions. That any such statement is generally true, however, the Board can by no means admit, since it is quite at variance not only with the results of its own tests, but with the observation and experience of those of its individual members of the longest and most extensive campaign experience.

On page 7 of the lecture quoted from is found: "Production of mechanical vehicles is flexible and practically unlimited as to quantity, it is possible to concentrate the manufacturing facilities for war purposes and to reach a high rate of production within twelve months as compared with the necessity for depending upon existing supplies of animals in case of emergency." The Board cannot resist the conviction that such comment is somewhat meaningless. Twelve months is a long time to wait in war for a sufficient supply of motive power. The existing supply of animals in this country at the present time is enormous, and is immediately available.

On page 8, Colonel Chase gives some figures as to the number of pairs of shoes that can be manufactured from the leather required to make harness for one regiment of 155-mm. howitzers. The Board is not prepared to accept the entire accuracy of the figures given, and is constrained to the belief that, even if correct, they show nothing more than a somewhat imaginary advantage of motorized artillery. If the shoes were made lighter, doubtless a still greater number of pairs could be made. If steel collars and rope traces were used in the harness, less leather would be required. If fewer motor vehicles were employed, the supply of alloy steel would be less taxed and more of it made available for gun forgings. Such purely academic and fanciful statements serve no other purpose than to indicate characteristics. It is a popular but most fallacious form of reasoning, to state characteristics, and then, without careful

analysis, assume that they constitute advantages. Such reasoning is apt to lead only to false conclusions.

Again on page 8 is found the statement: "Maintenance of a motor vehicle by mechanical repair shop units and a system of supply of mechanical parts is a more certain quantity than maintenance of horses under war conditions with the uncertainty of amount of loss due to sickness and accident." This statement may or may not be true. Maintenance problems are not solved either by ignoring or by talking about them. From the best information available to the Board, the maintenance problems were not solved during the late war in a manner at all satisfactory to the using services; nor can it ascertain that their solution in the future is regarded by maintenance experts of experience in any other light than that of a most difficult and uncertain task. In this connection, it may be well to invite attention to page 21 of this lecture where it is stated that: "At the close of hostilities, however, there were in production large quantities of 2½-ton caterpillar tractors which would have been used to replace the horses in the 75-mm. regiments within the next six months." The Board, four years after the above was written, has tested no less than three 2½-ton Ordnance tractors specially designed to pull 75-mm. guns. Not one has proved entirely satisfactory, and not one has, except in the matter of speed, demonstrated the same reliability or bad ground covering capacity as the old time-honored method of animal draught. The tractors referred to by Colonel Chase have since been withdrawn from service, after test, as mechanically worthless.

On page 23 of the lectures quoted from is found this statement: "The advantage of having the tractor always with the gun, ready for immediate action in case the gun position had to be changed, is very great as compared with the necessity of bringing the caterpillar tractors up from the rear when it becomes necessary to move the guns from one position to another." In the opinion of the Board, this alleged advantage is subject to considerable doubt. In the first place, if the engine or other part of the motive power of the self-propelled mount fails to function, and it is the experience of the Board that this usually happens if the mount has had to travel any considerable distance before arrival at position, then the gun cannot be started toward a new position until necessary repairs and adjustments are made. Repairs and adjustments cannot be conveniently made during firing.

In this case, it would certainly be better to have the tractors at a distance from the gun position undergoing repairs and adjustments so as to be ready to limber onto the guns when necessary to move to a new position. The position of the tractors when movement

is contemplated is ordinarily not far from the gun position. Considering the power and limitations of field artillery with its ability to fire at long ranges, it should never be necessary to move *only a short distance* from one properly selected position to another.

Continuing the lecture states: "With the self-propelled caterpillar gun mount the batteries are able to move forward at any time, immediately upon the receipt of orders, and the possibilities of pressing home a favorable attack are vastly increased as compared with the present methods which necessitates the infantry pausing in its advance until the artillery can be brought forward to new positions." From the experience had with self-propelled mounts during these tests, it is seldom that the self-propelled mount will reach a position; and after arrival, so many repairs and adjustments are necessary that there is no probability of immediate movement in any direction.

Furthermore, Colonel Chase's remarks are based upon a misconception of facts. The delay in the following up by the artillery is occasioned, by no means so much by the difficulties of the going, or by any delay in bringing up teams or tractors, as by the unwillingness of higher commanders to take guns in any numbers out of action so long as they can still reach their targets, even for so important a purpose as to provide a constant close support to the Infantry. Infantry attacks lose their impetus after just about so long an advance, and are apt, even in the early stages, to lack the power, if not the willingness, to make much headway without the maximum fire support of artillery that can be given them. This support cannot be given with any large proportion of the guns in motion.

Continuing on page 23 of his lecture, Colonel Chase referring to the transportation of ammunition states in substance that: "If the ammunition-carrying vehicle is drawn by horses it is subject to all of the difficulties of horse transportation; and if drawn by caterpillar tractors it is limited to such conditions of ground as can be traversed by a wheeled vehicle." Now it happens that comparative tests with the self-propelled mounts, tractor-drawn vehicles, and horse-drawn vehicles, demonstrated to the Board that the horse-drawn wheeled vehicles and tractor-drawn wheeled vehicles fully loaded *did* traverse ground that was impassable for the Christie and the Mark VI, Holt, self-propelled mounts. If the tractor-drawn vehicles be fitted with caterpillar adapters instead of wheels, such modification will increase the cross-country ability of the vehicles. However, as probably ninety per cent. of the travel of these vehicles is normally over good roads or across country over ground that is not difficult, the Board believes that the increased trouble of maintenance of caterpillar adapters over wheels, does not at all warrant such substitution for light matériel.

In his second paper, Colonel Chase summarizes the advantages of the self-propelled mount as follows: "Advantages—superiority of accurate control; quickness of mobility; ease of concealment; elimination of two separate units where one will suffice; maintenance with existing repair organizations. Disadvantages—increased weight; disablement of self-propelling power by gunfire or accident."

When these self-propelled mounts are in working condition, they function accurately, during firing, for shifting fire; but, when they are not in working condition, it is impossible to shift fire beyond the limits of traverse of the carriages, due to the excessive weight of this mount making it impossible of movement by man power. There is no quickness of mobility when the power plant fails to function. This is the usual condition with these mounts.

The statement in regard to ease of concealment is absolutely not correct. These mounts present larger targets, and are much more difficult to conceal while in position, than is the ordinary wheeled mount drawn by horses or by tractors. The elimination of two units is of most doubtful value with the present stage of development of the self-propelled mounts. The maintenance and repair of these vehicles in any number is far beyond the capabilities of existing repair organizations.

Paragraph 107 of the Calibre Board states: "Self-propelled mounts—while there is great promise for such mounts, those at present in existence and under test are, for the most part, excessively heavy. The most promising at this time is the 75-mm. gun, mounted on an approximation of the 2½-ton tractor. This mechanism, when mounted on a 4-ton trailer and hauled by the 3-ton four-wheeled drive truck, is capable of going over good roads at considerable speed, and after being dismounted from trailer can proceed across country under its own power. It has, therefore, important strategic and tactical uses." Just what these uses are considered to be is unfortunately not stated.

So far as the mounts under test by this Board are concerned, the remark in regard to excessive weight still holds good. The statement that the most promising is the 75-mm. gun mounted on an approximation of the 2½-ton tractor (Mark VII) is still correct, as shown by the experience of this Board in the tests of the Christie and the Mark VI, Holt. In the comparative tests made, it was found by the Board, that 75-mm. guns and caissons, and either Fordson or T-35 tractors, carried on trucks, with rolling kitchens, water trailers, and machine-gun trailers, pulled as trailers, behind the trucks, were capable of travelling over good roads at considerable speeds. All necessary personnel, ammunition and supplies of the

organization can be carried on the trucks and trailers and accompanying motor cars, motorcycles, etc., of the organization. When carried in this way, long marches may be made with the probability of arrival at destination of practically all of the vehicles.

No special arrangements or facilities are required for rapidly loading and unloading at points where it is required that organizations leave the road and proceed across country to position, utilizing the tractor motive power. Embankments and cuts may be utilized as unloading points or ramps may be improvised from materials available; or timbers, or short sections of railroad iron, may be carried for improvising ramps.

It, therefore, seems to the Board that the important strategic and tactical uses contemplated by the Calibre Board, whatever they may be, can probably be accomplished by using existing commercial types of small tractors and wheeled guns (75's) carried on trucks.

The Calibre Board, paragraph 31 of its report, intimates, in substance that the future limit of weight for divisional guns will be the supporting power of the light pontoon bridge equipment. With this theory, for reasons into which it is not necessary to enter in this connection, the Board is by no means prepared to concur. However, it is perhaps as well to indulge in some consideration of this idea in connection with the figures and statements on page 3 of Colonel Chase's second paper. Here the weight of the 75-mm. S.P. G.M. is given as 8010 pounds. While this represents just about the supporting power of the light bridge equipment it is less than one-half the weight of the Christie mounting and only about sixty per cent. of the weight of the Holt, Mark VI, self-propelled mount. The Holt, Mark VII, the lightest of the 75-mm. self-propelled mounts of which the Board has knowledge, weighs more than twenty-five per cent. more than the light bridge capacity assumed. Referring to the figures given for bridge capacities on page 31 of the paper referred to, it is at once seen that, absolutely contrary to Colonel Chase's statements, there is no reason to suppose that any of the self-propelled mounts so far produced can cross many of the "ordinary country road bridges" if indeed they can cross any of them. This takes no account of the many dilapidated and heart-breaking bridges and culverts in which this country abounds, which it is possible to cross with light artillery only by unhitching the horses, and taking them across not over a pair at a time, and unlimbering the gun and man-handling it over, or pulling it at the end of a prolonge. In such emergencies, the tractor-drawn gun has an immense advantage over the self-propelled mount; but it works at a great disadvantage as compared to the horse-drawn gun. It is usually forgotten, but should always be remembered, that, regardless

of what may be its weight pressure per square inch of track, the tractor represents a dead weight load of just so much between points of support on a bridge. A bridge that will just carry a 3000-pound field gun and no more will not stand up under a 4000, let alone a 7000 or 10,000-pound tractor. Colonel Chase's estimated weight of the 155-mm. howitzer S.P.C.G.M.—13,000 pounds—is so singularly in error that no consideration of its bridge-crossing power is called for.

The Board was much struck by, and invites particular attention to, the following objections made by a former Board sitting at Fort Sill, to the Holt, Mark VII, S.P.C.G.M., which, so far as the observations of the present Field Artillery Board permit it to judge, is far superior in almost every respect, to either the Christie or the Holt Mark VI:

"(*a*) The failure of the power unit involves the loss of the use of the gun.

"(*b*) The weight of the gun and mount prevent its movement by the gun squad.

"(*c*) The motive power is not available for other work.

"(*d*) At least two units of motive power are necessary for the service of each piece; one for the transportation of ammunition and one for the transportation of the gun.

"(*e*) The target is larger in firing position than when a separate power unit is used.

"(*f*) When under effective fire, the motive power as well as the gun may be destroyed.

"(*g*) The construction of a gun emplacement for such a weapon will require a much greater amount of work than for the usual type of gun mount.

"(*h*) Secret occupation or withdrawal from position will be almost impossible.

"(*i*) The upkeep and repair of the power plant are impracticable while the mount is in the firing position."

With the above remarks, the present Field Artillery Board is in full accord.

The minority report of the Fort Sill Board referred to suggests a possible use for the S.P.C.G.M. as anti-tank guns. The present Field Artillery Board concurs in this idea subject to the provision that the S.P.C.G.M. can be depended upon to function in a reasonably prompt and certain manner. In its experience, however, nothing of the kind can be expected from any of the self-propelled mounts that it has seen.

The minority report of the Fort Sill Board referred to states that for use as an accompanying gun that the Mark VII furnishes the smallest mobile target of any type of equal power proposed to date. This is not true of the Christie and Mark VI, Holt, submitted to the Board for test. Fordson's T-35's, or other light tractors of equal ability, pulling one-axle loads, furnish considerably smaller targets than do either the Christie or the Mark VI.

If necessary, light shields may be fitted to the small tractor and its load with greater facility than to the self-propelled mounts.

The minority report referred to also suggests that a possible use for self-propelled mounts is "to accompany a fleet of tanks." The present Field Artillery Board is of the opinion that guns and mountings should be designed to meet certain specific requirements, not that the using services should be called upon to find possible uses for them when general uses do not seem to exist. Doubtless a self-propelled mount could be used to accompany a fleet of tanks until it broke down or until it was put out of action; which, in view of its entire lack of protection for personnel, would probably be most promptly. Furthermore, it is not seen why a lighter gun mounted in a tank, or even the same gun mounted in a heavy tank, would not be far more desirable.

On page 36, Appendix A, General Deville states: "If a few horse-drawn batteries are preserved, it could only be with a view to disposing of a certain minimum number of guns in the event of a shortage of gasoline. But it must not be forgotten that modern warfare is impossible without gasoline, and that any power not having arranged for a continuous supply is certain to be defeated."

Now a few guns, in the event of a shortage of gasoline, are not going to do any good if the gasoline shortage lasts for any length of time. Horse-drawn guns, light, should either be maintained in numbers because they are better than gasoline-drawn ones, or else they should be done away with because some other method of traction is better. There seems to be no such half-way course as General Deville suggests. The statement that gasoline is essential to modern war is not correct so far as artillery is concerned. Not only can the horse do most of the artillery work that anyone ever thought of having done by motors, but steam has been and can still be used, not only for tractors, but for automobiles and trucks. Gasoline is convenient, yes; very convenient; essential, no.

General Deville continues: "I am not considering the possibility of complete want of gasoline, but a temporary shortage necessitating economy. In any case, artillery tractors will tend to disappear." Considering a war of movement and the not unlikely possibility of

aggressively handled cavalry riding across a line of communications, it would be most interesting to know just what General Deville means by a "temporary shortage." Such a lack of gasoline as would paralyze movement of divisional guns for two days would probably spell absolute ruin. That horses are able to march, and men to march and fight, when no rations have been available for forty-eight hours, is a fact that the records of the Confederate Armies, at least, in our own War of the Rebellion will amply prove. The Board cannot admit the statement that "Artillery tractors will tend to disappear."

Omitting his next paragraph, General Deville continues: "Artillery on caterpillar mounts is more mobile on uneven ground than horse-drawn artillery, and very much more so than tractors. In the field, it is not more difficult to look after the motor than to look after the horses, and the motor consumes nothing when not working."

The first sentence voices an idea that the Board is constrained to believe is absolutely false unless the General refers to horses that are attempting to pull a load way beyond animal power, or unless the tractor be very greatly outclassed by the load behind it, or unless he refers to *caterpillar* gun mounts and the *wheeled* Renault tractor. Under any other assumptions, the Board considers the statements inexplicable. It is not more difficult to look after motors in the field than it is to look after horses. However, the motor, without attention does poorer work possibly than does the horse. The contention that the motor consumes nothing when not working is old, and is, and never was, anything more than a catch phrase. The motor is nothing but a mass of metal without life, which does nothing unless fed. The horse for a time will work without food; he has a life to give; and, like the soldier, he gives it when called on to do so.

It is now believed that sufficient consideration has been given to such literature upon the subject as the Borad thought of especial value, and that sufficient comment has been made to demonstrate the very specious character of not a few of the arguments in favor of self-propelled caterpillar mountings for light guns.

Conclusions: Self-propelled mounts, as judged by these submitted for test, are, in their present form of development devoid of tactical usefulness for light guns and howitzers.

The Holt type, judged even only by the Mark VI, is superior in design, reliability and performance to the Christie; but there is no possibility of so modifying the existing design and assembly of either of the two types as to make it acceptable for general field artillery purposes.

So far as divisional guns and howitzers are concerned there

is no reason to even consider self-propelled mounts as substitutes for horse-drawn artillery. To make such a substitution in the present state of development of the self-propelled mount would be little, if any, short of madness.

So far as divisional guns and howitzers are concerned there is no reason to seriously consider self-propelled mounts as substitutes for tractor-drawn artillery. To make such a substitution, in the present state of development of the self-propelled mount, and in view of the promise given by light tractors as emergency prime powers for one-axle loads, would be an act of folly likely to involve serious, if not fatal, consequences.

Recommendations: 1st. That further experimentation on 75-mm. gun and 105-mm. howitzer self-propelled mounts be absolutely discontinued so far as any use for divisional artillery is concerned.

2nd. That when, and not until, experiments with heavier calibre self-propelled mounts may indicate the possibility of a very material weight reduction, further work be undertaken on a self-propelled mount for 105-mm. howitzer and 75-mm. gun with a view to developing, if possible, a special vehicle that may have some value as a mount for a special gun. as an anti-aircraft or anti-tank one.

3rd. That the conditional recommendations for work on a special gun mounting be considered as based largely upon an unwillingness on the part of the Board to take a definite stand against experiment, within reason with smaller calibres; since it is the belief of the Board that development along this line, if such development be possible, may be made more difficult if absolutely confined to the larger calibres.

THE ARTILLERY MECHANICS OF GETTYSBURG

BY JENNINGS C. WISE, LT. COL., F.A., O.R.C.

SOMEWHERE, within the broad scope of tactics there is that which for lack of a better characterization may well be called the mechanics of battle, the word technic not fully embracing the idea of fire as a force applied for a particular purpose. This is especially true in the case of artillery fire since the guns discharge their tactical mission less through movement than through position. Furthermore, although their placement is a primary factor in their correct employment, the problem of applying the energy which is to be developed with them remains to the tactician even after they are emplaced. It is undoubtedly true that a fire effect must be developed through correct technic, but that technic must apply the effect in accordance with sound mechanical principles.

Are we to drive the enemy from his chosen position? If so, the force of the artillery must be applied in one way.

Are we to hold the enemy to his position yet deprive him of the power to destroy an infantry anxious and willing to close with him? If so, we must exert the force of the supporting artillery in still another way.

In either case the method employed must embody correct mechanical principles, as much so as if by means of a fulcrum we are to move a stone with a crowbar, or with an axe we are to fell an oak, otherwise we may utterly defeat our object. When we begin to view the tactical mission of the artillery in this light we shall execute that mission more intelligently.

The point under consideration may be illustrated by the relatively stupendous battle of Gettysburg in which the task fell to the Confederate Army, or the assailant, of attacking the Federal Army in a position which proved to be impregnable for the infantry. And I think it can be shown that the destruction of the flower of Lee's Army by Meade was due, in the last analysis, to mechanical faults in the Confederate attack.

On July 1st, Lee found himself unable to break off the contact which A. P. Hill through his impetuous action of that day had gained with the Federal Army, while Meade had been led away gradually from his chosen defensive position behind Pipe Creek through the necessity of reinforcing first, Buford, then Reynolds, then Howard. Indeed, the heights overlooking Gettysburg, like a great magnet, seem to have drawn both armies from afar, neither

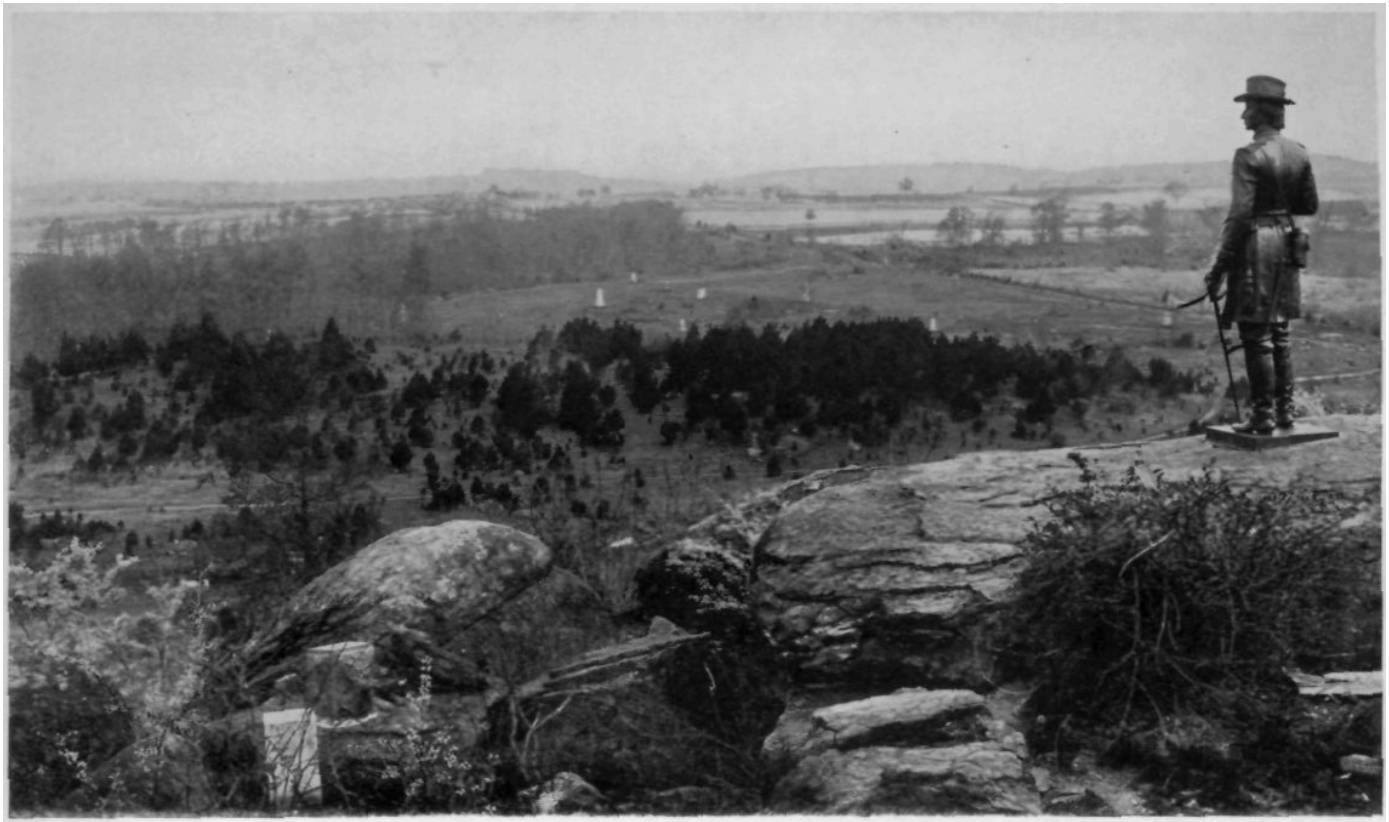
being able to resist the attraction of that position. The result was that Lee became hopelessly committed to the offensive on July 1st, while Meade was compelled to occupy the very position upon which Lee and Longstreet had agreed before leaving Virginia to fight a defensive action.

The Federal position of July 2nd and 3rd at Gettysburg has been likened to a fish hook, with Little Round Top on the south at the end of the shank, Cemetery Ridge forming the shank, Cemetery Hill at the bend, and Culp's Hill on the north at the point of the hook. With unturnable flanks in this position, Meade passively awaited the assault of Lee, opposing to the Confederates a battle line about three miles in extent.

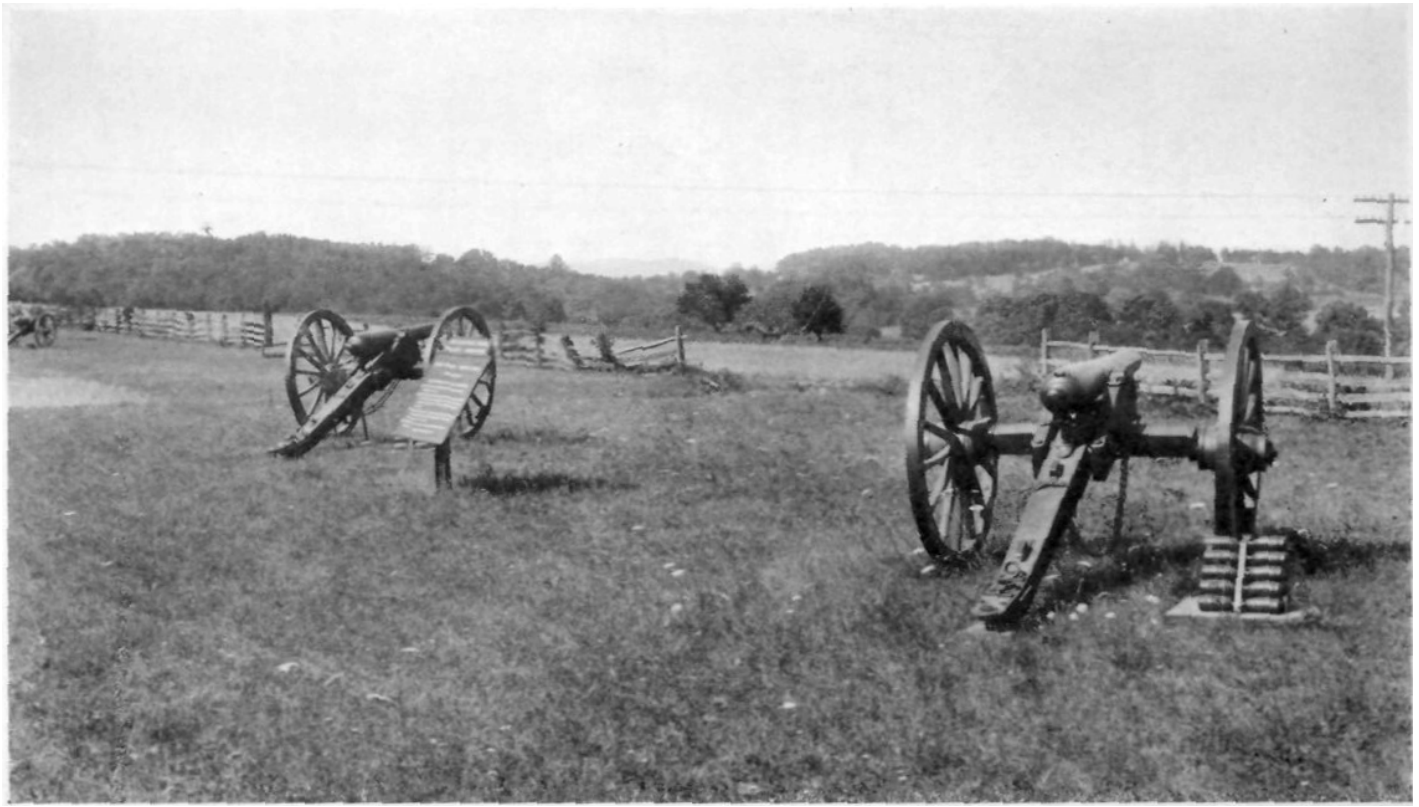
Opposite the shank of the Federal hook nature had marked out with a bold hand a frontal position for the Confederate Army along Seminary Ridge paralleling Cemetery Ridge, at a distance approximating the extreme effective range of light artillery in 1863, or in other words, at a distance of from 1500 yards to one mile.

It is not proposed to discuss here the mooted question of when or where Longstreet was expected to bring his corps into action for the purpose of delivering the main assault. The fact is that by nightfall of July 2nd Hill's, or the 3rd Corps, had established itself on Seminary Ridge with a line extending from the Hagerstown Road on the north to a point almost opposite and west of Cemetery Hill, the entire corps having been deployed. Connecting with Hill at the Hagerstown Road, Ewell, as he arrived from the north, had deployed his corps, or the 2nd Corps, in a line concentric to Culp's Hill, and passing through the town of Gettysburg with its flank resting on Benner's Hill east of Rock Creek. The artillery of these two corps had bivouacked during the night of July 1st along the line generally in rear of the infantry. Of the 2nd Corps Latimer's Battalion occupied Benner's Hill, while Jones' and Dance's battalions remained in rear of Johnson's Division (left division of Ewell's Corps) in readiness to move upon Culp's Hill should it be taken by Ewell. Carter's and Nelson's battalions had been posted upon the ridge north of the town. Of the 3rd Corps Pegram's, McIntosh's, Lane's, Poague's, and Garnett's battalions occupied positions along the rear crest of Seminary Ridge. Thus it is seen that neither Brown and Walker, the chiefs of artillery of the 2nd and 3rd Corps, respectively, nor General Pendleton, Chief of Artillery, Army of Northern Virginia, had any idea of manœuvring to obtain positions from which the artillery of the 2nd Corps north of the town might cross its fire with that of the 3rd Corps upon the hostile position.

Longstreet's, or the 1st Corps, being set in motion from the rear early on the morning of the 2nd, was deployed in lineal formation



LOOKING NORTH OF WEST FROM THE SUMMIT OF LITTLE ROUND TOP



THESE ARE MILLEDGE'S GUNS IN THEIR POSITION OF THE THIRD DAY
Cemetery Hill is Seen in the Right, Distance (It Was not Wooded at the Time of the Battle). Culp's Hill is Seen on the Left.

during the afternoon of that day on Hill's right, prolonging the Confederate line southward and casting Lee's right flank opposite Round Top. In these opposing positions, Meade, with a front of three miles, was able to bring into action not less than 40,000 muskets and 100 guns per mile, while Lee was able to deploy but 13,000 men and 40 guns per mile on the exterior line.

Despite Lee's numerical inferiority and the difficulties inherent to his position by reason of its concavity toward the enemy, there were, however, compensatory advantages for him since he retained the absolute freedom to dispose his artillery when and where he might see fit along a line of semi-circumvallation, or upon the are of a circle, while the Federal Artillery must needs remain at the centre. In other words, the Confederate guns might have been posted on the rim of a wheel while the Federal guns remained at the hub. Thus, the one, widely dispersed and in unknown positions with absolute freedom to shift as required, might have concentrated and crossed its fire by delivering it along the spokes of the wheel, while the other, though massed in a limited and known area, with no liberty of movement, was under the necessity of dispersing its fire. The mechanical advantages were, therefore, all on the side of Lee insofar as the artillery was concerned and might have been availed of in such a way as to neutralize both the advantages of the interior position and the Federal superiority in numbers.

But the tactical conceptions of the Confederates were still those of Napoleon whose short-range guns required the massing of artillery in order to obtain a concentrated fire. They did not perceive that with increased ranges there existed no relation between massed guns and concentrated fire save insofar as the range of the guns and their target required the proximity of the pieces. The result was that the force of the Confederate Artillery was mechanically misapplied, or applied in a way that could not accomplish the possible result.

The action of the 2nd of July had been piecemeal and indecisive, but no important change whatever in the disposition of the artillery was made that night. The result was that when the crisis of the combat arrived on July 3rd with the belated assault upon Cemetery Hill by Pickett's Division, Hunt was able to bring into action 220 guns against the 172 guns which the Confederates employed. The outcome was inevitable. The task set the Confederate Infantry was more than human courage could achieve. Longstreet's Artillery, under the gallant Alexander, pressing forward to the Peach Orchard, did all it could do by direct frontal fire to carry Pickett to his objective. But more than direct frontal fire was necessary. Hunt, masking the Federal guns with consummate skill until the heroic assaulting

column bared its breast, and breaking Pickett's formations, brought the Confederate offensive finally and decisively to an end.

Throughout Pickett's assault there were not less than five battalions, or twenty batteries of Confederate Artillery belonging to Ewell's Corps in and about and north of Gettysburg. No effort whatever seems to have been made to concentrate the fire of these units on Cemetery Hill, or to cross their fire with that of the 1st and 3rd Corps Artillery during the preparation preceding the assault. No less than fifty-six guns of the 2nd Corps remained idle at this critical hour and those which were in action were employed not against the point selected for the assault, but against Culp's Hill and other points.

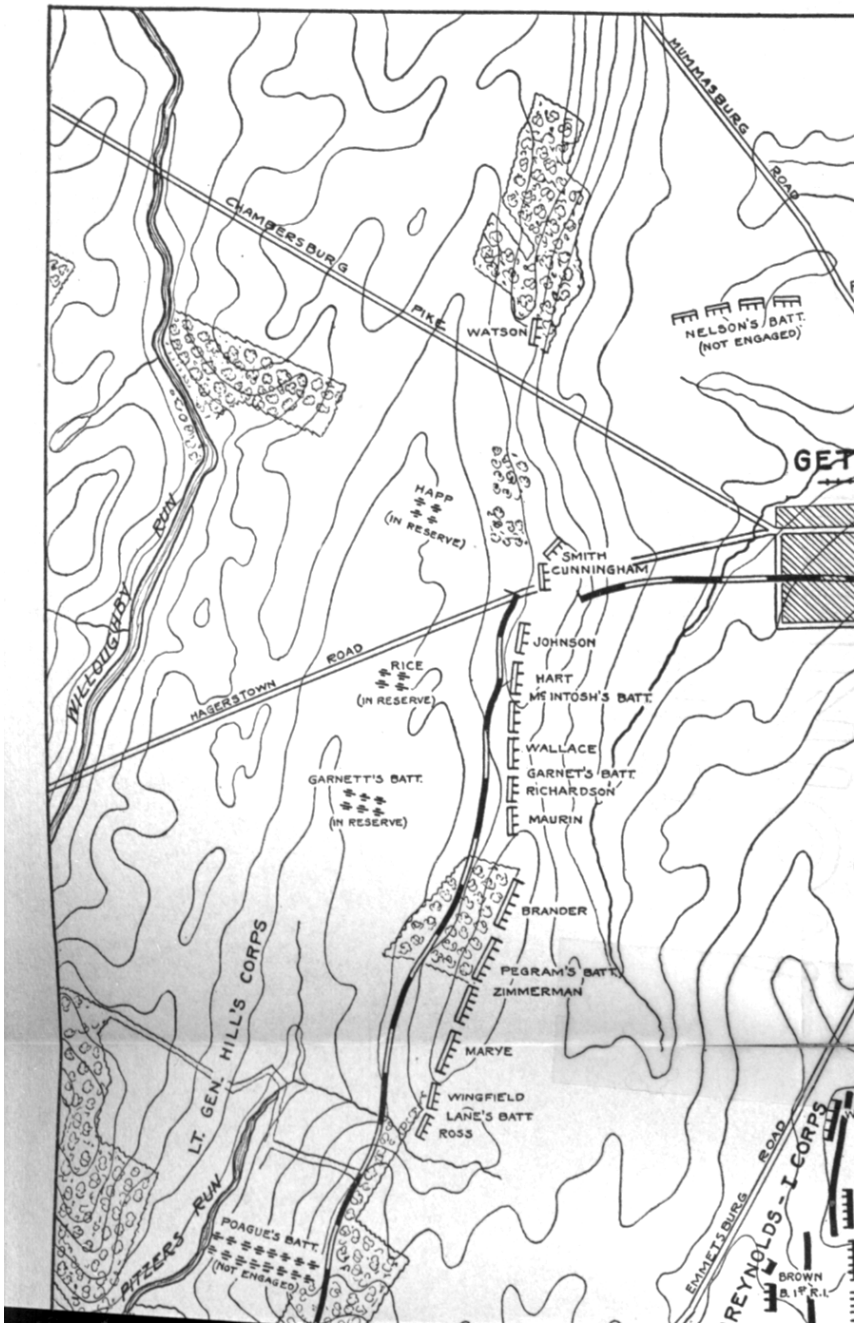
What might have happened had the correct mechanical principles been observed by the Confederate Artillery clearly appears from a detached incident which occurred during the battle. Quite independently of any general plan, Milledge's Battery had worked itself into a position on the flank of Cemetery Hill in search of better cover. During the cannonade preceding Pickett's charge, this battery fired from its position north of Gettysburg forty-eight rounds upon Cemetery Hill. The effect of this fire is described as follows by Colonel Osborn, Chief of Artillery of the 11th Federal Corps, which had sixty guns in position:

> "The fire from our west front had progressed fifteen to twenty minutes when several guns opened on us from the ridge beyond and east of Cemetery Hill. The line of fire from the last batteries, and the line of fire from the batteries on our west front, were such as to leave the town between two lines of fire. These last guns opened directly on the right flank of my line of batteries. The gunners got our range at almost the first shot. Passing low over Wainwright's guns, they caught us square in flank and with the elevation perfect. It was admirable shooting. They raked the whole line of batteries, killed and wounded the men and horses, and blew up the caissons rapidly. I saw one shell go through six horses standing broadside.
>
> "To meet this new fire I drew from the batteries facing west the 20-pounder Parrott Battery of Captain Taft, and wheeling it half around to the right brought it to bear on them. I also drew from the reserve one battery and placed it in position on Taft's right.
>
> "Fortunately for us, these batteries, placed in the new line, at once secured the exact range of their immediate adversaries. In a few minutes the enemy's fire almost ceased, and when it

> again opened, and while the fire was progressing, it was irregular and wild. They did not again get our range as they had it before we replied."

Osborn's story is eloquent testimony. If less than 50 rounds from Milledge's Battery could exert upon Hunt's great mass of artillery the effect described, what could Nelson's whole battalion to which Milledge's Battery belonged, have achieved in support of Pickett, had that single battalion been properly posted in relation to the artillery of the 1st and 3rd Corps? It seems almost certain that Pickett, who actually reached his objective on Cemetery Hill, would never have been driven out of the Federal position by Hunt's massed guns. It also seems certain that if Milledge could work his battery forward to within range of Cemetery Hill, Pendleton could have brought other guns of the 2nd Corps, including some of those which remained idle, into action against this point with decisive effect.

Gettysburg is spoken of frequently but erroneously as a battle of several days' duration. The facts are that several actions were fought by fractions of Lee's Army of varying strength on several different days, and at no time was the Confederate Artillery fully employed. Furthermore, so much of the Confederate Artillery as was engaged was not correctly employed. Nevertheless, for the very reasons mentioned, the series of engagements fought between Meade and Lee at Gettysburg when analyzed are particularly fruitful lessons for the Artilleryman. Indeed, it is doubtful if in the history of warfare a more convincing illustration of the necesstiy of the centralized control of artillery in a tactical chief can be found than Gettysburg, and it must be apparent that with the wider dispersion of artillery due to increased ranges this centralized control becomes more and more important to the correct application of the mechanical principles underlying fire effect and the economy of the force of artillery.


HUMMASBURG ROAD
CHAMBERSBURG PIKE
WATSON
NELSON'S BATT.
(NOT ENGAGED)
GET
HAPP
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SMITH
CUNNINGHAM
WILLOUGHBY RUN
JOHNSON
HART
McINTOSH'S BATT.
RICE
(IN RESERVE)
HAGERSTOWN ROAD
WALLACE
GARNETT'S BATT.
(IN RESERVE)
GARNETT'S BATT.
RICHARDSON
MAURIN
BRANDER
PEGRAM'S BATT.
ZIMMERMAN
MARYE
WINGFIELD
LANE'S BATT
ROSS
LT. GEN. HILL'S CORPS
POAGUE'S BATT.
(NOT ENGAGED)
PITZERS RUN
EMMETTSBURG ROAD
REYNOLDS - I CORPS
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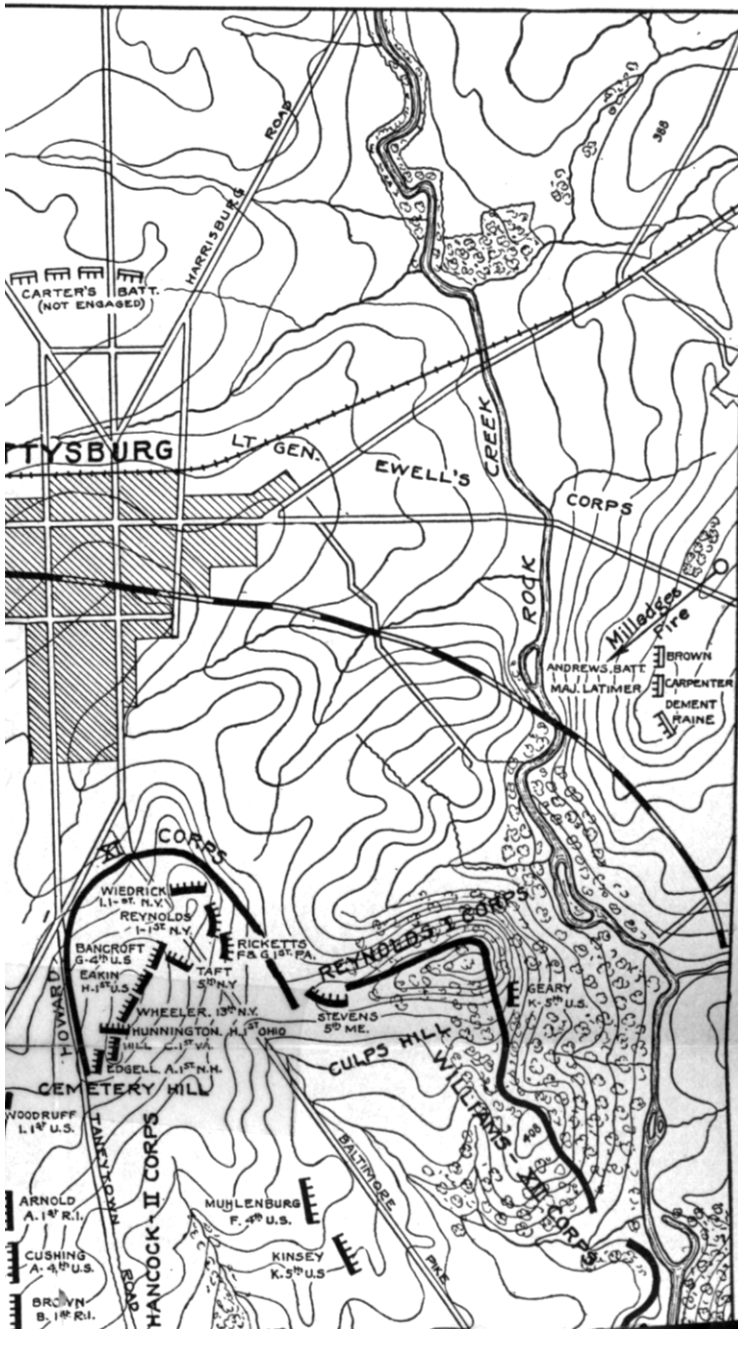
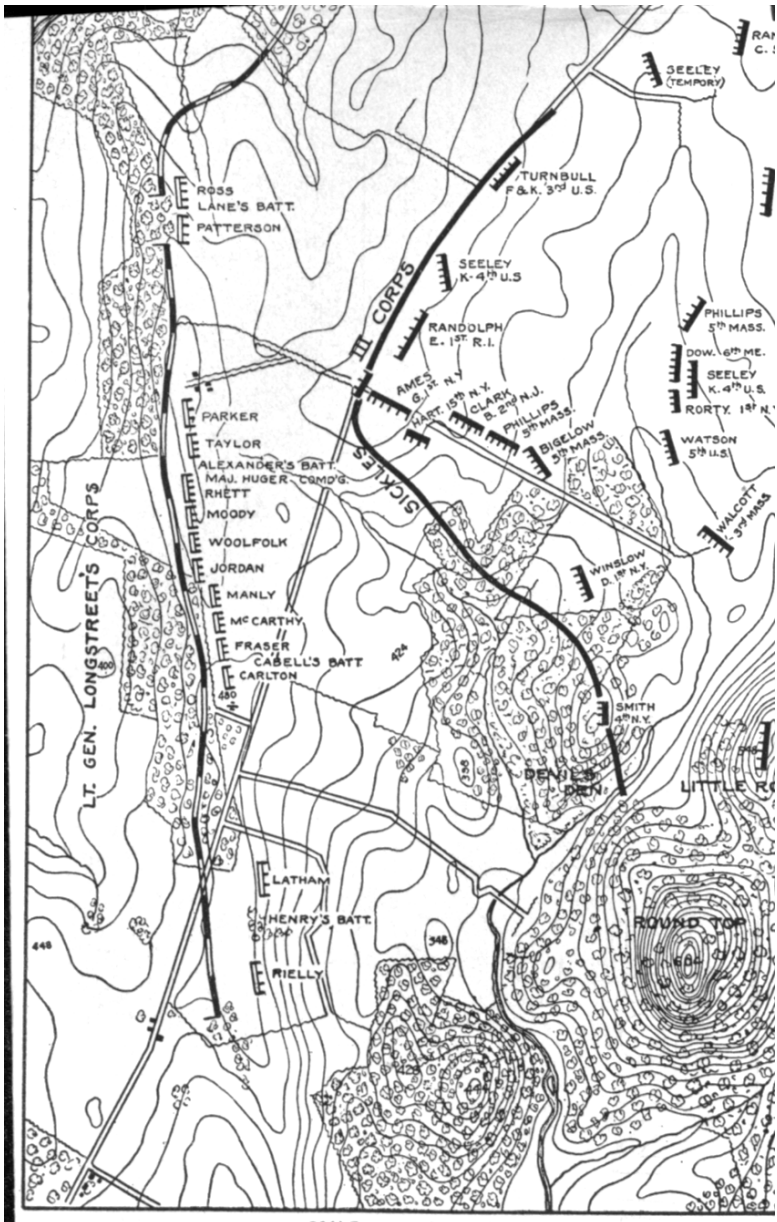
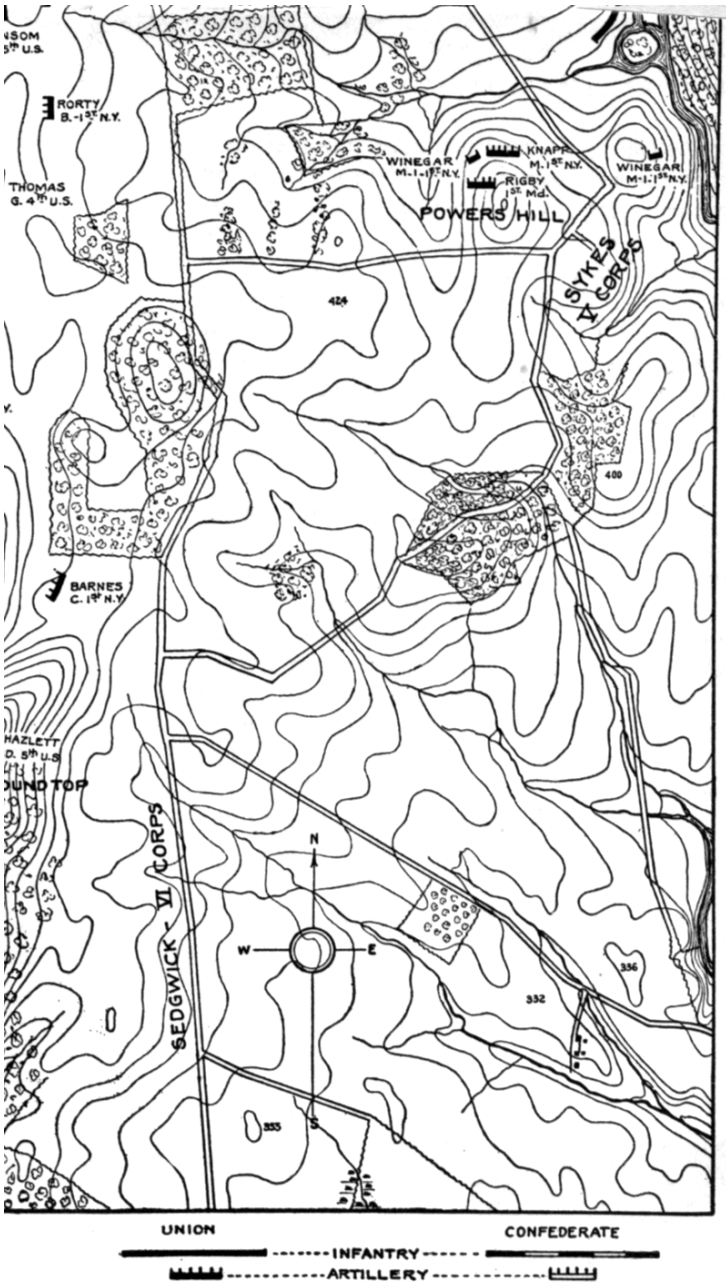

CARTER'S BATT. (NOT ENGAGED)
HARRISBURG ROAD
LT. GEN. EWELL'S CORPS
ROCK CREEK
Millegges Fire
ANDREWS BATT
MAJ. LATIMER
BROWN
CARPENTER
DEMENT
RAINE
XI CORPS
WIEDRICK L.1st N.Y.
REYNOLDS 1-1st N.Y.
BANCROFT G.4th U.S.
EAKIN H.1st U.S.
TAFT 5th N.Y.
RICKETTS F & G.1st PA.
REYNOLDS, I CORPS
WHEELER, 13th N.Y.
HUNNINGTON, H.1st OHIO
EDGELL A.1st N.H.
HOWARD
CEMETERY HILL
WOODRUFF L.1st U.S.
TANEYTOWN ROAD
II CORPS
GEARY K.5th U.S.
STEVENS 5th ME.
CULPS HILL
WILLIAMS
XII CORPS
BALTIMORE PIKE
ARNOLD A.1st R.I.
CUSHING A.4th U.S.
BROWN B.1st R.I.
MUHLENBURG F.4th U.S.
KINSEY K.5th U.S.



The Map Generally Shows the Positions About Noon of the Second Day. By Nightfall of the Hook from Cemetery Hill to the Round Tops, and Advancing to the Slopes of the Roun to the Assistance of Sickles to Stop This Advance by Longstreet. Sedgwick's VI Corps Only .

The Artillery Dispositions of the Third Day Find the Sixth Corps Artillery Brought into Union Reserve Artillery and Reserve Ammunition Train is Posted Near Power's Hill. Latime Battalion (to Which Milledge Belonged). Carter's Battalion is Moved to Seminary Hill and the Second Day.



l of This Day Longstreet Drove in the Angle Sickles Occupied, Straightening the Shank
ıd Tops. Sykes' V Corps and All but One Brigade of William's XII Corps Were Thrown
Arrived on the Battlefield at Dark to Strengthen the New Union Lines.
the Battle from East of Rock Creek, Where It Was Idle the Second Day. General Tyler's
r's Battalion is Moved Off Benner's Hill to the Rear, and is Replaced There by Nelson's
Jones' Battalion Takes Up a Position North of Town, Where Carter and Nelson were on

SOME OBSERVATIONS ON ACCOMPANYING ARTILLERY

BY LIEUTENANT COLONEL CLARENCE DEEMS, JR., F.A.

AT this period in the history of accompanying artillery, it would be natural to suppose that there would be little to set forth that is new. Perhaps this is so, since this tactical specialty has been handled both in peace and war for nearly 400 years; but, as we all know, in spite of the long-continued tactical use of this means, our own employment of the accompanying artillery in the World War often met with failure, principally due to the lack of previous combined training of our infantry and artillery. In view of the antiquity of the subject, this article might therefore be written as a means of emphasis of past faults, with suggestions as to the remedies that should be applied in the future. But, at this stage of our history, even such an analysis would be of doubtful merit since the more common faults were recognized and given to our A.E.F. through the "Notes on Recent Operations" and "Combat Instructions," which were published in France during the actual progress of the war. Hence a good reason should be presented, other than the mere value of public discussion, for bringing this subject once more into print.

With proper apology, therefore, the writer desires to present his reasons initially for the appearance of this article, and to say that it is inspired by the belief in the fact that today, in our Service at large, there does not appear to be a clear conception of the tactical differences existing between the two main classes of accomanying artillery, a matter of understanding which is just as important to the Infantry as to the Artillery. Unless these differences are thoroughly understood, we cannot hope to properly tactically train our younger officers in these places of initiative which carry local command.

Moreover, this subject is one that perhaps will be more or less affected by the mechanical developments of the present and the immediate future, since we note in some places the recommendation for the accompanying gun of the future to be mechanically propelled and lightly armored as well, thus permitting it to acquire some of the characteristics of the tank.

The principal points already mentioned will be discussed herein, together with a brief outline of some of the matters of historical interest in the development of this type of artillery.

Employment of accompanying artillery is a subject that, due to the violent differences of opinion thereon, has received far more

attention than it deserves as a tactical matter; yet, it is vitally important as a basic study, since it is here that the combined use of the two arms must be thoroughly understood and coördinated. If team work cannot be obtained in the minor elements, it surely will not exist elsewhere.

OUTLINE OF THE HISTORY OF ACCOMPANYING ARTILLERY

If we go back nearly 400 years (1527–1539) to the Franco-German-Spanish Wars between Francis I of France and Charles V of Germany, we find that artillery guns were deployed in *front* of the infantry, and that immediately prior to their use, in order to make the most of the element of surprise, great skill was shown in concealing them between the masses of troops.

The lapse of a century (1631) found a development which forms an interesting comparison with the methods of much more modern times. Gustavus Adolphus in the 30 Years' War, during German campaigns, used iron 4-pounders drawn by horses; two of these guns were attached to each infantry regiment, under orders of its colonel, and such skill in training was reached that they were fired three times as fast as the infantry musket. This is the typical case of the permanently assigned accompanying gun being used as regimental artillery.

A century still later (1741–1744), during the wars of Frederick the Great (in the Silesian campaigns), accompanying artillery consisted of 2-, 3- or 4-pounders, assigned to the infantry battalion, under the direction of a corporal in command of each piece, but under the control of the infantry battalion commander. This meant a rather more intimate liaison between the infantry and artillery than had existed in the prior period just mentioned, for they had ceased to be regimental guns and had become battalion guns.

Some years later (1765) the reorganization of the French artillery by Gribeauval (who has been termed the "father of modern artillery") opened the way to the application of new ideas, for he divided the field guns into 3 reserves (right, left and centre), thus injecting the principle of the employment of artillery in mass (supporting artillery) as well as the development of the dominating idea of the modern barrage in the application of its fire. But he did more than this; he also prescribed battalion guns—two to each battalion—and thus (since they were true accompanying weapons) approached remarkably closely the present general conception, in principle, in the use of both supporting and accompanying artillery.

From 1793 to 1802 the British used two field pieces with each battalion, and then abolished this organization.

Jumping to the period of our own Civil War, we find both accompanying

guns and accompanying batteries (also accompanying platoons) used on many occasions. In the organization of the Western (Union) armies a battery of artillery was permanently assigned each brigade of infantry and maintained as part of this organization until the Battle of Chickamauga in September, 1863. No better historical example of the aggressive action of an accompanying platoon could probably be cited than that of Gilliss' at the Battle of Spottsylvania, which galloped ahead of the charging Union infantry, unlimbered immediately in front of the famous Bloody Angle and supported this charge by pouring canister into the Confederate intrenchments. This platoon was practically annihilated, but not before it had given the most magnificent support as accompanying artillery. Also, we feel justified in citing the Battle of New Market. Here McClanahan's Battery rendered the most signal service, supporting Imboden's cavalry so effectively that the Union line was enfiladed, their cavalry dispersed, and finally the whole line gave way as the immediate result of the action of an accompanying battery.

In 1866, during the Austro-Prussian War, the Austrians followed a course similar to that of the Western Union armies prior to 1863, except that they attached 4-pounders (a much lighter weapon than that used by the Federals) to each infantry brigade.

In the German drill regulations of 1892 it was prescribed that the infantry, during their advance to the attack, should be accompanied by a few batteries, up to the shortest ranges.

Somewhat prior to 1911, the French system was to send forward a platoon of light artillery in the firing line to accompany each infantry battalion up to ranges less than 1000 yards from the enemy. In 1911 the system was changed, and they used what they called "infantry batteries" in the proportion of one battery for each infantry battalion, which supported the infantry by their fire, sending forward platoons into the firing line during the advance, and in some cases bringing up the entire battery into the infantry line at the moment of assault.

Now, considering the World War, we can find many examples of the use of accompanying artillery. The study of German tactics is particularly valuable, for we see how they relied on accompanying artillery at the very height of their most successful drives, and what excellent returns it gave. That this impression still prevails is shown in the words of Colonel George Bruchmüller, late Chief of Artillery, attached to German General Headquarters, and who recently wrote:

> "For these batteries the most important consideration was rapid changes of position forward in close support of the infantry. These infantry accompanying batteries often prevented

the infantry from being held up in its advance. The deeds of heroism that they performed are worthy of comparison with some of the most heroic acts in history. Always eager to advance, following closely on the heels of the infantry, they engaged the enemy at close range and thus helped in the breakthrough to bring victory to our colors."

In the teaching of our own General Service Schools today, the use of accompanying artillery survives as a tactical method to be employed when circumstances demand it. In the use of the division artillery, supporting artillery becomes the usual proceeding; attached artillery essentially becomes justified by special conditions, generally due to the anticipated failure of the supporting artillery at a later phase of the action. Accompanying artillery is a form of attached artillery. Its use is specially indicated when observation and communication for the supporting artillery becomes disrupted due to battle conditions and when the engagement is likely to resolve itself into a series of more or less local engagements. It is employed also, especially in deep penetrations, to overcome the islands of local enemy resistance that the supporting artillery has failed to sufficiently crush and for which the infantry auxiliary weapons lack the desired power. It is justified in its use, too, because generally it can act far more quickly than the supporting artillery in attacking these local targets, as was indicated by the Valdahon tests. Time is a most essential element on the battlefield, for it measures the relative change in power due to comparative losses as well as the advantages of mobility gained by swift and decisive local blows.

This much of an historical outline will, it is believed, impress upon the reader the importance of the subject which is discussed. A method that has survived on the battlefield for 400 years and which, today, is incorporated in our system deserves most intimate and constant study.

TACTICAL COMPARISONS

In our service papers considerable has been written regarding accompanying guns, but, generally, not much has appeared relating to accompanying batteries. Our authorized texts from the General Service Schools have failed to entirely set forth the tactical similarities and tactical differences between these two kinds of accompanying artillery. Moreover, discussions that have been noted at various times throughout the service relating to this subject, have, in general, accepted the tactical similarities and, at the same time, have failed to observe the tactical differences. The conception of the writer is that marked dissimilarities exist.

The tactical *similarities* may be summed up in brief by saying that both the accompanying gun and the accompanying battery are

used to further the advance of the infantry to which attached by attacking targets insufficiently neutralized or neglected by the supporting artillery, or in assisting in settling an emergency situation calling for prompt employment of weapons additional to or more powerful than the infantry auxiliaries.

The tactical *differences* between the two types of accompanying artillery are marked. They should be most fully understood and accepted by all infantry commanders, since attached artillery comes under direct infantry command, and all accompanying artillery is attached artillery. Briefly, they may be given as follows:

(*a*) *Influence of Command*.—The accompanying gun is an emergency weapon of the assault battalion commander; whereas, the accompanying battery is the weapon of the infantry regimental (or even brigade) commander.

(*b*) *Movement*.—The gun moves swiftly, from cover to cover, in short bounds of say some 400 yards, depending on the accidents of the terrain, which permits it to remain near the infantry assault battalion until the moment is reached for its use. But the battery makes much longer and far less frequent moves, and at slower gaits.

(*c*) *Location*.—An ideal situation is that which finds the accompanying artillery, the commander thereof and the infantry local commander as well, as close together as the terrain and the other conditions will permit. So it follows that:

The accompanying gun will usually operate very close to the area occupied by the assault battalion. The small amount of space that it occupies does not prevent its movement, if necessary, through open infantry formations and it does not interfere with infantry manœuvre by its presence in their area.

On the contrary, the accompanying battery operates considerably farther to the rear. Because of its mass, it cannot operate through infantry formations, and at short ranges forms a conspicuous and vulnerable target while in movement.

The result is that, usually, we expect the use of the accompanying gun at ranges less than 1500 yards and that of the accompanying battery under (sometimes materially) say 2500 yards.

(*d*) *Character of Fire*.—Direct laying will be the general rule for the accompanying gun, due largely to the short range employed, ease of distinguishing targets, the flat trajectory and the fact that a single target is attacked by an individual piece. In some cases indirect laying will be employed. Such instances are indicated when, for any cause, the target is indistinct, and is with difficulty pointed out to the gunner, resulting in loss of

time. This condition might ensue due to lack of good visibility as a consequence of the presence of smoke, fog, rain or snow.

Indirect laying is generally employed by the accompanying battery, because of the greater range at which it is used. The battery becomes an unnecessarily large enemy target if not utilized behind a covering mask. Moreover, the battery commander meets difficulty in controlling the fire of four pieces, using direct laying, if any of the cannoneers, giving way to the temptation of making individual corrections as a result of watching the effect of the fire on the target, injects these corrections of data secretly into the setting of any instrument.

(*e*) *Safety*.—For the accompanying gun this is obtained by swift moves, from cover to cover. The employment should be brief, when called for, followed by prompt concealment in a place of safety near by. Initially, the battery seeks good concealment behind a mask located in such a position that it will allow sustained fire delivered at suitable ranges.

(*f*) *Initial Use*.—For the accompanying gun, this should not be expected, though a good position, in observation, should be chosen, if practicable, before the jump-off.

The accompanying battery may frequently be utilized not only at the beginning of the attack proper, but will often perform its duties in connection with tasks assigned during the artillery preparation.

(*g*) *Time of Use*.—Accompanying guns should be ready to advance with the assault battalions when the latter leave the line of departure, and should follow the assault battalions very closely.

Accompanying batteries, though they may take part in the artillery preparation or accompanying fire, should be ready to jump off with the regimental reserves, or at the very latest with the brigade reserves.

The general principle is that accompanying artillery should not be expected to be displaced forward at a late hour with a view to catching up to the infantry unit to which attached. (It leaves the line of departure, as closely as it can be arranged, with this infantry unit.)

(*h*) *Detachment of Accompanying Guns from an Accompanying Battery*.—When accompanying batteries have been attached to infantry assault regiments, and no accompanying guns have been provided for assault battalions, accompanying guns, may, in an emergency, be sent from the accompanying battery to the assault battalion.

The point is here made that it is relatively easy to detach

accompanying guns from an accompanying battery, whereas, it is very difficult, on the battlefield, ever to assemble detached pieces to reconstitute an accompanying battery. They become dispersed and suffer such losses that this becomes impracticable.

(*i*) *Accompanying Guns and Batteries in Simultaneous Employment by the Same Unit.*—Few cases will arise where both accompanying batteries and accompanying guns will be necessary at the same time attached to the same unit. This is because their tactical employment has been distinctly indicated within definite spheres—essentially they are weapons for different infantry units.

THE USE OF THE PLATOON AS ACCOMPANYING ARTILLERY

This, in our service, at least according to the present system, is rarely justified. The reasons are these:

The platoon, as a unit, forms too great a mass to be manœuvred in connection with the assault battalion. It should be broken up when in this area and employed as separate guns. Hence nothing is gained by the platoon organization in taking over the duty of accompanying guns.

To utilize the platoon in the place of the battery, under the command of the infantry regimental or brigade commander, gives to these infantry elements far less power than they need, if they need accompanying artillery at all. Again the platoon fails to fit our organization.

The conclusion then is, as has been noted, that it has no place in our system. It is interesting, however, to note that it is still provided for in the French Drill Regulations, though referred to only in general terms, and not fitted into a specific niche in their system.

INDICATED FUTURE DEVELOPMENTS

In ideas recently set forth by writers on the subject, it appears that principal attention has been paid to the accompanying gun rather than the accompanying battery.

There is unquestionably a strong sentiment among artillerymen that the 75-mm. is the lightest gun from the standpoint of striking and bursting energy of its projectile that can be effectively used to perform accompanying gun duty.

Typical targets on the modern battlefield for the accompanying gun would be: pill boxes; concrete or earth machine-gun emplacements; sensitive parts of enemy strong points; machine guns in the open; single hostile field guns; anti-tank guns; tanks and troops in counter-attack. When we attack such targets as emplaced machine

guns and single field guns with earth (sometimes revetted), sandbag and even concrete work, the 75-mm. gun has about reached its limit of attack capacity; *i.e.*, of a single, well-directed round putting out the target. It seems to be obvious that a lighter gun than the 75-mm. is not desirable.

Accepting this, if mechanical means of transport be employed, then a gun of 75-mm. calibre should be mounted thereon.

The present self-propelled mounts are of large size—too great and bulky to permit their use (for direct laying) on a modern battlefield for any length of time, because of the size of the target that they present. If, however, the 75-mm. mounted thereon were so designed as to be capable of high-angle fire with reduced charges, this type of weapon could probably then find a place as an accompanying gun, because of its ability to fire from deeply defiladed positions. But, again, it would be subject to the objection that in changing position, when exposed to view, its size would make it an easy target. In spite of the objections offered there seems to be a marked trend toward some kind of a mechanically transported mount. In the *Revue Militaire Française* of January 1, 1922, Major Block expressed himself thus: "In order to preserve an intimate and permanent contact with the infantry, a portion of the artillery might borrow from the tanks their caterpillar treads and a little of their armor."

Will mechanically transported guns, self-propelled, be of special advantage for use in accompanying batteries? It is not seen why such will be the case. These batteries can well come from the division artillery, as at present, when available. The self-propelled mount will find its greatest use in the organization of portée batteries, belonging to the general headquarters' reserve artillery, which must meet strategic demands by swiftly travelling long distances.

CONCLUSIONS

Based on the above, it may be concluded that accompanying artillery has long been accepted as a necessity; that it is utilized under our present system when it appears that the supporting artillery as such is unable to give the desired support; that marked tactical differences exist between the proper use of accompanying guns and accompanying batteries; and, that a tendency has now appeared toward developing self-propelled guns, particularly for use as accompanying guns.

FROM THE ATLANTIC TO THE PACIFIC WITH A BATTERY OF PACK ARTILLERY

BY CAPTAIN OLIVER F. MARSTON, 4TH FIELD ARTILLERY

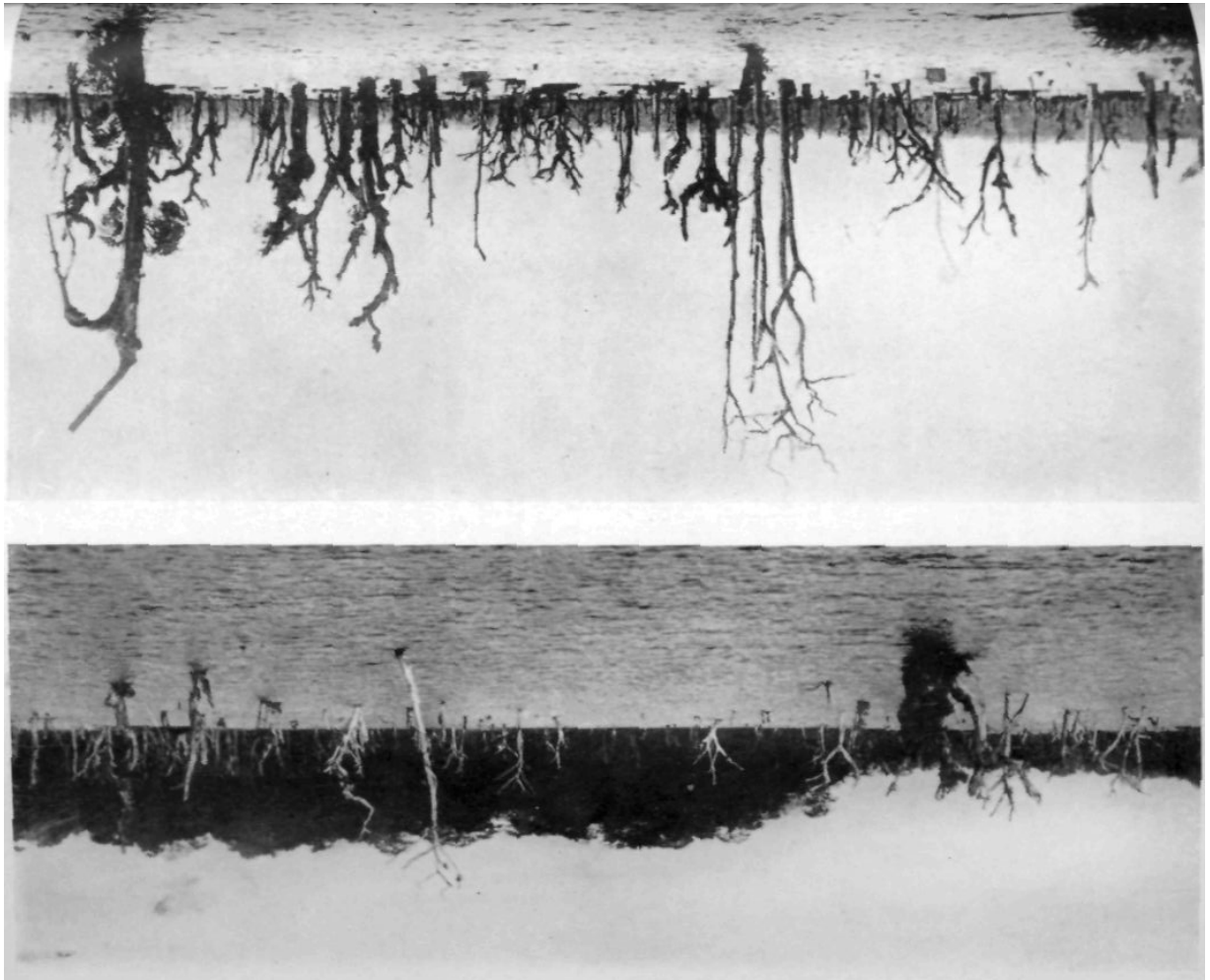
CONTRARY to the general belief, there is, at the present time, neither wagon road nor trail across the Isthmus of Panama, old highways having been mostly obliterated by the creation of Gatun Lake, which was necessary in the building of a lock canal. This lake, which was formed by the construction of Gatun Dam across the Chagres River, has inundated most of the old Morgan Trail, and spread its waters through nearly one hundred and sixty-seven square miles of rolling country covered with dense tropical jungles.

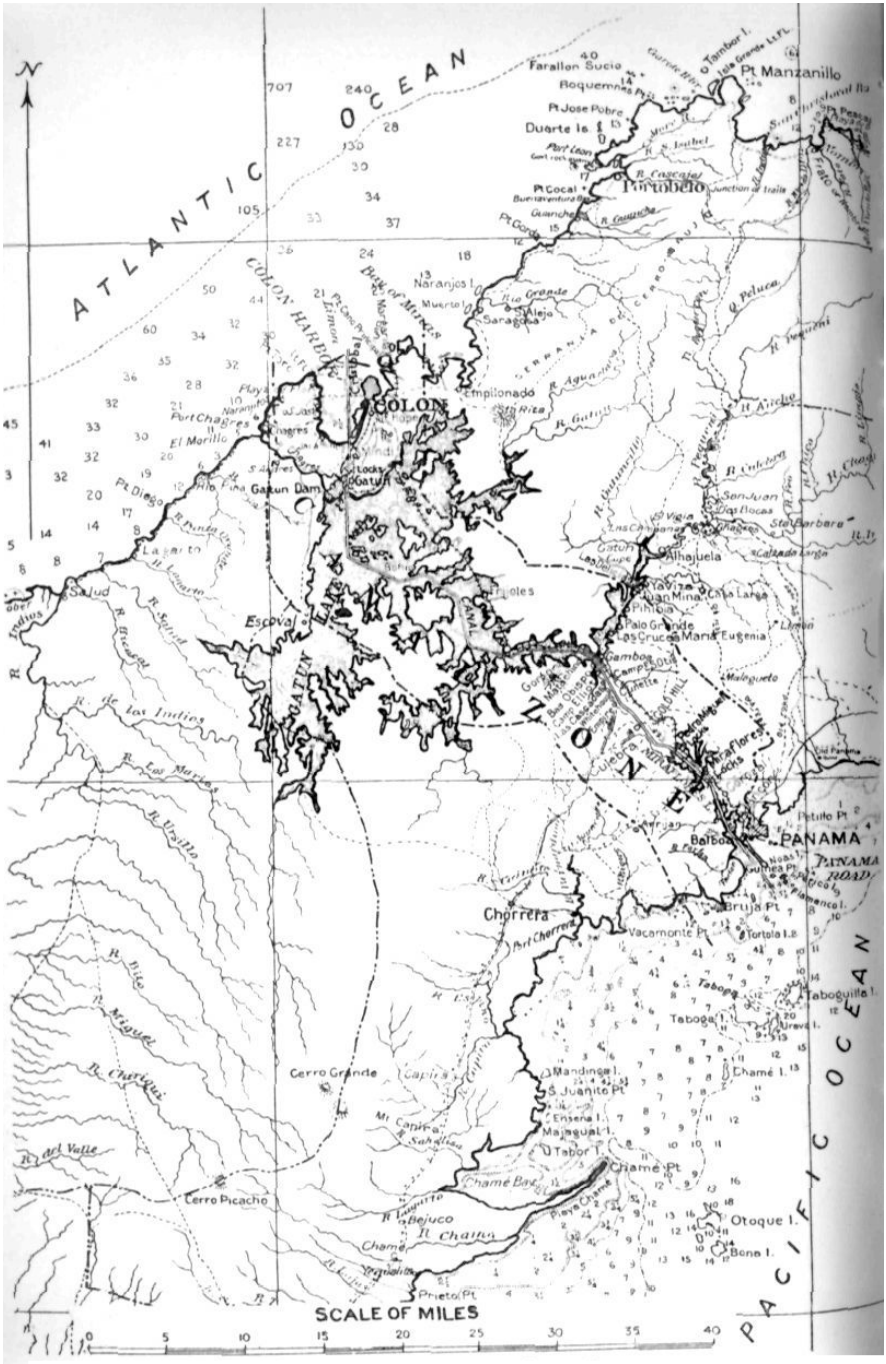
To anyone who has camped, even for a short time, in the nearby country, which is so unusual to American eyes, there comes a desire to explore even more extensively the mysteries and beauties of these luxuriant fastnesses, so near and yet so far from civilization. It was this sense of adventure, accentuated by the desire to forget the monotony of garrison life in attempting something entirely new, which led Battery "A" of the Fourth Field Artillery to seek permission to blaze a trail across the Isthmus of Panama.

It may be said here that military experts were very skeptical as to the success of the undertaking, believing the trip with so large a party to be practically impossible, because of the difficulties in transporting sufficient rations and forage (carried entirely by mule-back) through unmapped country, the general formation of which presented unlimited difficulties, with its numerous mountains and stream crossings and dense vegetation. Besides there were the inevitable dangers of malarial fever and other tropical diseases.

However, permission was granted to make the attempt, and on the morning of the sixth of February, 1923, Battery "A" hopped off for the Pacific side. The outfit, consisting of three officers (one medical officer), one hundred men and ninety animals laden with four guns and supplies, crossed the lower guard gates of Gatun Locks in high spirits and entered the jungles at the west end of Gatun Dam.

As is frequently the case, the "dry season" had not been all that its name implies, and the steep trail which followed a ridge along Gatun Lake was wet and slippery. Eight mules fell backward in climbing one hill, which necessitated lightening their burdens until the top was reached, and then readjusting the loads. Five others bogged down in crossing a stream, making repacking even





The Country Through Which the Battery Marched Has Never Been Mapped Beyond the Shore Line of Gutan Lake.
The Rivers Shown Are but Approximations, and Serve Only to Indicate the Presence of Streams.

more difficult because the loads had first to be hauled out of the water by means of ropes.

A camp site was hewed out of the undergrowth about four o'clock in the afternoon, where the firing battery made preparations for the night. The pack train arrived about two hours later, their work having been much more difficult because of the larger proportion of loaded animals it was necessary for them to handle.

Just when the hard work of the day was about to fade into comparative unimportance before a hearty meal of good old army chow, a mess kit spoon of liquid quinine was administered to all. Only the very optimistic seemed able to reassure one another that the first day of new and gruelling work is invariably the hardest and that malaria is worse than the taste of quinine.

The light of day was rather late in reaching camp on account of the thick jungle foliage, so preparations for the day's march were not completed until nine o'clock. It had rained during the night, and the outfit was able to progress but a few miles over increasingly difficult trails, although the firing battery advanced steadily, stopping for but a few minutes rest and a cigarette at noontime. (A substantial breakfast and an early supper, with no midday meal, sufficed while travelling under such severe conditions.)

All of the mules were carrying loads weighing three hundred pounds, so it was impossible to give those which were not in condition to endure such exceptional work a rest by transferring part of their top loads to other animals. The poor animals were loaded to the limit of their endurance, even had the going been fairly good. Instead, no sooner would the mules and their burdens be snaked out of one bad crossing, by the tireless efforts of the drivers and cannoneers, than they would be in another difficult place. In one case a mule fell backwards and rolled a short distance down a very steep and muddy hill. He reached a level spot near the bottom, but, instead of attempting to get up, lazily flopped over once more and went hurling over the edge of a fifteen-foot bank where he lay squarely on his back in the middle of a dry stream bed. Naturally we all thought he was done for, but when a packer worked his way down to the prostrate animal and cut away his load, he proved to be very frisky and viciously bit the man's leg. Upon being pushed and pulled back to the trail, Mr. Mule found his load returned to him, so he grunted protestingly for the remainder of the day's journey.

The country through which we passed is well known, this same Escoval Trail being frequently travelled by detachments of troops and Americans having business with the few native inhabitants. However, although the trail when dry does not present the same

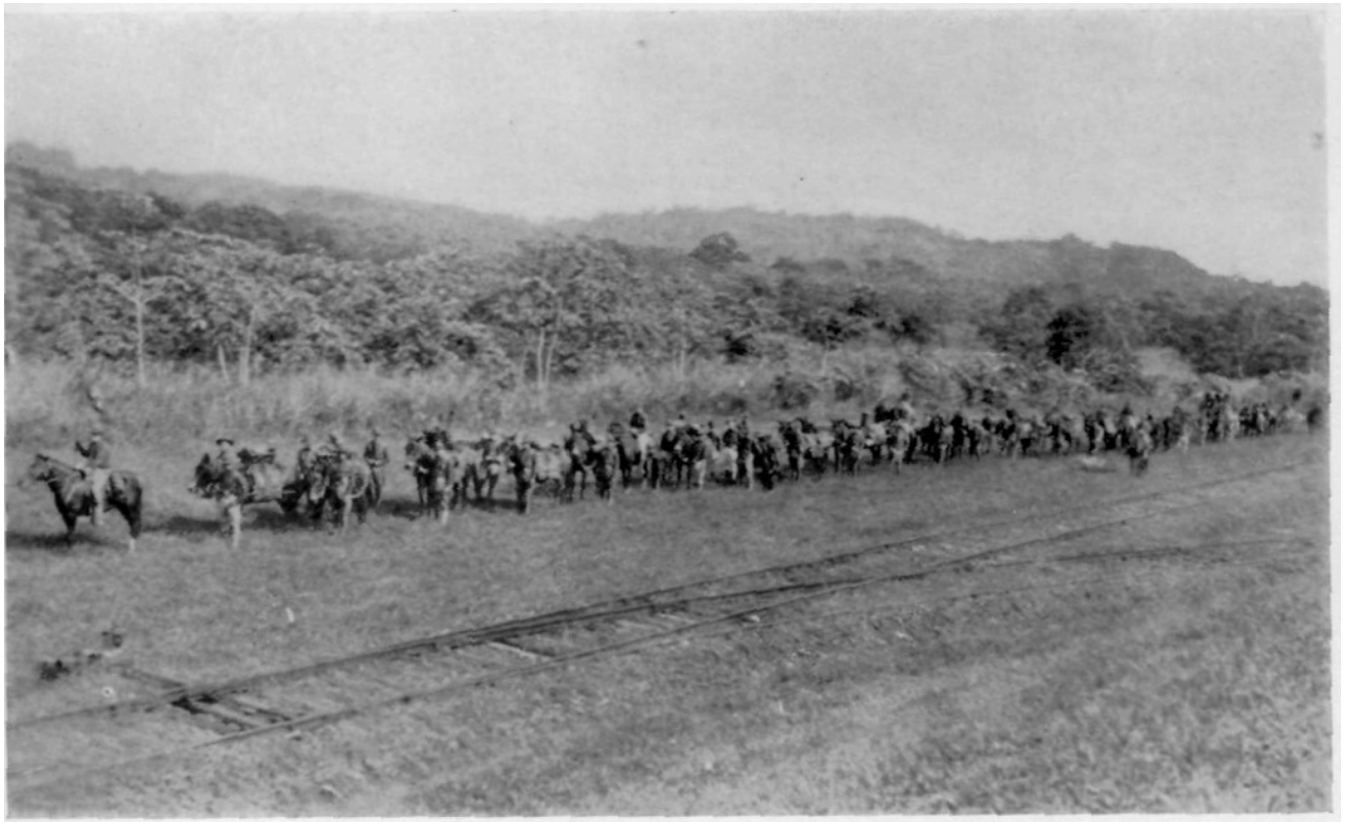
difficulties, the Indians seem to prefer the water route of communication, travelling about Gatun Lake in boats made of hollowed-out logs known as Cayucas.

Nature had not made the nearby country sufficiently attractive to distract one's attention from the difficulties of the march, but two flocks of wild turkeys were tempting targets. Two birds were brought down with a pistol and helped the cooks give a little variety to the evening meal, which was prepared at Camp Cunningham. In the meantime the pack train had retraced its steps, collecting the loads which had been left by the wayside because of darkness and difficulties and had brought them all up to the first night's camp. From there picked mules were sent up to the firing battery with rations, forage and medical supplies.

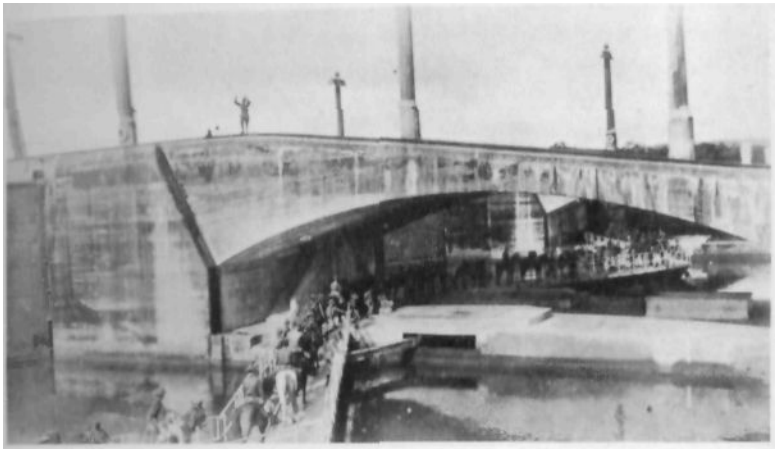
Shortly after leaving Camp Cunningham, the following day, the firing battery crossed the Canal Zone Line and entered the Republic of Panama. From here on the small streams became more numerous, necessitating the construction of seventeen short bridges and several corduroyed stretches over boggy places. In spite of the time required for even crude construction work, an advance of twelve miles was made during the day. The firing battery arrived at Cuipo at five o'clock in the evening, and made good use of a large cleared area, which had been used by natives as a banana plantation, for a camp site. By dusk preparations for the night had been completed, and the entire outfit awaited the arrival of the pack train, which had been wallowing in their wake for the past two days. The loads of rations and forage were appreciably lighter, so the pack train was able to catch up with the main column about eight o'clock that night.

The village of Cuipo consists of but a handful of native huts, mostly one-room affairs of thatched palm leaves, in which the natives themselves, hogs and chickens, dogs and parrakeets and any other domestic animals and pets they may possess, live together in apparent peace and comfort. The natives sleep in rude fibre hammocks, not only because the domestic animals monopolize most of the floor, but because of the countless crawling things which bite and sting. When forced to spend the night in the open, the native constructs for himself a high bed, using for the purpose four forked sticks supporting crosspieces about three feet from the ground, and the whole covered with a light, spongy bark, peeled in large sections from a certain kind of tree.

In order to secure pure, fresh, drinking water, he utilizes a vine two or three inches in diameter and covered with heavy brown bark. This vine extends upwards for many feet without twisting or branching; otherwise it does not appear at all unusual. The native with his machete severs the vine near the root, and shapes it into a



THE FIRING BATTERY LEAVING GATUN



CROSSING THE CANAL ON THE GUARD GATES OF GATUN LOCKS

THE MAINTENANCE SECTION

kind of spout. After cutting the vine again about six feet higher up to admit air, he drinks from the lower end. From a section this long, about a pint of excellent drinking water, may be obtained.

In spite of the general appearance of Cuipo, it is an important "lakeport," being the centre for the shipment of small quantities of fruit and milk from the interior to Gatun. It was here that the battery was to receive additional supplies of rations and forage by gasoline launch from Gatun. The boat did not arrive until late that evening, but besides the necessary supplies there were packages of newspapers and mail, so there was great rejoicing. A one-sided communication had been maintained by dispatching messages by carrier pigeons each day, but this was our first news from the post—and our last until the newly blazed trail lay behind us.

At Cuipo a halt was made while trail-cutting details went ahead to prepare a path for the advance. For some distance we tunnelled through the thick undergrowth, using for the purpose a native knife known as a machete. This has a blade of from two to three feet long, terminating in a short bone handle, and usually made quick work of cutting away the rank vegetation we encountered. However, our progress was very slow, even though we cut away just sufficient jungle growth from the sides and overhead to permit one loaded animal to pass through. During the first day it was necessary to construct three small bridges, but the next morning higher country was reached and a very steep mountain encountered. The ascent was so abrupt that it was necessary to cut a path around the side of the mountain with picks and shovels until the top of a lower adjoining ridge was reached. The crown of this ridge was just wide enough for the animals to travel single file. The sides were almost perpendicular. From this high country Gatun Lake could be seen on the left and the Caribbean Sea on the right. The further slope of the ridge was not so steep; down this a winding trail was cut, terminating at the Lagarto River, which flows west to the Caribbean Sea.

It must be undrestood that for the past two days we had been cutting our own trail, mile by mile, through an unknown and entirely untravelled section of Panama. It was impossible to use a compass because of the many abrupt turns necessary in seeking out the best footing for the animals, and the vegetation which offered the least resistance to our advance. The nights were not only inky-black and shut in by the trees and vines, but generally rainy, and it was an effort to pick out constellations which were of any assistance. However, a general southerly direction was maintained by observing the sun during the day. We carried in mind the fact that, in case it became necessary to get in touch with

the post, it was always possible to cut our way due west to the Caribbean Sea or east to Gatun Lake and establish communication. The distance in either direction would not have been more than ten miles.

While the handful of trail cutters pushed ahead, the remainder of the men and animals were having a well-earned rest at Cuipo. The mules and equipment were cared for, and the men bathed and disported themselves, and washed some of the trail mud from their clothing.

After two days in camp the firing battery and the pack train followed along the trail made by the advance party to the Lagarto River. Many of the ordinary difficulties of the march had been obviated by the trail-makers, so the main body was able to travel in one day as far as the cutters had advanced in two; and the entire outfit camped together that night.

From here different details of men were sent a day in advance of the others to prepare the trail. If the going was very difficult and they were unable to proceed far, they would return at night to the main camp, otherwise supplies would be sent ahead to wherever nightfall and weariness overtook them.

The Lagarto River follows an extremely winding course between high, steep banks, which makes the building of bridges difficult and fording very treacherous. During the next day of our journey, within half a mile's march, we crossed this river four times, each crossing presenting increasing difficulties. Sixteen mules were bogged in the river at one time, necessitating prompt action on the part of the men to save them from drowning. Their loads had to be cut off in the water so the weight would not drag them beneath the surface, and then both animals and loads fished out with ropes. For the remainder of the day the entire outfit simply wallowed through the mud and tangle of undergrowth. The men and mules were nearly exhausted and everything and everybody completely covered with wet sticky mud. At the fifth crossing of the Lagarto it was imperative to halt.

During the journey from Cuipo the remaining pigeons had been badly shaken up. It was impossible to care for the poor birds properly, so after writing final reports they were released. The birds perched in a nearby tree for over an hour, until sufficiently recovered to attempt their homeward flight.

Meanwhile we cleared away a space in a grove of Ivory Nut Palms for a camp site. From the general appearance of the entire outfit after wallowing all day through the muddy crossings of the Lagarto River the place was quite appropriately called "Camp Hog." We had not ventured across the stream at this point, so the

water was comparatively clear. However, it was impossible to lead the animals down the steep bank, so they were watered from canvas buckets passed from hand to hand, chain-fashion up the incline.

I have never seen any men work as hard as this outfit, and they did it willingly and cheerfully. The exceptional high spirit which prevailed throughout the entire trip was an inspiration and an example to everyone. Gathered about the camp fire after supper, the hardest days turned into but a hazy background for the glowing accounts of the Old Timers' past experiences. One of the mechanics told so many blood-curdling tales of encounters with, and escapes from jungle beasts, that every one of the weird night noises seemed fraught with impending danger. Imagination ran riot for awhile and some found it difficult to go right to sleep, but after the exhausting work of the day weariness soon conquered.

The next day it was necessary to scrape the mud from the equipment, drain the water out of the aparejos and reset some of them. The men and animals were beginning to feel the strain of advancing under such appalling conditions, and although all were well and sound, this brief respite from the duties of the march was very much needed.

While out from camp making a reconnaissance, a large troop of friendly monkeys was encountered. They were very inquisitive and came quite close to inspect us, but scampered off when attempts were made to catch them. One of the men saw fresh tapir tracks (called by the natives mountain cow) and decided to try his luck at hunting. He became lost in following them and spent the rest of the night finding his way back to camp, where he returned about sun-up the next morning very sleepy and disgusted.

From Camp Hog the battery marched eight miles in as many hours over the trails which the advance party had cut, but were forced to camp early in the afternoon as the men and animals were about exhausted. The country was growing more rough and hilly as we approached the continental divide, and our progress was correspondingly difficult. Camp was made at the foot of a long steep hill, where there was barely enough room for the picket lines. Again it was necessary to water the animals from canvas buckets. We were now at the headwaters of the river which had caused us so much trouble. The hill frowning above us did not promise any improvement in the trail, only difficulties of a different kind.

Daylight found the men and animals much refreshed and ready to continue the march. The steep hill proved to be very difficult to ascend. Five loaded mules tumbled down the slope about one hundred and fifty feet, but, owing to the mass of vines and underbrush, the falls were broken and none were seriously injured. The

other mules were assisted over the hill by three men. Two pushed from the side and rear on the load and the driver pulled the animal zigzag up the slope over the best footing. Owing to the weight and bulk of the loads, when an animal did lose his footing, it was necessary to take a turn around a nearby tree with the halter shank until the pack could be removed. Then the mule was led to a comparatively level spot and reloaded. It must be remembered that every animal which fell necessitated an enormous amount of additional work on the part of the men in unloading and unsaddling, then repacking and making another attempt, which was often just as unsuccessful. The remainder of the day's march proved to be a succession of ascents and descents of hills about the same as the first one. By afternoon part of the series of ridges comprising the continental divide lay behind us.

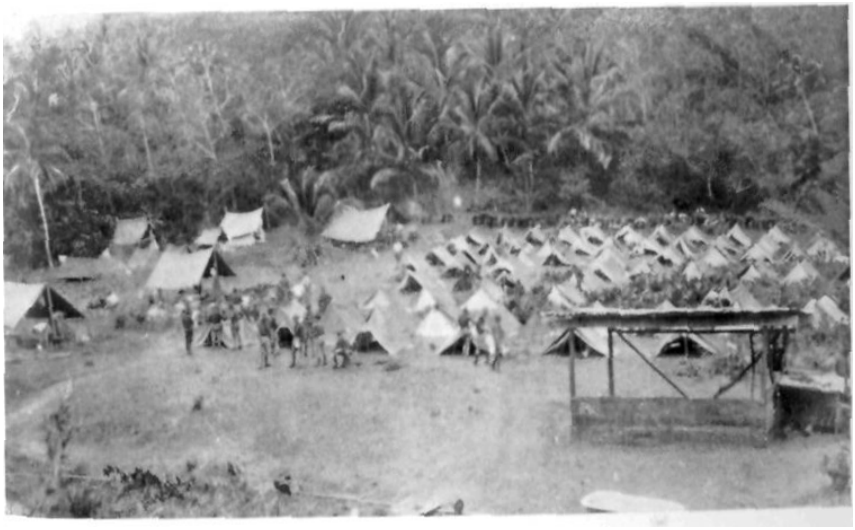
The battery camped in an opening near the banks of the Siricito River, which flows into Gatun Lake. There was an Indian settlement nearby where purchases were made of a supply of native oranges and fresh eggs. From here the pack train was sent about a mile down the river to its mouth to get some supplies which had been sent on from Cuipo in cayucas, because there were not sufficient animals to carry all at once and it seemed unwise to send them a second time over the trail from Cuipo.

The difficult trail followed the river the entire distance, crossing and recrossing it many times. All of the fords were rocky and treacherous and the current quite swift. At one of these crossings five mules were swept into a deep hole. It is a well-known fact that a mule in contrast to a horse, will submit very quietly and peacefully to any outside assistance offered when he is in a dangerous predicament or is suffering pain, so two packers promptly swam out to the struggling animals and cut away their loads. Four of them were able to scramble to a firm footing. but the fifth had been dragged further down stream and could hardly keep the weight of the load from pulling his nostrils beneath the surface of the water. When the packers reached the poor animal he seemed beyond all "mule-reasoning," and in a last desperate effort to keep from drowning, kicked and struggled against his rescuers until, in order to save the men, the mule had to be sacrificed.

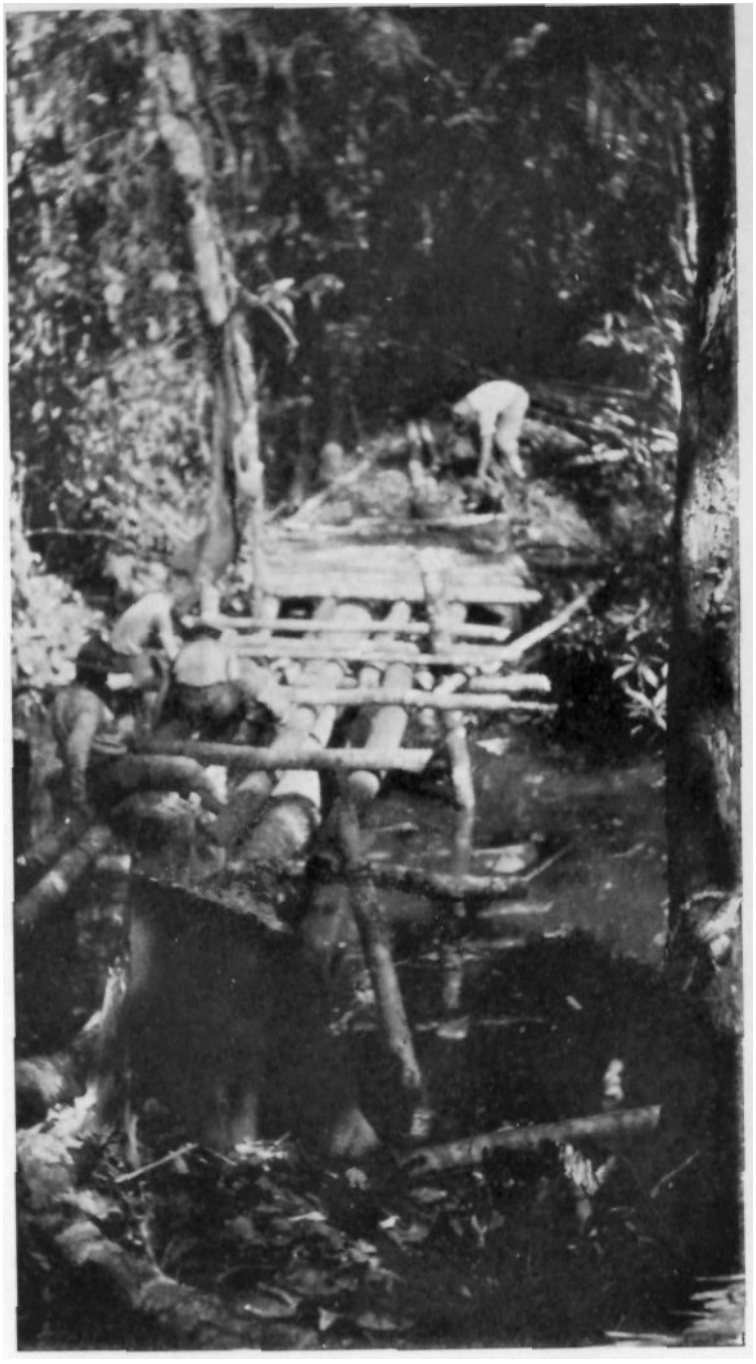
The loads and saddles, with the exception of the burden carried by the drowned mule, were picked up a short distance down the river where the strong current had washed them to the bank. After reloading, the pack train continued its journey back to camp.

The news of the loss of the mule cast gloom over the entire command, not only because he had carried all the hard bread with him, but because he had been the strongest pack animal in the train

THE CONSTRUCTION OF NUMEROUS SHORT BRIDGES WAS BUT ONE ITEM IN THE TOIL OF THE JUNGLE TRAIL.



"A CAMP ON THE EDGE OF THE JUNGLE"



BRIDGING WHERE WADING IS IMPOSSIBLE

and, up to this time had done a great deal more than his share to make the hike a success. In honor of his memory the spot was named Camp Forty-five, which was the faithful animal's hoof number.

At Camp Forty-five the men had an opportunity to police up a bit and go swimming, and the animals were given a much needed rest and allowed to graze—the first real grazing since their departure. All during the trip we had been troubled with ticks and red bugs (jiggers) and the animals suffered intensely from screw worms, which infest every break in the skin. Contrary to our expectations, we had not been troubled with many mosquitoes until our arrival at the Siricito, where the millions at Camp Forty-five seemed anxious to make up for their neglect in the past. Here also we encountered what the natives call the fever ant. They travel almost singly. Only about a dozen were seen in the entire camp, but the bite from one was enough to make up for the scarcity. The unfortunate victim suffered intense pain about the infected parts and ran a high temperature for two days. The fever ant is jet black and about an inch long. Another species of ant was found in large numbers in decaying wood. They looked very much like the fever ant, but were about half as large, and their bite, though painful, did not seem to bring on such alarming symptoms.

After leaving this camp, aeroplanes were sighted through the trees, but we were unable to attract the attention of the fliers. Later, it was learned that these planes had been sent out to look for the battery, as we had had no means of communicating with headquarters for four days, and they feared we were in distress. Although the aviators took great risks in flying close to the tree-tops, the vegetation was too thick for the eye to penetrate, and their mission was unsuccessful.

From Camp Forty-five the battery pursued a native trail, which followed the line of least resistance to the Siri River. At this camp a bit of diplomacy was necessary to prevent a claim against the Government, since the men in the advance party had camped in an Indian's coffee patch, because it offered an easy clearance. Fortunately this Indian had never seen any soldiers, and was interested in the entire outfit. We succeeded in getting in his good graces by having him eat a meal of army chow and giving him a few cans of beans. These overtures made him forget the incident and we shook hands in parting. Near this camp we encountered a small tribe of Indians whose custom is to file their teeth to a point. We learned that this is done when the children are young.

As the loads of rations and supplies received from Cuipo were too heavy to carry at one time, part had been left at Camp Forty-five.

The overworked pack train returned for them while the firing battery advanced across the Siri River. The stream at the place where we forded, was about one hundred feet wide and very shallow, with a firm gravel bottom. We were glad to be able to eliminate some of the difficulties of the march. From here on the series of ridges seemed endless. We crossed one after another all day long. From one high hill (sometimes called Trinidad Mountain) we could see the surrounding country for miles, and Gatun in the distance. That night we camped on the banks of the Trinidad. This was the last stream of any importance to cross our path. We were thankful that it presented no difficulties in fording. Although wider, its characteristics were similar to those of the Siri River.

It was imperative to rest here as long as possible as the effects of the gruelling work done by the entire outfit were beginning to show. The pack train arrived the second day of our stay with its supply of fast dwindling rations. In order to properly celebrate our reunion, quantities of fresh pork and rice were purchased from the natives.

Breakfast next morning consisted of the remainder of the rations. The outfit gritted its teeth and marched. A messenger was dispatched to Chorrera to advise the camp of our condition, but none were content to trust in the arrival of the much-needed supplies. By almost superhuman effort the entire command marched twenty-five miles over terrible trails and arrived at Chorrera that evening.

The camp of the 20th Infantry Brigade had prepared a royal welcome. Because of such short notice donations were made by the outfits from their own supplies. There was fresh meat and bread (which tasted like cake after three days without any) and even ice and for the mules double portions of hay and oats. Unspeakably weary and very, very hungry, but with light hearts, the men gathered together for a real banquet.

Thirteen days of tireless effort and endless work had brought us back to beaten paths. It was good to return to them, and better still was the knowledge that we had taken the first steps to add another to their number. "Me and Morgan!" murmured the men of Battery "A" as they rolled up in blankets on the hard ground. And down on the picket line an ancient gun mule in reverie nodded his head; "Yes, me and Morgan's mule!"

AN INSTANCE OF POST-WAR TRAINING

BY LIEUTENANT THOMAS NORTH, F.A.

IN a memorandum to the Chief of Field Artillery sometime ago, the Chief of the Chemical Warfare Service made a statement to this effect: "The experiences of the last war should be used as signposts, and not as roads." Much has been written of what was done during the war, and how; the foreign journals are largely devoted to ruminating over achievements of 1914–1918, with occasional studies which are based solidly on the conditions which existed during the war; but there has been a disappointingly small output as to what has been accomplished by way of constructive training in the five years which have been afforded us for digesting our experiences.

It is with these thoughts in mind that I set down a few observations concerning the training and performance of one organization over a period of twelve months, hoping that others who are just as busy on new work may feel the urge to give the service at large the benefit of their post-war training experiences.

The organization to which I refer is the First Observation Battery at Fort Bragg, N. C. This unit was organized in August, 1922, as part of the 13th F. A. (Corps Artillery) Brigade, representing the active element of the corps observation battalion. Its authorized reduced strength is 67 men, although it has never reached this total; during the year from 48 to 58 men have been present for duty. One officer was present all of the time, and another joined the battery early in 1923.

The task which was allotted to this unit was couched in about the following terms: "We are outshooting our present means of observation. Your mission is to do your part towards overcoming this difficulty." In addition to this general mission, which was to be followed under the guidance of the Field Artillery Board, the Battery was also charged with the duties of flash ranging, spotting by bi-lateral observation, etc., which have apparently been regarded as the characteristic function of the corps observation battalion. I mention this advisedly as a second mission, for the reason that while it was covered, it showed itself to be limited in scope. To be able to fulfil the first mission implied ability to fulfil the second.

Following close on the birth of the Observation Battery, the tests of the several types of flashless powder for the 75-mm. gun were carried out. They were successful, spectacularly so, if I may use the wrong term. Such a result was most opportune in that it became

object lesson number one on the futility of blindly following the experiences of the war.

A short digression may be worth while. Soon after the war a table of organization was printed and published, headed "Observation (Flash) Battery, Corps Artillery Brigade," and it seemed that the Battery were doomed to perform little else but flash ranging. Undoubtedly the designer had in mind the severance of the growing twins which the Engineers passed on to the Artillery in the post-war readjustment—sound ranging and flash ranging—the former becoming, at once, an active function of the Coast Artillery, while the latter fell to the lot of the Field Artillery. But it is far from likely either that sound ranging will be a monopoly of the Coast Artillery (the cumbersomeness of existing types of apparatus is the only argument against its use by corps artillery for counter-battery work) or that flash ranging will be the prime function of the corps observation battalion, particularly in the light of the flashless powder tests. Flash ranging is a particular case of a situation met daily by surveyors, and frequently by artillerymen, the problem of the location of an unknown point by intersection from known points; the unknown point being an enemy gun-flash or muzzle-smoke. A convenient signalling apparatus for this work was produced during the war by the Western Electric Company, and conditions on the western front were such as to offer the maximum opportunity for the practice of the method.

To return to the subject, the personnel of the First Observation Battery were about what might be expected. They were transferred from other Field Artillery units at Fort Bragg, and, with the addition of recruits, represented the average type of soldier at that post. There were no men with college training, and but one or two who had completed high school.

It was decided that the first real task of the battery should be a thorough test of methods of high-burst ranging, under the direction of the Field Artillery Board. This would have been a strain on the capabilities of an experienced group of trained men, and at the outset the outlook seemed disheartening. However, in preparation for the work ahead, training was started in October, beginning with the fundamentals.

Courses were conducted in map-reading, and elementary arithmetic beginning with simple addition. For the map-reading course, occasional papers No. 65 of the Engineers' School—Manual of Topography—was used as a textbook, and was found invaluable, so that by the end of November every man taking the instruction was able to read the Fort Bragg map and was actually able to go to a point on the ground if the coördinates were given. Great stress

was laid on this subject because a topographic sense is essential to the personnel of the observation battalion. The arithmetic class was held daily and was not dropped until well on in the spring of 1923. In addition to these two courses the basic instruction of the soldier was carried on, following the relevant paragraphs of Field Artillery Memorandum No. 7, 1921—Minimum Specifications of Standard of Training for Field Artillery. Shortly after the commencement of the training period, the men, having been under observation, were divided into four main groupings, *viz.:* (1) Those showing aptitude for observer work; (2) those showing aptitude for communications work; (3) those showing aptitude for maintenance work (clerks, cooks, chauffeurs, etc.); (4) those showing little aptitude. This last class numbered only two or three and was finally absorbed by the other classes.

At this point classes were started in more specialized work; courses in the theory and use of the observing instruments (particularly the battery commander telescope), together with the relevant geometry, for the observers; and in elementary electricity, communications, and the use of the flash-ranging communications apparatus for the communications detail. Examinations, usually written, were held weekly in all subjects, and were followed by critiques. There were no known precedents which the observers' instruction could follow; the communications detail followed the parts of the text of Instruction Pamphlet C-2, Field Artillery School, Camp Knox—Electrical Communications for Field Artillery—which were applicable, and thereafter the course had also to be improvised.

After a time the observers and communications men worked together. Practice in flash-ranging was obtained by setting up a miniature installation of communications over a small area, with observers at each of the six stations which the board can accommodate, from which small smoke-bomb puffs at a distance of about half a mile could be seen. In this way the drills were worked out and developed. The data were sent in turn to the observers in this manner: base point, so-and-so, base deflection, so many mils (thus orienting the instrument); azimuth, so many mils (thus setting the instrument approximately on the burst). Thereafter, by manipulating the azimuth worm knob, and by reading in the reticule each observer was able to find the azimuth of each burst. Each observer had assigned to him a recorder, who performed the arithmetical operations incident to reading in the reticule, and gave the azimuth so obtained to the telephone operator who made the report to the switchboard upon demand. The officer in charge controlled the smoke-bomb party by a separate wire. This practice was carried on for many days until a thorough familiarity with his duties was implanted in each man.

On a few occasions the Battery went on the range and followed the same procedure, observing on actual shell-bursts independently of the firing battery. At this point it was felt that the Battery was competent to perform the mechanical operations peculiar to flash ranging, and without further delay it embarked on practice in high-burst ranging. The procedure was quite similar to that previously adopted. The bursts of the smoke-bombs were raised by hoisting the pots into trees by cords and pulleys. In addition to the azimuth setting an angle of site was given to each observer. Because of the experimental nature of the work to be undertaken, it was deemed advisable to have two observers at each station, one to note the height of burst, the other to note the direction. The height of burst observer was instructed to turn his reticule so that the scale was vertical instead of horizontal.

During all of this time theoretical instruction was carried on. A course in surveying was given to the observers, using Breed and Hosmer's "Surveying." This course went on until late in the following spring and covered the use of the tape, the level (Wye and Dumpy), the transit, and the plane table. As its contribution to post maintenance the Battery was assigned the duty of constructing the range telephone system, and this gave ideal practice to the communications men.

In January the test of high-burst ranging methods was begun, the work lasting until July. Various types of instruments were used, but the observers seemed to experience little difficulty. The supreme test probably lay in their actual ability to collimate pairs of the French telemetric instruments, which was no mean achievement as those who have witnessed this mystic rite will agree. Both day and night observing was carried on, results at night being obtained both with tracer shrapnel and with high-burst shrapnel.

On one occasion an interesting test of the accuracy of the observers' readings was made. It had been found that serious discrepancies existed between the height of burst as computed from the reported site readings of the different observers. Accordingly all of the observers were brought together at a point near to the gun and all of their instruments given the same elevation by setting the crosswires of the reticules at a certain number of mils (read on the reticule) above a fixed point on the sky line. The gun fired a series of high-burst shots. After each shot each observer noted the height of burst with reference to the cross wire, left his instrument, and reported his reading, in turn, to a recorder in such manner that he could not be overheard by the other observers. It was found that the readings checked usually within a mil, sometimes within a half mil, and on some occasions exactly with each other. The test seemed

to indicate that the trouble lay with the bubble settings. From other investigations it was fairly well established that the fault lay with the crudeness of the bubble and its mechanism. This is not a condemnation of the bubble nor of the instrument. It merely indicates that the battery commander telescope is hardly accurate enough for the experimental tests in which it was called upon to take part.

Prior to this time it had been found practical to develop a competent and accurate plotter, and one or two computers. To hear privates responding promptly to requests for "V-V_0" under the known conditions, or the "mean range error of bursts," impressed some of the onlookers as novel. For the tests, the survey work was gradually assumed by the observer detail.

The culmination of the preceding work was reached in June when the organization went into camp on the range to take part in a problem with the 17th F. A. which represented a corps artillery brigade. The mission of the Observation Battery was to establish an installation for conducting high-burst ranging over the corps front. The Battery decided to establish three observation posts, the central station with plotting board being at one of them—the observation posts, as usual, to be connected by telephone. Save for the general reconnaissance, all of the preparatory work and the operations incidental to the conduct of the problem (so far as the Observation Battery's duties were concerned) were preformed by the enlisted personnel. The observation detail was divided into two plane table and one level parties. The plane-table parties consisted of instrumentman and assistant, two chainmen and one or two axemen.

The observation posts lay roughly at the apices of an equilateral triangle having 3000-metre sides. To locate them was by no means a simple matter; there were only three control points in this region, none of which were intervisible, two being traverse points, the other being a triangulation point at which the plane tables could be oriented by using distant points to the rear. The terrain was rolling, with heavy blackjack oak and pine growth. One party ran over two kilometres of traverse. Nevertheless, during the firing, excellent intersections on bursts from the three observation posts were common, indicating that the locations of the latter were probably accurate. It is due to the survey parties to add that with the exception of one man, none of them had handled any of the equipment before joining the organization. About seven thousand yards of wire were laid for the use of the Battery. The actual time consumed in this preparatory work, save for the initial reconnaissance, was the equivalent of less than the daylight hours of one day. In an emergency the reconnaissance could have been made briefer because the observation posts for high-burst ranging could be selected from the

map; for flash ranging and general observation of the enemy sector more care would be required. The results of the fire were quite satisfactory, according to those officers of the firing battery who executed the shoot.

The gratifying feature of this work, and of that throughout the year, was the manner in which the men responded to the instruction given them, and grasped their duties. The chief reason, of course, was that they were thoroughly interested. The system of instruction had been painstaking. No effort had been spared to explain in detail the principles and application of the various subjects. It is my belief that the method of instruction: First you do this, second you do this, third you do this, or you'll do a week in the kitchen (as I have heard said) is totally wrong. Maintaining the men's interest, maintaining their confidence by thoroughly covering the topic before entering the classroom, and maintaining a good mess are a far preferable method. The present-day soldier is evidently often capable of far more than that for which he is given credit, and I have little sympathy with those who sigh for the soldiers of yesteryear.

ORGANIZATION OF A LIAISON DETAIL FOR A BATTALION OF LIGHT ARTILLERY

BY CAPTAIN GEORGE D. WAHL, F.A.

IN most service journals and publications the subject of liaison is handled with an atmosphere of mystery and awe as if one would imply that it could only be understood with divine intervention. Most of these publications likewise confine their discussions to a statement of a few idealistic principles and a tabulation of the equipment to be carried. It is believed that these statements go wide of their mark. What we younger artillery officers need is a precise statement of exactly what is wanted of us and a suggestion of some practicable method of doing that which is asked.

The aim of this article is to suggest a method of organizing the men authorized for liaison purposes so that they will obtain the necessary information we need. We have a good idea as to what the various members of a battalion commander's detail do. There is apparently no reason why the duties of the members of a liaison detail should not be similarly understood.

The sole purpose of military organization should be to increase fighting efficiency. The most conspicuous example of such an organization is the Roman Legion. The Romans thoroughly appreciated the fact that a man fought better as his chances of surviving apparently increased. Consequently, it was understood among them that the neighbors on the right and left of any man helped him when he was hard pressed. Also the man behind him stepped into the front rank when the front rank file became tired or injured. Knowing that assistance would come quickly in case of need and steadied by rigid discipline, the Romans went to the assault with irresistable élan.

In spite of all scientific improvements, the fundamental instrument in war still remains today the individual infantry soldier exactly as in Roman times. All improvements are designed primarily to increase the chances of that individual on our side and to make the chances of the corresponding one on the other side more hazardous. Among the greatest of modern improvements along these lines is that in artillery.

Artillery can assist infantry only by its fire. With its help it can influence the action in two ways. It discourages the enemy by causing him losses. It can also encourage our troops by giving them the consciousness that they are being and will be supported in much the

same way that the Roman Legionary knew that he could rely upon his right and left hand neighbor for assistance.

However, the Roman Legionary came to rely fully upon his comrades only after they had demonstrated their value. In demonstrating our value the best evidence we can give is that which can be appreciated by the individual infantry soldier with his own eyes, *i.e.*, shells bursting among his enemies. Our mission, as artillerymen, in battle is "To shoot, to shoot, and to shoot. To hit, to hit, and to hit."

Obviously we can shoot at and hit many things and do no good at all. Our problem then resolves itself into one of determining what we are to shoot at, so that in hitting it we accomplish our double purpose of raising the morale of our troops and causing perturbation to the enemy. It is believed that in the general case two dozen rounds placed effectively where our own troops can witness and be assisted by their effect will have a much more beneficent result than two hundred rounds placed on targets unseen, and at the moment causing no discomfort to our troops.

In order that our fire may be really effective, *i.e.*, in order that we may attack the targets the infantry want hit, at the time they want them hit, we send liaison details with the infantry units when they go into action.

The functions of these liaison units may be divided into two parts. Each part corresponds to one of the ways in which artillery assists infantry in battle. In the first place, they must furnish the artillery with information by which it can regulate its fire efficiently. Next, by a judicious use of propaganda it must make sure that the infantry does not overlook the support that the artillery has, can, and is willing to give. As we have seen in discussing the Roman Legionary, the mere knowledge that he would be supported made him a better fighter. So also in our case the liaison details should take every occasion to bring the support they render to the infantryman's attention, especially when the infantry supported is green or strange to the artillery. This function becomes less necessary as the infantry becomes seasoned and well acquainted with its supporting arm.

The liaison detail's function of keeping the infantry informed as to what the artillery is doing is well understood. This discussion, therefore, is mainly concerned with the information which it should furnish the artillery. In taking up this discussion we will first define exactly what we want, next where we can find it, and third, how we may transmit it back, so that it may be of use to us in regulating the fire in front of our troops.

To start with, the information we desire may be divided into

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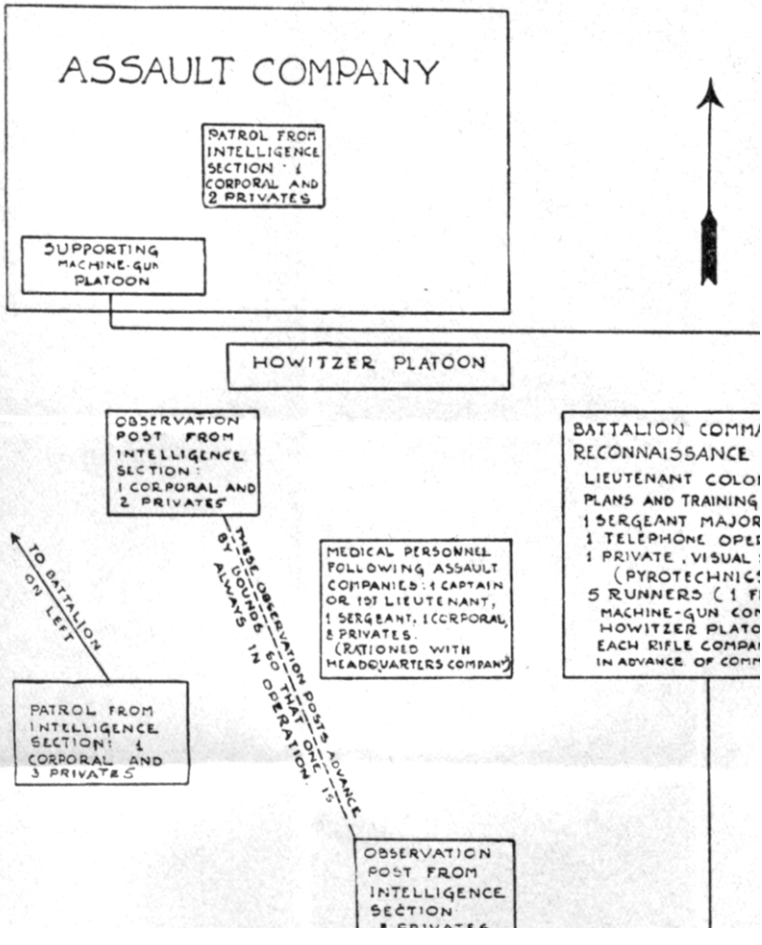
INFANTRY BATTALI

ONE COMBAT FORMATION — OTHER



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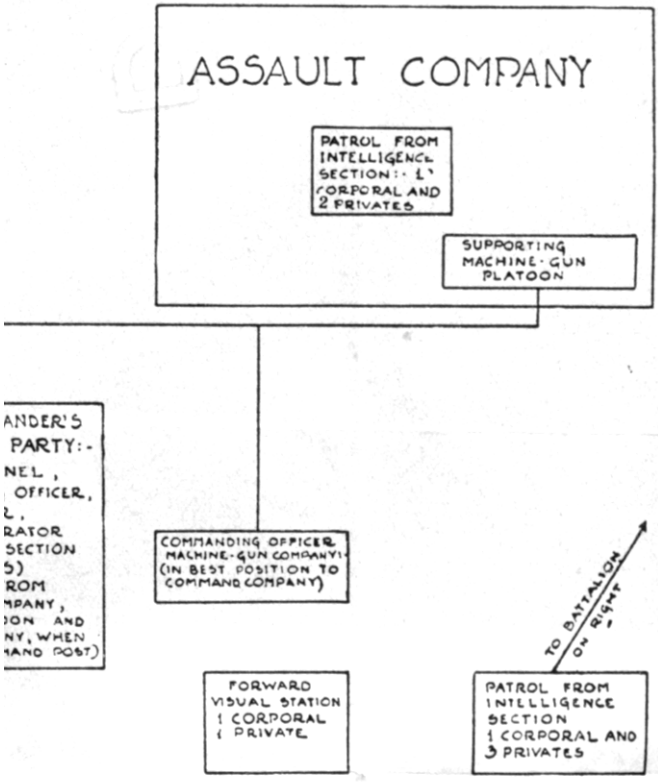
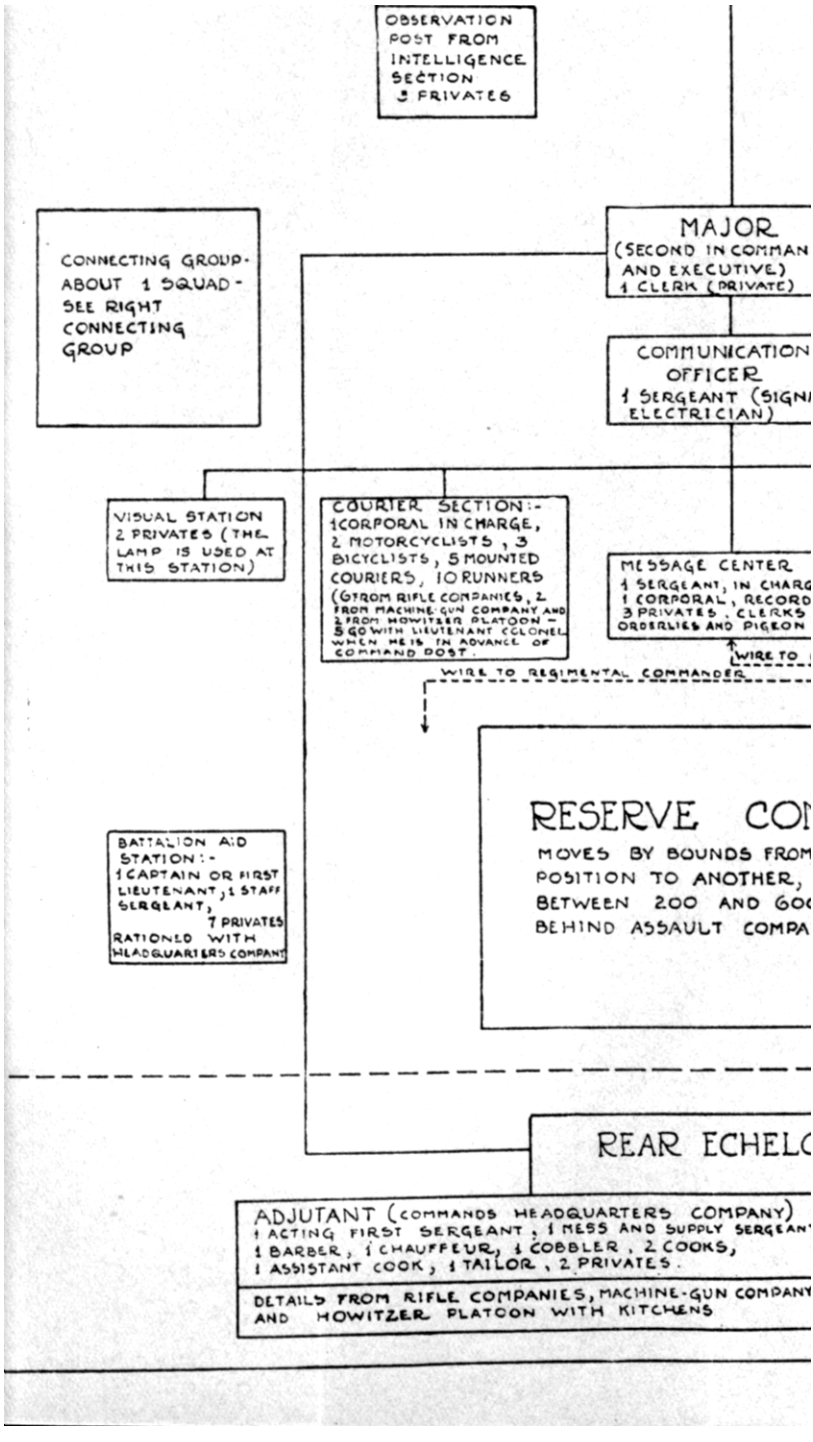
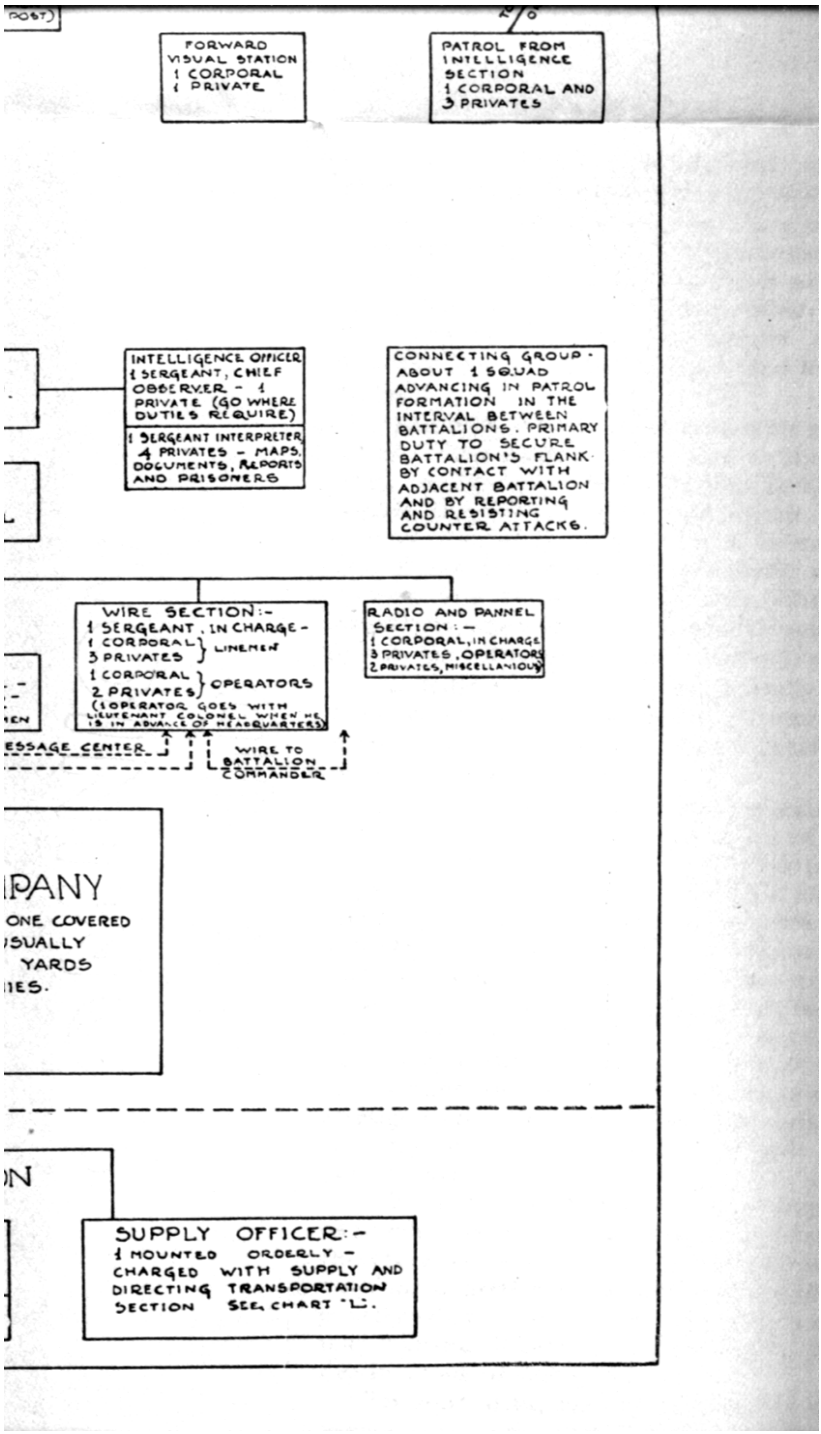
FORMATIONS MAY BE USED




OBSERVATION POST FROM INTELLIGENCE SECTION 3 PRIVATES
CONNECTING GROUP- ABOUT 1 SQUAD - SEE RIGHT CONNECTING GROUP
MAJOR (SECOND IN COMMAN AND EXECUTIVE) 1 CLERK (PRIVATE)
COMMUNICATION OFFICER 1 SERGEANT (SIGNA ELECTRICIAN)
VISUAL STATION 2 PRIVATES (THE LAMP IS USED AT THIS STATION)
COURIER SECTION:- 1 CORPORAL IN CHARGE, 2 MOTORCYCLISTS, 3 BICYCLISTS, 5 MOUNTED COURIERS, 10 RUNNERS (6 FROM RIFLE COMPANIES, 2 FROM MACHINE GUN COMPANY AND 2 FROM HOWITZER PLATOON - 5 GO WITH LIEUTENANT COLONEL WHEN HE IS IN ADVANCE OF COMMAND POST.
MESSAGE CENTER 1 SERGEANT, IN CHARG 1 CORPORAL, RECORD 3 PRIVATES, CLERKS ORDERLIES AND PIGEON
WIRE TO
WIRE TO REGIMENTAL COMMANDER
RESERVE CO
MOVES BY BOUNDS FROM POSITION TO ANOTHER, BETWEEN 200 AND 60 BEHIND ASSAULT COMPA
BATTALION AID STATION:- 1 CAPTAIN OR FIRST LIEUTENANT, 1 STAFF SERGEANT, 7 PRIVATES RATIONED WITH HEADQUARTERS COMPANY
REAR ECHELO
ADJUTANT (COMMANDS HEADQUARTERS COMPANY) 1 ACTING FIRST SERGEANT, 1 MESS AND SUPPLY SERGEAN 1 BARBER, 1 CHAUFFEUR, 1 COBBLER, 2 COOKS, 1 ASSISTANT COOK, 1 TAILOR, 2 PRIVATES.
DETAILS FROM RIFLE COMPANIES, MACHINE-GUN COMPANY AND HOWITZER PLATOON WITH KITCHENS


POST)
FORWARD VISUAL STATION
1 CORPORAL
1 PRIVATE
PATROL FROM INTELLIGENCE SECTION
1 CORPORAL AND 3 PRIVATES
INTELLIGENCE OFFICER
1 SERGEANT, CHIEF OBSERVER - 1 PRIVATE (GO WHERE DUTIES REQUIRE)
1 SERGEANT INTERPRETER
4 PRIVATES - MAPS, DOCUMENTS, REPORTS AND PRISONERS
CONNECTING GROUP - ABOUT 1 SQUAD ADVANCING IN PATROL FORMATION IN THE INTERVAL BETWEEN BATTALIONS. PRIMARY DUTY TO SECURE BATTALION'S FLANK BY CONTACT WITH ADJACENT BATTALION AND BY REPORTING AND RESISTING COUNTER ATTACKS.
WIRE SECTION:-
1 SERGEANT, IN CHARGE -
1 CORPORAL
3 PRIVATES
LINEMEN
1 CORPORAL
2 PRIVATES
OPERATORS
(1 OPERATOR GOES WITH LIEUTENANT COLONEL WHEN HE IS IN ADVANCE OF HEADQUARTERS)
RADIO AND PANNEL SECTION:-
1 CORPORAL, IN CHARGE
3 PRIVATES, OPERATORS
2 PRIVATES, MISCELLANIOUS
ESSAGE CENTER
WIRE TO BATTALION COMMANDER
IPANY
ONE COVERED
ISUALLY
YARDS
IES.
N
SUPPLY OFFICER:-
1 MOUNTED ORDERLY -
CHARGED WITH SUPPLY AND DIRECTING TRANSPORTATION SECTION SEE CHART "L".

two general classes. The first class is that which we need at regular intervals and which also can be furnished to us regularly. We will refer to it in this discussion as regular information. The second class can come to us only at intervals. We will call it emergency information.

The first class of information (regular) can be tabulated as follows:

1st. Location of friendly advanced elements in our objective zone.
2nd. Location of enemy elements in our objective zone.
3rd. Location of friendly advanced elements in adjacent areas.
4th. Location of enemy in adjacent areas.
5th. Targets on which artillery fire would be profitable.
6th. Effect of artillery fire in our objective zone.

The time the report is rendered is of course included and is of utmost importance, especially in computing the probable present location of our advanced elements and thus determining the areas in which it is safe to fire. Under modern infantry tactics we can expect few and, if any, only the most fleeting and indistinct glimpses of anything. In addition to his other duties an artillery observer will have to be quite familiar with infantry tactics and formations in order to interpret correctly what little he does see. In future wars we will have to base our fire largely on information similar to this regular information in order to insure its having any appreciable effect.

The need for these various items of information is apparent to any artilleryman, and needs no discussion. There is one point concerning them which does need some elucidation. How often is this information to be furnished?

There are two extremes between which the average case comes. To illustrate the first case, we can take the action of the Second Division at Soissons. The rolling barrage lifted 100 metres every two minutes. The battalion commander needs information under these circumstances at very short intervals—approximately every half hour. The other extreme is a completely inactive sector. Here a report once every twelve hours would be amply sufficient. The commander concerned will have to estimate the interval desirable in any particular situation.

Our second class of information (emergency) may be tabulated similarly to the above as follows:

1st. Changes in infantry plans.
2nd. Infantry desires and complaints.

The first subhead above covers a multitude of situations and some explanation of what is meant would not be out of place. For instance, we are deployed on the defensive. We decide to make a raid. This is a change in plan. Likewise, suppose that we are advancing at the rate of 100 metres in four minutes and the hostile resistance forces us to stop. Although forced on us we have changed our plan. What we refer to as a change in plan is any change from what the infantry originally told us they intended to do.

The second subhead grows largely out of the first. It does not need any explanation.

The moment when this emergency information will have to be transmitted cannot possibly be foreseen. It can only be forwarded as quickly as possible as the need arises.

We have enunciated so far exactly what we want our details to tell us. The next thing we must do is to point out how this information may be obtained.

There are two ways in which this information may be secured. One way would be to go out and get it with purely artillery personnel. The second way would be to rely upon the infantry headquarters for some of it. The first method might be the most desirable, but it requires many more men than the tables of organization permit. We are then forced back upon a reliance on some of the information which the infantry gathers for its own purposes.

It is necessary at this point to digress for a minute and discuss the organization of an infantry battalion and more particularly its headquarters in an attack. If this is not done some of the things mentioned later will not be clear. The subject is covered very concisely by chart J of the Infantry School at Camp Benning. With apologies to that institution, we attach the chart and the following brief discussion.

In the rectangles representing the assault companies is a smaller one showing a patrol from the intelligence section. Likewise patrols are shown going out to the right and left hand neighbor assault battalions. Two observation posts are shown which move alternately so as to keep constant watch over the zone of advance of the battalion as well as over adjacent areas. These patrols and observation posts report eventually to the intelligence officer's station shown to the right of the executive in the command post.

The information to be covered by reports from these observation posts and patrols is given by a pamphlet from Ft. Benning and includes the following:

Enemy front line.
Enemy order of battle, including reserves.
Enemy artillery.

Enemy defensive organization.
Enemy intentions and tactics.
Terrain.

If we add to the above list the location of our advanced elements which the intelligence section also ascertains and the effect of our own fire which can be seen from the observation posts, a comparison with the tabulated list of regular information will show that all the elements of that list are contained herein. The regular information, then, can be secured mostly through the activities of the intelligence section of the front-line infantry battalion.

It is not intended that the inference should be drawn from this article that only such data as can be secured from the infantry will be used. Information secured by purely artillery personnel should be used when obtained. However, it is useless to parallel the sources of information of the infantry by the efforts of ten men. It is much more economical to use the information gained by the infantry and secure any additional information which is needed through the efforts of the liaison detail when necessary.

Just in rear of the assault company rectangles on chart J may be found a rectangle labelled battalion commander's reconnaissance party. That party is seen to include the battalion plans and training officer, the sergeant major and an assortment of runners for communication purposes. In action this party continually moves forward to some point behind the advancing elements from which the greater part of the zone of advance can be seen. Any changes in plan, whether forced on us or premeditated, should come to light first with this group. Likewise the battalion commander is the one who expresses the desires of the infantry and makes their complaints. From this party we can gather our emergency information.

We have enumerated so far exactly what we are looking for and indicated where it could most probably be found. The third part of this discussion will concern itself with the gathering of this information and transmitting it back to the artillery battalion concerned.

According to our organization at the present time the only people we can make available for liaison purposes from the headquarters of a battalion of light artillery are the following:

1 Liaison Officer.
1 Scout Sergeant.
1 Scout Corporal.
3 Scout Privates.
2 Telephone Operators.
1 Lineguard.
1 Motorcycle and Sidecar.

With this small party we must cover the activities of the front-line

intelligence and operations sections and still have enough to replace casualties and transmit the information back to the rear.

We have stated above that the "regular" information could be gathered from the intelligence section with the possible exception of the effect of our own fire. Let us detail one of the two scout noncommissioned officers to the task of sifting the information gathered by this section and preparing the regular report required. By detailing one of the scout privates with each of the two observation posts, we can require from them the report as to the effectiveness of our fire. This group of one noncommissioned officer and two men can handle the regular information. (See tracing attached to Chart J.)

The emergency information can best be obtained from the battalion commander's reconnaissance party. For this duty we can assign the liaison officer in person. We can also give him one operator and a lineguard with the only phone in the detail to assist him in his communications.

We can place the remaining noncommissioned officer in charge of transmitting the information to the rear. The only personnel available for his use will be one scout private, the spare telephone operator and the driver of the motorcycle and sidecar. The means of communication at his disposal are thus seen to be two runners, one motorcycle, the telephone line when it is in and, in cases of emergency, the infantry will permit the use of the S.C.R. 77-A set assigned to the front-line infantry battalion.

Under no circumstances should any message be sent to the rear without the signature of the liaison officer or the approval of the infantry battalion executive in case the liaison officer is absent with the battalion commander.

Although not directly connected with the liaison detail, we may properly include in this discussion a mention of the artillery-infantry telephone line. This is a most difficult line to lay and maintain. Its successful operation directly effects the efficiency of any liaison detail at present.

On starting out to lay the line, the preliminary reconnaissance will usually show some point in advance of the artillery battalion switchboard to which the wire may be laid by the cart under cover. At this point the wire may be cut and a phone attached. This point then serves, temporarily, as a forward communication centre from which messages from the front can be telephoned back to the battalion command post.

Reconnaissance pushed further forward will usually find another point where the cart will be under cover but which cannot be reached by defiladed routes. If the cart is turned about, the wire may be pulled by hand from the cart to the new piece of cover.

When the wire has reached the new piece of cover, it is cut at the cart and spliced to the wire end near the cart. The phone is sent to the forward end of the line, which in its turn becomes the forward communication centre. The cart must then cross to the new bit of cover by taking an increased gait over the exposed places. On its arrival the whole process is repeated.

In this way the end of the wire should finally arrive at the infantry command post. If the artillery communications officer keeps on the job, it should never be more than 400 metres from the command post at any time. The scout noncommissioned officer in charge of the transmission of messages can then either connect to the forward end of the wire with his breast reels or he can send a written message to the forward communication centre by runner for transmission to the rear, by phone.

There is some information which must be furnished the liaison detail in order that it may fulfil that portion of its duties which deal with keeping the infantry informed of the doings of the artillery. These things may be enumerated as follows:

1. General area the artillery battalion occupies, including the command post.
2. How the battalion may be reached by runner, phone and wireless.
3. Quantity and types of ammunition available.
4. What the artillery cannot hit.
5. Location of observation post and what they can see.

Most of this information will have to be furnished from time to time in the form of memoranda. Dead space charts, elaborate wire diagrams, etc., are usually out of date by the time they are completed in a moving engagement and will be rare. They are an ideal toward which to work.

This discussion has involved only liaison with the front-line infantry. It is the most difficult to obtain. The necessary liaison with the infantry regiment is usually obtained with the close proximity of the command posts of the infantry regiment and artillery battalion. This can only be secured if both commanders realize that mutual sacrifices will have to be made. The artillery battalion cannot move its headquarters every half hour or so. When it is necessary to send a liaison detail to the infantry regiment the organization and functioning of the detail is similar to that sent to the infantry battalion. This detail, however, will have to be furnished complete by the artillery regiment from which the battalion comes. The tables of organization do not allow sufficient personnel otherwise.

The personnel available for liaison in a battalion of artillery is

pitifully small. No reserve is available to replace casualties or to make necessary reliefs.

The artillery usually outlasts the usefulness of several infantry front-line battalions in action. The liaison details suffer the same fatigue and mental stresses as do the infantry units to which they are attached. If they are allowed to stay in front too long they break down and inefficiency is the result. However, if the detail is to be relieved the personnel from the headquarters of the artillery regiment must be used or the batteries will have to be called upon to supply the men. The result in either case will be that the artillery battalion commander will be held responsible for the functioning of a detail over whose training he has had no supervision.

From time to time in any one moving engagement liaison with the infantry regiment will be necessary. The command posts cannot move simultaneously all the time. These we have stated will have to be borrowed from the artillery regiment. Will the artillery regiment always be readily accessible when this need arises?

It would appear that an artillery battalion should have at least two complete liaison details permanently a part of its headquarters. When the one serving with the front-line battalion is exhausted, it can be rested by using it at infantry regimental command post, where its duties will not be arduous. The detail which originally worked at the infantry regimental command post can then replace the front-line liaison unit. Under this organization the artillery battalion may be expected to function under usual conditions without the aid of borrowed personnel whose personal ability and training are uncertain factors until they are tried.

We cannot afford to allow ourselves to be influenced unduly by our experiences in the late war. Equipment, organization and training are constantly improving. It is our business to take every opportunity to improve our own efficiency and make use of all the things which can be turned to our needs. We should at least rely on the other branches doing what they say they can do.

In case the fundamental idea of this article has been lost sight of in the maze of words, it is restated at this point.

Our mission in battle is to shoot at and hit the targets the infantry want hit at the time they want them hit. It is the purpose of the liaison details to insure this coördination of our efforts. The function of these details is twofold. They furnish us information. They must also show the infantry what we are doing in order to promote their confidence in us. The end we must strive to attain is the relation of the right and left hand neighbors to the Roman Legionary previously discussed. The Legion was the greatest fighting combination in all history.

COLORADO ENDURANCE RIDE OF 1923

BY MAJOR HENRY LEONARD, U.S.M.C.

This article with the accompanying cuts is reproduced from *The Remount* by courtesy of the American Remount Association. A table of the data relative to the results of the Ride appears in the "Current Field Artillery Notes" of our last JOURNAL.

AUGUST has come and gone and the Western Endurance Ride has passed into history, leaving behind it a trail of pleasant memories and some useful information. This event was the sixth of its kind to be held in the United States, four having occurred in the East and two in the West.

The Colorado Ride had an entry list of 22 this year, of which number 19 faced the starter on Monday morning, July 30; of these, 7 completed the ride. The entered horses this year were almost uniformly immeasurably superior in type, breeding, and conformation to those which competed last year, and evidences of the stimulating effect of the competition are apparent on every hand. It is safe to say that prior to the 1922 contest the overwhelming majority of ranchmen and "cow punchers" alike in this country clung to the fond illusion that the horse par excellence for all work requiring endurance and the capacity to come in tired at night, after a long grind, and go out the following morning fresh and ready to repeat the journey down a long road was the range-bred cow pony of uncertain lineage.

This does not mean, and I do not suggest, that the blood horse was not known and appreciated in Colorado, for the facts are otherwise. The thoroughbred and the standardbred have been raced here for many years, but the cowman's idea has been that horses of this kind were creatures of luxury, fit to do superlatively well a comparatively few seconds' work at high speed, but wholly unadapted by breeding and habit to undergo any sustained effort on the road, or to carry appreciable weight on his back. It is not too much to say that today if the entry list of the Endurance Ride were thrown open to horses of uncertain breeding or of known plebeian blood (as was the case in 1922 when the Ride was started in the West) there would be no single such entry. I say this advisedly, and it is predicated not only upon what I have heard expressed among my ranchmen and "puncher" friends, but also upon the

characteristics which they as a class possess. Among no other body of men is there manifest such a broad open-mindedness and willingness to act upon an established fact; such a readiness to accept man or horse upon the basis of what he is and can do and not upon what is said about him, or what his forebearers were. So in accordance with this habit of mind, they are going in for thoroughbred horses and for breeding their good mares to Remount thoroughbred stallions because thoroughbred horses have shown to them what they can endure and accomplish. And more than this, they are buying thoroughbred mares and thoroughbred colts at a rate which removes from the realm of speculation the proposition of making this one of the premier horse-breeding sections of the country.

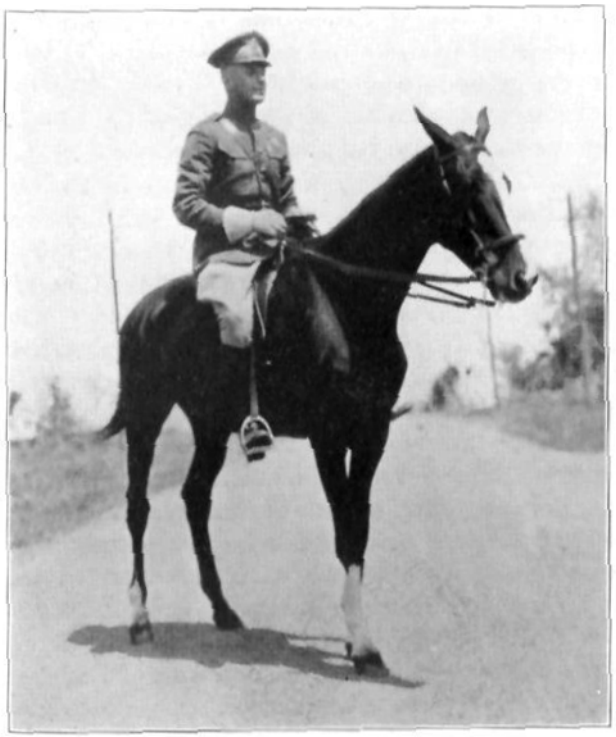
Using a process of elimination, an opinion is offered as to why the various horses which dropped out were unable to proceed further. On the first day, after having covered less than 50 miles, Commodore, Entry No. 19, died following an attack of acute indigestion. A post-mortem examination was at once performed by the official veterinarians and it transpired that something which this horse had either eaten or drunk had caused violent indigestion followed by the generation of a large volume of gas in the intestinal tract which caused pressure upon the heart and death. As was to be expected, some unfavorable comment was at first indulged in by that element found at large in every community which neither thinks nor seeks to learn facts. In truth they sedulously avoid the ascertainment of facts in order that their theories and preconceived views may not be complicated thereby. Had this horse's death transpired after he had completed several days of the ride, the situation might have been more difficult to clear up in the minds of many. His death was no more brought about by exercise than is the death of a self-indulgent businessman, who has eaten not wisely but too well, superinduced by exercise. Happily this fact was removed from the realm of speculation by autopsy.

The second day weeded out the unfit mercilessly, eight horses being disqualified or withdrawn. At 11:35 on this day, Tennessee, No. 3, was ruled out because of excessive fatigue accompanying a slight cold. This horse wings with near fore at walk, wings both fore at trot, and wings near fore at canter while turning off fore out upon hitting the ground: he has corns in both fore feet and his front heels are slightly contracted. His bad way of going and the additional effort resultant therefrom, and in some measure his cold, put him out.

David Gray, No. 7, Rabbit, No. 8, Sergeant, No. 9, and Star, No. 10, had not had nearly enough preparation and were consequently

THE ENTRIES WHICH FINISHED

From left to right: 1. *Norfolk Star*, Captain Herbert E. Watkins, rider; 2. *Nintu*, Lieutenant Maxwell M. Corpening, rider; 3. *Babe*, Ted Flynn, rider; 4. *Indianola*, Captain H. R. K. Tompkins, rider; 5. *Captain*, Ed Bronson, rider; 6. *Kansas*, Jack Joyce, rider; 7. *Chief*, Jack Hall, rider. The Governor of Colorado in the centre.



NORFOLK STAR—FIRST PLACE

not ready for the work expected of them. David Gray and Rabbit could not be gotten into condition to do the work they were given to do, at the rate they were required to do it, by any amount of preparation. They simply are not bred and built to do it. Last year Rabbit finished second because only one horse was able to make time and maintain condition. This year a fast pace was set on the first day, many riders being determined to make minimum time. Rabbit's short muscles and choppy gait could not be lengthened out, so he had to make "more revolutions." He could not maintain the pace. David Gray is a fine, strong horse, but his draft blood let him down when he had to make time. Sergeant and Star might possibly be prepared to make the ride. Swipes, No. 15, is too far away from the ground—too long of leg. Boise, No. 17, is a fine young three-quarter bred horse which appeared to have gotten congested over the loin due to cold, with consequent stiffness and bad action behind. Tad H., No. 20, was withdrawn by the Chief of the Remount Service when the horse was going finely. The action was taken because the rider of this entry, though ill, was too courageous to substitute another in his place. One admires so much the spirit that it dwarfs the question of judgment. As Tad H. had already served 30 mares and with 28 more booked, the Chief of the Remount Service wisely decided in favor of a successful breeding season for the stallion, rather than a continuance in the ride.

Tango, No. 6, went out on the third day by reason of fatigue and muscle soreness. This horse paddles with his off fore at the walk, wings with near fore at the trot, is calf-kneed, cow-hocked, and showed old interference marks behind. Of course he tired! He had to do twice as much work as a straight-going horse, and his inequalities of conformation did nothing to offset his errors in gait.

Wauketa, No. 4, went out on the fourth day; fatigue was causing her to knuckle badly on rough spots in the road and her respiration and pulse began to show irregularity. This mare faded away in the loin and flank under exertion. Chiqueta, No. 11, did not start on the fourth day. It may well be that this mare's soreness came from being shod with polo shoes; the soles of her feet were too close to roads having loose stones on a hard sub-surface, and consequently they got too much hammering.

We now pass to a consideration of the horses which finished. Chief, No. 1, was not placed because he was sore all around and came out lame in off hind and off fore on the morning of final examination. His trouble came from the fact he places both fore feet in the median line at the walk; paddles at the trot and canter, and has side bones in front. He went along on his courage.

Norfolk Star, No. 16, captured first place with a condition score

of 58 per cent., a speed score of 31.47 per cent. (time—46 hours 4 minutes), and a consequent figure of merit of 89.47 per cent. This horse won first place last year also, being the only horse, East or West, which has ever secured this distinction twice. He is thick-winded as a result of distemper and his hind fetlock joints are somewhat enlarged. He gives the impression of being slim in the waist, but his heart girth is 72 inches and his loin 73 inches; this, accompanied by an 8½-inch front cannon, a 9-inch hind cannon, a tremendous dimension from point of hip to point of buttock, and perfectly straight gaits, leaves small room for wonder that he covers ground with slight effort. To an observer it was rather amusing to watch the tactics of the rider of this entry. Each morning he checked out very close to 7 o'clock, the final minute for starting; about 1 P.M. he would catch up to the field, his horse having been on the bit throughout the forenoon; for an hour or so he would ride along with the bulk of the contestants and about 2 o'clock he would quicken his pace and proceed to the finish without apparent effort. The psychological effect of this performance upon the other riders was very evident; conscious that he had started almost half an hour later than some of them, they began to fret when he caught them; when he left them in the afternoon the effect was heightened, with consequent reaction upon their mounts. Nintu's rider was the single exception to this—he started ahead, stayed ahead, and came in ahead, with highest time score and shortest time on the road.

Nintu, No. 18, finished second, with a condition score of 53 per cent., a time score of 34.14 per cent. (45 hours 44 minutes on the road), and a figure of merit of 87.14 per cent.; only 2.33 per cent. below the winner. This mare had just one month's work before starting in the ride; prior to that she had been on pasture for two years without any work. She was not ready to start and lost 7 points on her condition score because during the ride the tendons in her front legs, and her front fetlock joints filled somewhat. Both she and Norfolk Star ran surprisingly uniform pulse, respirations, and temperature. Norfolk Star's highest pulse was 40; highest respiration, 18; and highest temperature 101.4. Nintu showed a pulse of 42 on one occasion, with highest respiration 18, and highest temperature 101.2. Referred to a normal standard of 34 to 44 for pulse; of 12 to 18 for respiration; and of 99.2 to 100.4 for temperature, it would seem to suggest that these horses evinced no more effects from the ride while it was actually in progress than from ordinary exercise.

Babe, No. 21, finished third with a condition score of 56 per cent., a time score of 26 per cent. (46 hours 45 minutes on the road), and a final merit of 82 per cent. This mare goes low and straight.

NINTU—SECOND PLACE

BABE—THIRD PLACE

INDIANOLA—FOURTH PLACE

CAPTAIN—FIFTH PLACE

KANSAS—SIXTH PLACE

NINTU ON THE ROAD IN THE BLACK FOREST

LUNCH STOP

CHIEF—SPECIAL PRIZE

Indianola, No. 12, finished fourth, with a condition score of 47 per cent., a time score of 32 per cent. (46 hours on the road), and a final merit of 79 per cent. This horse goes low and straight. He showed the coarseness in conformation of his percheron sire, but the bone, tendons, and courage of his dam.

Captain, No. 2, finished fifth, with 50 per cent. for condition and 25.07 per cent. for speed (46 hours 52 minutes on the road), and a final score of 75.07 per cent. This horse is a short-backed standardbred. He was broken this spring and started work in harness. He is a horse of courage; his straight shoulder and high way of going heated his joints and tendons in front somewhat.

Kansas, No. 5, finished in last place, with 44 per cent. for condition, 19.60 per cent. for speed (47 hours 33 minutes), and a total score of 63.60 per cent. This Kentucky saddle horse started out mixing gaits, racking and foxtrotting by turns; he finished with a square trot.

Of the 19 saddles in use, 13 were of stock design ranging in weight from 35 to 45 pounds, the remaining six being army field saddles running from 18 to 21 pounds in weight. After considerable examination of the question it would seem probable that the stock saddle distributes the weight over a greater area of the horse's back than any other and when ridden by one accustomed to its employment is well adapted to use in the long ride.

The final examination of the horses which finished occurred on the irregular ground lying beside the Cheyenne Mountain Country Club polo field with results as above indicated. This year an innovation was adopted in working out the horses. Mr. Albin and I rode each horse which finished. I feel that five years of judging (and let him try it who believes it an easy task) have entitled me to retirement, but I have no hesitancy in saying that should I again judge, I would not be willing to pass finally upon a lot of Endurance horses without riding each during the final examination. It is a certain method of learning how much is left in a horse and how he is going.

Each year's experience renders it more abundantly certain to me that I do not care to own a horse which does not travel straight. Were I purchasing horses for field service, however great the emergency, and whatever other concessions I made, I should not buy a single one which did not travel straight, or which had any eccentricities of foot or leg action; and I reach this determination because, were I to depart from it, I am sure I should only be sending encumbrances into service.

It may be interesting to note the shrinkage in weight after five days' work of this kind and the rapidity with which it is taken back.

For this purpose only the seven horses which finished will be used in the following table:

WEIGHTS

Name	Start lbs.	Evening 5th day lbs.	Loss lbs.	Morning 6th day lbs.	Loss lbs.
Norfolk Star	1000	920	80	985	15
Nintu	1045	990	55	1030	15
Babe	950	870	80	935	15
Indianola	1080	1008	72	1065	15
Captain	1055	988	67	1005	50
Kansas	1160	1095	65	1125	35
Chief	1065	965	100	1005	60

The four top horses had lost from 55 to 80 pounds in the five days' ride; their powers of rehabilitation and recovery were such, however, and their condition so good that within the space of about 27 hours they regained sufficient from food, water, and sleep to reduce their net loss to 15 pounds each. Although two of the lower ranking horses showed a lesser loss on the ride by as much as 15 pounds, yet their fatigue was such that they did not recuperate so rapidly nor were they able to assimilate their feed so well. These horses were carefully watched and no salting was allowed, so inordinate quantities of water played no part in recovery of weight.

MR. BROWNLOW enlisted in the Regular Army at the beginning of the World War, and received his recruit instruction and training as a soldier, under Sergeant Hogan. He later became an officer in the 12th Field Artillery, and served as such until the return of the regiment to the United States, when he returned to his civil pursuits.

Sergeant John D. Hogan, a resident of St. Helena, Kentucky, enlisted in Battery "D," 6th Field Artillery, July 6, 1905, and remained until July 5, 1908. He served with Battery "A," 3rd Field Artillery, from August 3, 1908, to August 2, 1911; Battery "E," 3rd Field Artillery, from August 6, 1911, to August 11, 1914. Reënlisted August 16, 1914, at Fort Slocum, New York, and was assigned to the 84th Company, Coast Artillery Corps. He was transferred to Battery "E," 3rd Field Artillery, November 28, 1914, and later when the 12th Field Artillery was organized, Sergeant Hogan was selected, to train men for overseas service. He was transferred to Battery "B," 12th Field Artillery, on June 7, 1917.

Sergeant Hogan participated in the following battles while a member of the 12th Field Artillery: Verdun, May 26, 1918; Château Thierry, June 3, 1918; Soissons, July 18, 1918; Lorraine, August 6, 1918; St. Mihiel, September 12, 1918; Argonne (Champagne), October 2, 1918; Argonne, November, 1918. Killed in action November 6, 1918, at Bayonville, France.

ONE ROUND HOGAN

BY J. L. BROWNLOW. EX-12TH F.A.

Five years ago—how the time flies Since
we planted you under the sod.
Loving hands gave you back to your
Maker,
Back to the soldier's God.

You were born to the Field Artillery, The
rattle of harness and chain,
The shriek of the high explosive And the
shrapnel's deadly rain.
'Twas ten years ago that I met you—(I
was then but a raw recruit)
But you taught me the tricks of the old 3-
inch
Ye gods, how you loved to shoot.

Came the war with it's myriad horrors;
Disease, filth and gas-drenched breath,
But you went, like the man God made
you
To the arms of a certain death.

I saw you at Château Thierry, Soissons
and Saint Mihiel,
Always calling for "high explosive To
give the Heines Hell."

Bayonville, up in the Argonne, The Sixth
of November, the date
You went west to your Maker, smiling As
you whispered "Old bud it's fate."

I can hear the words of the "Padré" And
his prayer like a mother's kiss,
As he read from a thumb-worn Bible
"Greater love hath no man than this."

Up on high, old Pal, are you watching.
And guarding us here below?
Are you guiding the steps of your gun-
crew?
Aye, somehow I seem to know.

When we go to our final encampment
With the regiment forevermore.
May God write my name on your detail,
"One Round Hogan's Number Four."

CURRENT FIELD ARTILLERY NOTES

Fort Sill Schools

THE Sill Schools opened the middle of September and five officers' classes are pursuing as many different courses—the Special Course, the National Guard Officers' Course, the Reserve Officers' Course, the Advance Course and the Battery Officers' Course.

The Special Course is designed primarily for senior officers of the Regular Army who are detailed from other branches to the Field Artillery. These details are made necessary by the shortage of high ranking field officers of the Regular Field Artillery under the present system of promotion. The course lasts four months and thirteen officers are now taking it.

Nine Reserve Officers and forty-two National Guard Officers, a total of fifty-one, drawn from twenty-two States, are taking their respective courses. These last for three months and will be repeated with new officers next spring—March 15th to June 15th. The two classes are at present combined for instruction.

There are thirty-one officers in the advance course. This is for field officers of the Regular Army Field Artillery. It lasts nine months.

The Battery Officers' class is the most numerous at the school. Its members are drawn from the Regular Army Field Artillery and as its name implies is for the captains and lieutenants. There are eighty-five students entered in this course which, like the advance course, lasts nine months.

In addition to the officer classes, there is the school for enlisted specialists, which comprises courses for horse-shoers, saddlers, battery mechanics, motor mechanics and communication specialists. These last four months and will be repeated next spring. The students are detailed from the Regulars and National Guard.

National Guard Drill Attendance

There is an interesting study in comparisons furnished by the Armory Inspection Reports of the various National Guard units. These reports cannot with justice be relied upon to furnish a final order of merit of the organizations, of course; the reports are made out by different inspectors with unavoidably different personal standards of excellence and the units themselves work under different conditions of local favor. However, the "Yearly Average Attendance at Drill" has been selected as the one characteristic which is free from a lack of uniformity in inspection,

and the results are tabulated in the Office of the Militia Bureau. The Field Artillerymen may well be proud of their showing.

The following table gives the relative standing in drill attendance during 1922 (based on a comparison with the maintenance strength) of the highest company-battalion-regiment (or similar tactical unit) in each State:

COMPANIES—OR SIMILAR UNITS

Order	Unit	State	Percentage
1.	Btry. D, 141st F.A.	Ala.	137
2.	Btry. D, 192nd F.A.	Conn.	135
3.	Co. K, 14th Inf.	N. Y.	129
4.	Btry. D, 110th F.A.	Md.	123
4.	Btry. E, 150th F.A.	Ind.	123
6.	Btry. B, 120th F.A.	Wis.	121.5
6.	Btry. F, 101st F.A.	Mass.	121.5
6.	Btry. B, 185th F.A. (155-mm. H.)	Iowa	121.5
9.	How. Co., 155th Inf.	Miss.	116
10.	Btry. A, 189th F.A.	Okla.	115
11.	Co. G, 295th Inf.	P. R.	114
12.	Btry. A, 147th F.A.	S. Dak.	113.8
13.	Co. F, 122d Inf.	Ga.	112
13.	Co. B, 163rd Inf.	Mont.	112
15.	Co. I, 103rd Inf.	Me.	111
15.	421st Co. C.A.C.	N. C.	111
17.	Co. F, 159th Inf.	Calif.	108
18.	Btry. C, 130th F.A.	Kan.	107.5
18.	Co. D, 104th Engrs.	N. J.	107.5
20.	347th Co. C.A.C.	R. I.	106.3
21.	Co. I, 135th Inf.	Minn.	106.1
22.	Co. A, 149th Inf.	Ky.	106
22.	Co. L, 111th Inf.	Pa.	106
24.	Co. K, 154th Inf.	Fla.	105
24.	Tr. B, 106th Cav.	Mich.	105
24.	Co. E, 161st Inf.	Wash.	105
27.	Co. G, 164th Inf.	N. Dak.	103
27.	Co. C, 133rd Engrs.	S. C.	103
27.	Co. A, 111th Engr.	Tex.	103
30.	Co. G, 1st Inf.	Hawaii	101.5
31.	Co. I, 162nd Inf.	Oreg.	100
32.	Co. K, 134th Inf.	Neb.	98.4
33.	Co. B, 156th Inf.	La.	98
34.	Tr. A, 107th Cav.	Ohio	97
34.	Btry. B, 111th F.A.	Va.	97

COMPANIES—OR SIMILAR UNITS (*continued*)

Order	Unit	State	Percentage
36.	Co. C, 153rd Inf.	Ark.	92
37.	Btry. C, 128th F.A.	Mo.	91
38.	Co. I, 172nd Inf.	Vt.	89
39.	Tr. A, 116th Cav.	Idaho	86
39.	Btry. C, 145th F.A.	Utah	86
41.	Btry. E, 158th F.A.	Ariz.	85
42.	Co. A, 117th Inf.	Tenn.	82
43.	Co. K, 130th Inf.	Ill.	79
44.	Btry. G, 197th Art. (A-A.)	N. H.	78.5
45.	Tr. C, 111th Cav.	N. Mex.	71.5
46.	Co. A, 142nd Aux. Engrs. Bn.	D. C.	71
47.	Co. G, 150th Inf.	W. Va.	67
48.	Co. H, 157th Inf.	Colo.	66
49.	Btry. H, 198th Art. (A-A.)	Del.	58.5
50.	Tr. C, 115th Cav.	Wyo.	54

BATTALIONS—OR SIMILAR UNITS

1.	2nd Bn. 192nd F.A.	Conn.	131.4
2.	2nd Bn. 141st F.A.	Ala.	131.3
3.	2nd Bn. 101st F.A.	Mass.	120
4.	3rd Bn. 10th Inf.	N. Y.	116
5.	1st Bn. 103rd F.A.	R. I.	113
6.	1st Bn. 185th F.A. (155-mm. How.)	Iowa	107.7
7.	2nd Bn. 147th F.A.	S. Dak.	107.3
8.	2nd Bn. 295th Inf.	P. R.	104
9.	3rd Bn. 150th F.A.	Ind.	99
10.	1st Bn. 146th F.A.	Wash.	97
10.	2nd Bn. 130th F.A.	Kan.	97
12.	1st Bn. 122nd Inf.	Ga.	96
12.	1st Bn. 117th F.A.	N. Car.	96
12.	2nd Bn. 134th F.A.	Ohio	96
15.	2nd Bn. 107th F.A.	Pa.	95
15.	1st Bn. 127th Inf.	Wis.	95
17.	1st Bn. 152nd F.A.	Me.	93
18.	1st Bn. 112th F.A.	N. J.	91
19.	1st Bn. 123rd F.A.	Ill.	90
19.	1st Bn. 118th Inf.	S. C.	90
21.	3rd Bn. 135th Inf.	Minn.	89
22.	2nd Bn. 149th Inf.	Ky.	88
23.	3rd Bn. 162nd Inf.	Oreg.	86
24.	1st Bn. 111th F.A.	Va.	84
24.	3rd Bn. 180th Inf.	Okla.	84

BATTALIONS—OR SIMILAR UNITS (*continued*)

Order	Unit	State	Percentage
26.	1st Bn. 156th Inf.	La.	82
26.	1st Sq. 106th Cav.	Mich.	82
26.	3rd Bn. 155th Inf.	Miss.	82
29.	1st Bn. 144th Inf.	Tex.	81
30.	3rd Bn. 1st Inf.	Hawaii	80.5
31.	1st Bn. 110th F.A.	Md.	79
31.	1st Bn. 140th Inf.	Mo.	79
33.	1st Bn. 164th Inf.	N. Dak.	74.1
34.	2nd Bn. 141st Art. (A-A.)	Ark.	74
34.	1st Bn. 134th Inf.	Neb.	74
36.	1st Bn. 172nd Inf.	Vt.	72
37.	1st Bn. 145th F.A.	Utah	71
37.	1st Sq. 116th Cav.	Idaho	71
39.	2nd Bn. 154th Inf.	Fla.	69
40.	1st Bn. 159th Inf.	Calif.	67
41.	1st Bn. 197th Art. (A-A.)	N. H.	66
42.	2nd Bn. 150th Inf.	W. Va.	63
43.	1st Bn. 157th Inf.	Colo.	54
44.	2nd Bn. 198th Art. (A-A.)	Del.	50
45.	2nd Sq. 115th Cav.	Wyo.	35

REGIMENTS—OR SIMILAR UNITS

1.	192nd F.A. (155-mm. Gun)	Conn.	117
2.	101st F.A.	Mass.	109
2.	105th Inf.	N. Y.	109
4.	130th F.A.	Kan.	89.5
5.	107th F.A.	Pa.	83.5
6.	102nd Cav.	N. J.	83
7.	179th Inf.	Okla.	82
8.	150th F.A.	Ind.	81
8.	146th F.A.	Wash.	81
10.	126th Inf.	Mich.	80
10.	134th F.A.	Ohio	80
10.	105th Cav.	Wis.	80
13.	135th Inf.	Minn.	78
14.	132nd F.A.	Tex.	76
15.	133rd Inf.	Iowa	75.1
16.	183rd Inf.	Va.	74
17.	203rd Art. (A-A.)	Mo.	71
18.	122nd F.A.	Ill.	62
19.	159th Inf.	Calif.	58

Computing Service for Rank and Promotion

When called to active duty a reserve officer takes rank in his grade according to a computed date. This date precedes that on which he is placed on active duty by a period equal to that total length of active service performed by him in that grade or in any higher grade. For example a first lieutenant, with six months' active duty as shown on his Statement of Service, is called to active duty on August 12, 1923; his rank dates from February 12, 1923; this latter date determines his precedence when he comes in contact with two or more other first lieutenants in an organization, on a board, etc., etc.

Computing service for promotion is a different case than that explained above. All duty, both active and inactive, counts for promotion. To be eligible for promotion a reserve officer must have credit for three years' service in his present grade; one of these years must, moreover, be in his present grade since November 11, 1918. To compute the credit of three years' service, count all time in the present grade since April 6, 1917. This time need not be continuous. Count as double all time in the present or higher grade between April 6, 1917, and November 11, 1918. Service in a lower grade than the present grade does not count for promotion.

Commissions in the Organized Reserves

The attention of all officers who served in the World War is invited to the fact that until November 11th of this year they may come into the Officers' Reserve Corps with the highest rank they attained during the war, and without more than a physical examination. After November 11th, the entire requirement of mental examination and all legal restrictions will apply to everybody applying for a commission—World War veteran or not. It will be well for Reserve Officers to inform any former officer not yet commissioned and not cognizant of this situation.

The Work of the Field Artillery Board

In the May–June, 1923, issue of the FIELD ARTILLERY JOURNAL appeared an article giving a list of the tests before the Field Artillery Board with comments on certain of them. Since then some of the tests have been completed and other new tests have been added.

Tests Completed

1. Self-propelled mounts.
2. Divisional tractors.
3. Tractors, reconnaissance.
4. Powder charges, experimental, 155-mm. Howitzer.
5. Experimental sight mountings for 75-mm Gun, French.
6. Flashlights.

7. Special Regulations for Gunner's Examination.
8. Signalling panels.

Tests Uncompleted

9. Reel carts.
10. 105-mm. German Howitzer.
11. Saddle bag modification for dismounted canteen.
12. Divisional guns.
13. Periscope, observation.
14. High-burst ranging.
15. Sound and flash ranging.
16. Water-proof clothing and tents.
17. Lace boots for enlisted men.

New Tests

18. Radio communication for Field Artillery.
19. Gas masks for telephone transmitters.
20. Handwheels for gun carriages.
21. Comparison of re-rifled and unre-rifled 240-mm. Howitzers.
22. Oil lanterns for illuminating Aiming Posts.
23. Deviation Board, Unkles.

Self-propelled Mounts

Two types of self-propelled mounts were submitted to the Board, *viz.:* A Christie with a convertible track, and a Holt with nonconvertible track. Both carriages were designed to carry either a 75-mm. gun or a 105-mm. howitzer. The test was to determine the tactical usefulness of self-propelled type of mount, and its advantages, if any, over horse or other type of traction. The report appears at length in this JOURNAL.

Divisional Tractors

Three types of so-called 2½-ton tractors were submitted to the Board, *viz.:* Ordnance tractor, Model 1920 with the White, 16-valve engine; Artillery tractor, Model 1918 with the Class B truck engine; Artillery tractor, Model 1918 with the Cadillac engine as originally manufactured.

The number of defects found in all three types are too numerous to mention. The Model 1918, Class B engine was generally more satisfactory than either of the other types. The Board concluded that either of the models, with proper modification, could be used for divisional artillery, but would be less satisfactory than portée artillery using trucks for easy-going and light tractors for difficult going.

In addition to the three types of Ordnance tractors tested, two light tractors of commercial manufacture were tested by the Board.

The Holt, Model T-35, a tractor weighing about 4500 pounds, of the conventional "caterpillar" type, gave a most creditable performance and was recommended by the Board as satisfactory for use with motorized divisional guns or howitzers pulling a single-axle load where road speeds not exceeding four miles per hour are sufficient. The Fordson Tractor, with a caterpillar adapter in place of the rear wheels, also gave a very satisfactory performance under test, and was recommended as suitable emergency equipment for motorized divisional equipment under the same conditions of load and speed as stated above.

Tractors, Reconnaissance

Two types were submitted to the Board, *viz.:* 800-pound tractor, equipped with Henderson motorcycle engine, and 1600-pound tractor, equipped with a four-cylinder Franklin engine. The tractors actually weigh more than the above figures. Both tractors are equipped with water-tight aluminum bodies, a propeller, and a rudder for travelling in water, and rubber-tired wheels and Chase track for travelling on land. After a careful test, the Board has concluded that these tractors are not suitable for the purpose for which they were intended.

Powder Charges, Experimental 155-mm. Howitzer

This is the second test of aliquot and semi-aliquot part charges for the howitzer. In this particular test, two types of bulk charges were submitted, *viz.:* The first made up of one igniter section, four 1/5 sections, and two 1/10 sections, secured together by straps on the igniter; the second made up in bundles of four 1/10 sections each, the necessary number of such bundles plus the individual 1/10 sections required to make up the proper number for each charge, to be secured together by straps attached to the igniters.

After completion of the test, the Board recommended that the charges be made up as follows: Seven 1/5 sections, seven 1/10 sections and five igniters placed in the above order from top to bottom in the standard metal powder container. No parts of the charge are to be tied together until they are made up for firing. The Board recommended the use of nine charges, omitting the charge made up of a single 1/10 section.

Experimental Sight Mountings for 75-mm. Gun, French

Two sight mountings have been designed to permit the use of the panoramic sight on the French 75-mm. guns. One type is made of flat plates and the other of tubes.

The Board recommends modification of the tubular design and further tests.

Flashlights

This is an Ordnance flashlight modified to take Type BA-1 batteries.

The Board found the flashlight superior to present issue Ordnance flashlight, but inferior to the issue lighting devices used at guns and at fire-control instruments, and also inferior to commercial flashlights.

Special Regulations for Gunner's Examination, Heavy Artillery

The Board has submitted a set of regulations, and has recommended that they be tentatively adopted.

Signalling Panels

These panels are for use in signalling from ground to airplane. Some of the panels were orange on one side and white on the other side, and some were orange and white on one side, with colors reversed on the other side. The test was a comparison of these panels with the standard black and white panels.

The Board found that on all types of background except snow, the white panels were superior to any of the other colors. On a background of white target cloth, representing snow, the black was much superior to the white, and to the orange and white, and slightly superior to the orange. On a background made up of strips of target cloth spaced by irregular strips of grass and earth, representing a broken field of snow, the orange panels were best.

The Board recommended the adoption of panels having orange on one side and white on the other side.

Reel Carts

The liner of the present cart is undesirable because the shape and size of the compartments are not correct for present equipment. All the issued equipment will go into the chest if no liner with compartments is used. However, it is necessary to protect instruments from constant jolting, hence a new type of liner has been designed, which permits packing all equipment and which seems to give satisfactory protection.

105-mm. German Howitzer

These howitzers have been given road tests behind various types of tractors over improved and unimproved roads and across country. Part of the firing program has been completed, and at present a road test behind horses is going on. The results so far have been very pleasing. The howitzer has a very sturdy appearance and yet it is not excessively heavy. It has pintle traverse, constant recoil, horizontal sliding block, and fires semi-fixed ammunition with six zones. The maximum range is about 10,600 yards.

Saddle Bag Modification for Dismounted Canteen

The first modifications tried have not proved as satisfactory as had been expected. Further modifications are being made and it is hoped that a solution will finally be found.

Divisional Guns

The test of the split trail carriage, Model 1920, mounting a nickle steel gun has been completed. The carriage was found to be too heavy and yet of such weak construction that it did not stand up under either firing or road tests. The split trail feature was found unsatisfactory; this carriage was less stable in most positions than the carriage with the box trail.

All tests except the firing test on the box trail carriage, Model 1921, mounting a chrome steel gun have been completed. So far the carriage has proved generally satisfactory.

The Ordnance Department are now designing a new split trail carriage, Model 1923. The wooden model has been completed and it is hoped that the pilot mount will be ready for test at Aberdeen about November, 1924.

Periscope, Observation

Awaiting repairs to periscope.

High-burst Ranging

This test has been completed and the report is being written. A method has been devised which seems very simple and which has given most excellent results in a rather long series of firing tests.

Sound and Flash Ranging

This is a continuing program carried on by the 1st Observation Battery.

Water-proof Clothing and Tents

This material has been received, but as the clothing is wool, the test will not start until colder weather sets in.

Laced Boots for Enlisted Men

This material has been received, but the test has not been started.

Radio Communication for Field Artillery

The Chief of the Signal Corps has asked the using services to make a study of their needs, in the way of radio equipment for the division, corps, and army, to include both ground to ground, and ground to airplane sets. The study is to state definitely the maximum sending range for the sets, the number of non-interfering channels of communication (frequency bands), and whether telephone, telegraph or both are desired. When all the studies are completed and approved, the signal corps will undertake to design sets

to meet the several requirements as nearly as possible, and at the same time, cut down on the number of types of sets.

Gas Masks for Telephone Transmitters

This is a comparative test between a Signal Corps Type and a Navy Type.

Handwheels for Gun Carriages

In connection with the design of new gun and howitzer carriages, the Ordnance Department has submitted a type elevating and traversing handwheel. The wheel is cast brass and has a torus rim, dished spokes, and a cylindrical handle perpendicular to plane of the rim. The Board reported that with slight modification, the handwheel would be satisfactory if made up in proper sizes.

Comparison of Re-Rifled and Unre-Rifled 240-mm. Howitzers

Considerable trouble has been experienced with these howitzers because of swelling of the bore during firing. In the re-rifled howitzers, two filets have been cut away on the driving side of the lands. It is hoped that this modification will relieve some of the pressure and do away with the swelling.

Oil Lanterns for Illuminating Aiming Posts

This is a comparative test of lantern submitted by the Ordnance Department and lanterns of British type. It is hoped that an oil lantern may solve some of the difficulties that have been experienced with electrical illumination of aiming stakes.

Deviation Board (Unkles)

This is a board for the graphical solution of problems arising in unilateral, bilateral, and flank observation.

Annual Meeting of Our Association

Notices of the approaching annual meeting to be held in December are being sent out to the active members of the association. There are no prospects of any unusual business to come before this meeting. The routine election of members of the Executive Council to fill vacancies due to expired terms, is perhaps the most important consideration. The two year term of office of the following members of the Council expires this December: Major General William J. Snow, Brigadier General DeWitt C. Weld, Colonel George E. Leach, Colonel Andrew Moses, Colonel Oliver L. Spaulding, Colonel Leroy W. Herron, Lieutenant Colonel Robert L. Bacon and Lieutenant Colonel Augustine McIntyre. It will be noted this list includes four from the Regular Army, two from the National Guard, and two from the Reserve Corps. Their successors must, under our

constitution, be drawn from the same source in order to maintain the prescribed proportion on the Council.

Our association consists of active members and associate members. Under Section 1 of Article V of our constitution only active members may vote. Section 2 of Article III prescribes the following to be elegible to active membership: "Commissioned Officers on the active list of the Field Artillery of the Regular Army and of the Organized Militia of the several states, territories and District of Columbia and commissioned officers on the active list of the Field Artillery Section of the Officers Reserve Corps; provided, that Officers of the Regular Army when separated from the field artillery, by promotion or detail in staff departments, shall not thereby lose their status as active members." Active members not able to attend in Washington should send their proxies to the Secretary.

Address of Members

The address of a number of our members is being changed without their request with this number of the JOURNAL. It is done in an effort to make our mailing list as nearly correct as possible. Some mistakes may result. The forebearance of the members thus affected is asked.

The Association would always be glad to change the addresses of the members without notice to save them the trouble. However a study of our mailing list indicates this is impossible. Our civilian members cannot be followed. Our members in the National Guard and Reserve often are engaged in business which causes them to make temporary changes; some wish the JOURNAL to follow and some do not. Some want the JOURNAL at their business addresses; some want it at their Armory, and others want it at their home. The orders for the change of station of a Regular Officer too often do not result in the change, for these to be taken as a guide.

The members do appreciate the cause of the trouble when a JOURNAL is lost in being forwarded or in being sent to a deserted address. However, the best of us cannot avoid a feeling of dissatisfaction in such cases and the coöperation of all will improve the service. Send in a change of address when you move.

Supporting the National Guard

No doubt the progressive National Guardsman is called upon to make a maximum sacrifice in serving his organization. In recognition of this during the last year the Chamber of Commerce of Los Angeles and the businessmen of St. Paul have taken active steps to assist their local units. In St. Paul one hundred leading businessmen subscribed to the following:

"We believe in the National Guard and in the plans of the War Department for the national defence.

"In order to facilitate the enlistment of our employees in the local organizations of the National Guard, we have subscribed to the following provisions:

"1. National Guardsmen in our employ will be given fifteen days' leave of absence in each year, with pay, for the purpose of attending camp; this leave not to affect in any way the regular vacation privileges.

"2. When called into active service by the Governor of the state we will pay National Guardsmen in our employ the difference between their regular wages and what they receive in National Guard pay.

"3. The fact that the man is a National Guardsman shall entitle him to preference—other things being equal—in securing employment, or in case of reduction of force, in retaining employment."

Division Spirit

The Officers of the Seventy-sixth Division, Organized Reserves, bought out a solid block of six hundred seats for the Yale-Army game. While the seats were alongside the cadets, there were loyal supporters of each team in the Seventy-sixth's stand. The significant fact is the evidence of union in a broad and mature patriotism which fosters both institutions.

Resolutions of the National Council of the Reserve Officers' Association

The annual Convention of the National Guard Association was held October 23rd; the National Convention of the Reserve Officers Association met October 27th; the American Legion convened October 12th in their annual meeting. These organizations, together with such bodies as the Association of the Army of the United States, the Military Order of the World War and others, are striving each in their own field and after their own methods, to promote patriotism, good citizenship, national defence, and ultimately or immediately the welfare of our country. The Resolutions as adopted by the National Council of the Reserve Officers' Association of the United States in their annual assembly at Indianapolis last July is quoted below:

The Selective Service System

WHEREAS, in the event of a major emergency, it is of the utmost importance that the Selective Service System shall begin to function at the earliest possible moment, insuring those units of the armed forces which must immediately organize, the necessary personnel;

AND WHEREAS, there exists throughout the nation, at this time, a great body of patriotic citizens whose training and experience in the Local, District, and Medical Advisory Boards, in the administration of this system, render them of great value to the Government;

AND WHEREAS, the necessarily intricate details of the Selective Service System make it of great importance that there should be, at all times, a supply of trained officials ready to begin work of selection when occasion demands it;

NOW THEREFORE, BE IT RESOLVED, that the National Council of the Reserve Officers' Association of the United States, is of the opinion that a plan should be developed, and maintained at the highest point of efficiency, which will provide, in the event of an emergency, a Selective Service System that will insure a swift and sure supply of personnel to the armed forces.

WHEREAS, these resolutions are the expression of the National Council of the Reserve Officers' Association of the United States; THEREFORE BE IT RESOLVED THAT, the Secretary of this association be instructed to forward copies of these resolutions to, the President of the United States, the Governors of the several states, the Commanding General of the Armies, and the public press.

Additional Regular Army Personnel for the Training of Civilian Components of the Army

WHEREAS, the Regular Army which is now at an approximate strength of 11,589 commissioned officers and 112,250 enlisted men, the commissioned personnel of which is now being employed as follows:

Overhead for the three components (War Department, Corps Area Headquarters, Depots, Arsenals, Service Schools, and miscellaneous.)	3,388
Foreign Garrisons	1,833
Regular Troops in the United States	4,787
With the Civilian Components	1,581
Total	11,589

WHEREAS, during the summer training period approximately 5000 Regular Officers and 60,000 enlisted men are wholly or partially employed with the Civilian Component of the Army of the United States;

WHEREAS, this number is deemed inadequate to give necessary instruction during the summer training period for the limited personnel now authorized to attend summer camps under the present appropriations;

WHEREAS, present indications are that an effort will be made at the session of Congress to reduce the present strength of the Regular Army;

WHEREAS, it is realized it is impracticable to further reduce either the overhead of foreign garrison commissioned personnel, and reductions will necessarily be made in the number of officers now serving with the civilian components of the Army of the United States;

WHEREAS, it is the urgent desire of this council that more instruction be given not only during the summer training period, but all-year round, thereby necessitating the detailing of more Regular Officers for duty with the civilian components of the Army of the United States;

BE IT RESOLVED, that the National Council go on record as not only strongly opposing any reduction in the present strength of the Regular Army, but that it favors the establishment of a peace-time strength of not less than 15,000 officers and 150,000 enlisted men.

Support of the National Guard

WHEREAS, this association, recognizing in the National Guard the largest organized body of soldiers in the Army of the United States, and realizing that the attainment of its high ideals is essential to the perfection of the National Defence;

BE IT RESOLVED, that the Reserve Officers' Association extends to the National Guard, its officers and men, and to the Chief of the Militia Bureau, its warmest congratulations for the program already made and urge that Congress and the State Legislatures render adequate support to all National Guard units;

BE IT FURTHER RESOLVED, that it is the sense of this meeting that individual members of the Officers' Reserve Corps, as a necessary element of their support of the one Army idea and of their duty as citizens of this great commonwealth, should, whenever and wherever possible make individual and collective effort to secure the active coöperation and assistance of the people in support of the National Guard in furtherance of their patriotic endeavor to comply with their most important mission.

Support of the R.O.T.C.

WHEREAS, the National Defence Act of 1916, as amended by the Act of June 4, 1920, made provision for the maintenance of R.O.T.C. units, the mission of which, as defined by the War Department is "to provide systematic military training at civil educational institutions for the purpose of qualifying selected students of such institutions for appointment as Reserve Officers in the military forces of the United States";

WHEREAS, the training of such Reserve Officers is essential to the military program of the United States in accord with the provisions of the Defence Act of 1916, as amended;

WHEREAS, R.O.T.C. training in civil educational institutions has proved its efficiency and value in the physical, mental, and moral upbuilding of Reserve Officers;

WHEREAS, civil educational institutions are actually training some 4500 competent Reserve Officers per year for the military forces of the United States;

WHEREAS, funds appropriated to the War Department for the support of R.O.T.C. units are not adequate to provide for training of the 7000 Reserve Officers per year needed to complete the military program of the United States;

BE IT RESOLVED, that the National Council of the Reserve Officers' Association endorse the R.O.T.C. training now being carried on at civil educational institutions;

BE IT FURTHER RESOLVED, that civil educational institutions, especially the larger high schools, be encouraged to organize cadet corps for the purpose of extending the physical, mental, moral, and citizenship training that is now being developed in existing R.O.T.C. units and also materially to supplement the R.O.T.C. training now conducted under War Department supervision.

Support of Citizens' Military Training Camps

RESOLVED, that it is the sense of the National Council of the Reserve Officers' Association of the United States that as the Citizens' Military Training Camps conducted by the War Department represent one of the most important mediums for the inculcation of the sound principles of responsible citzenship and for physical, mental and moral development in the youth of our nation, it is incumbent upon all that every effort be made to inform all citizens of the true purpose and real value of these camps, and that all Reserve Officers render unstinted support to the Corps Area Commanders in the matter of informing young men of the advantage of the camps and of securing their attendance thereat.

Congressional Appropriation for Organized Reserves

WHEREAS, Organized Reserve units in order to provide for the National Defence in an emergency must possess the efficiency required to fulfil their mission and both personnel and funds must be adequate to produce this efficiency; and the personnel and funds now available for the purpose are inadequate;

NOW, THEREFORE, BE IT RESOLVED, by the National Council of the Reserve Officers' Association, that the total sums appropriated annually by Congress should be sufficient to permit the Army, including

its three components, to be adequately prepared to fulfil its mission;

That the amount of funds appropriated by Congress for the Organized Reserves should be increased annually so that within five years the annual appropriation for the Organized Reserves shall be sufficient to permit the establishment and maintenance of the efficiency of all the units thereof as required by their missions; and

That specifically for the fiscal year 1925 the sum covered in the War Department estimates for the Organized Reserves, as may be prepared under the limitations of the Budget, should be increased to $6,000,000.

Appreciation of the Regular Army

WHEREAS, it is the established policy and practice of the War Department to further in every possible way the complete amalgamation of the components of the Army of the United States, fostering in all the essential military virtues of comradeship, teamwork and mutual understanding;

BE IT RESOLVED, that we record our high appreciation of the efficient help that the personnel of the Regular Army has given in the organization and advancement of the citizen components of the Army of the United States; and our confident belief that the War Department will continue to aid, to the full extent of the means at its disposal, the development of the citizen forces.

Development of Unit Efficiency in Organized Reserves

WHEREAS, such organizations as are required by the National Defence Act to form the basis for complete and immediate mobilization for the National defence have been designated and distributed among the three components of the Army of the United States;

WHEREAS, those organizations assigned the Organized Reserves are to so train units of its peace establishment that the combat units will be able to promptly expand to efficient war strength during the mobilization period;

WHEREAS, it is understood that basic mobilization plans have been drawn and the mobilization mission of the Reserve units are now determining and those plans contemplate Reserve units who will be able to fulfil the missions assigned;

BE IT RESOLVED, that the National Council of the Reserve Officers' Association enjoin all Reserve Officers, especially those commanding units, to lend every possible aid in the preparation, conduct, and participation in unit training schedules to the end that an *esprit* will be built up in each unit and that such efficiency as may be required by mobilization shall be established and maintained.

National Guard and Reserve Coöperation

There is in Special Regulations Forty-three, official provisions for the Corps Area Commanders to grant requests from Artillery Reserve Officers to be attached to Regular units for target practice. The Officers of the 103rd Field Artillery, Rhode Island National Guard, and the 302nd Field Artillery, Organized Reserves, have by a most commendable effort been able to secure local extension of the letter of the regulation, and have interpreted its spirit to the fullest extent, as is shown in an account of their target practice in the *Spirit of Seventy Six*, the Bulletin of the Seventy Sixth Division.

At 6:30 A.M. on Saturday, June 23, 1923, the first detachment of officers of the 302nd Field Artillery left for the Charlestown Beach Range, travelling in automobile for fifty miles, and covering that distance in one hour and a half. They were met at the Perryville Church by a guide from Battery "A" of the 103rd Field Artillery, and conducted immediately to the range.

Without any delay the day's problems were commenced, with Major W. F. Hoey, Jr., acting as Infantry Liaison officer, and as such, designating the various targets, which represented units of the enemy that were endangering the position of our own infantry. Coaching and instruction were ably handled by Captain Stanley F. Bryan, who at the close of the firing, about 5:15 P.M., commended for their efficient work the officers who had conducted the firing.

Problems consisted of destroying machine-gun nests, preventing opposing enemy from making a landing on the distant beach, harassing fire over an area known to be occupied by the enemy, and laying a barrage in front of our own infantry. Several of these problems were conducted from an advanced observation post located at the headquarters of our Infantry battalion, using lateral observation in two instances.

The whole day's program was carefully scrutinized by Colonel Everitte S. Chaffee, of the 103rd Field Artillery, through whose coöperation the field service was made possible. The team-work of the National Guard and the Organized Reserve is perhaps better illustrated by these two Field Artillery units than by any other organizations in the East. From the very start, the 103rd Field Artillery and the 302nd Field Artillery have worked together, the various joint activities of their respective commands during the past year well reflecting the personal coöperation between the two commanding officers.

The 302nd Field Artillery detachment consisted of the following officers, each of whom conducted at least one problem: Lieutenant Colonel Barker, Captains Hartwell and Mauran, 2nd Lieutenants Pretat, Freeman, Deming, Plympton, Veaudry and Wallace.

Captain Gordon McLeod of Battery "A," together with his lieutenants and men, were the hosts of the Reserve Officers at dinner and supper, during which meals the problems of the day were fought all over again with friendly discussion enjoyed between the two units.

Desiring to get even a longer day of work out of his officers than on the June 23rd trip, Colonel Barker and his second detachment reported at 6:00 A.M. on August 4, 1923. The trip to Perryville was made in one hour and twenty minutes—a record for all time. Proceeding to the range, the firing started at once.

Colonel Chaffee assigned the targets and Captain Bryan coached the younger officers. He was assisted by Lieutenant Colonel Barker. Captain Bryan, as an instructor, has the happy faculty of being able to correct a man's mistake in a manner that arouses greater incentive rather than resentment.

The problems of the day were all on the longer of the two ranges, whereas the firing on June 23rd had been on the shorter range. Targets this time averaged 2500 yards distance. The post of command was 200 yards on the left flank of the guns. Communication was by telephone assisted by a system of colored flags to signal to the range guards. Indirect laying was used in all problems. In all, ten problems were solved, and all successfully.

Firing ceased at 5:30 P.M. and Captain Bryan gave a very interesting talk and demonstration on fire control instruments. This was supplemented by a few remarks from Colonel Barker on the same subject. Colonel Chaffee expressed himself as being pleased with the good judgment shown in solving the problems, and the interest and coöperation displayed by all officers in each of the three trips that have now been made by the 302nd to the range.

A total of sixteen officers fired problems at Charlestown which means that practically every officer of the 302nd Field Artillery fired a problem with service ammunition and took part in field manœuvres during the year, either at Camp Devens or with the 103rd Field Artillery.

During the firing the entire outfit was subjected to three gas attacks conducted by men from the Chemical Warfare Service; the great effectiveness of smoke screens was also demonstrated. Captain Nelson of Battery "C," assisted by his lieutenants, showed a keen interest in helping the reserve officers in every way possible, and all officers who participated agreed it was a very beneficial and enjoyable day's work.

Officers present from the 302nd included: Lieutenant Colonel Barker, 1st Lieutenants Harrower and Albrecht, 2nd Lieutenants Pretat, Freeman, Nordquist, King, Dana, Johnson, Cooney, Hughes, Palmer and Jackson.

Officers of the 302nd Field Artillery who fired a problem with service ammunition and took part in field manœuvres, 1923, is as follows:

Field officers	3	100 per cent.
Captains	3	50 per cent.
First Lieutenants	4	57 per cent.
Second Lieutenants	15	48 per cent.

Eastern Endurance Ride

As this JOURNAL goes to press the ride is under way. There is little to report beyond the fact that there is a considerable number of good entries and the test is progressing satisfactorily. An account of the results will appear in our next issue.

Polo

The Military Championship of the World

The British and American Army teams played their Championship Series the middle of September. All consoling speculations as to the value of the meeting of the two army teams, even if we lost, was unnecessary. Our army team won, and the measure of their strength is the undenied strength of the great British players against whom they played.

For the Americans Major A. H. Wilson played number 1; Major J. K. Herr, number 2; Lieutenant Colonel Lewis Brown, Jr., number 3, and Major L. A. Beard, number 4. The British played Lieutenant Colonel T. P. Melville at number 1; Lieutenant W. S. McCreery at number 2; Major F. B. Hurndall at number 3, and Major E. G. Atkinson at number 4 in the first two games. In the third game Major Lockett played number 4 while Major Atkinson went to number 2 position.

J. C. Cooley, writing in the *Town and Country Magazine*, describes the first two games as follows:

"The United States team in the opening game won a brilliant victory over the British by a score of ten goals to seven. The British officers started in with a rush and in no time had scored two goals. The American officers seemed stage struck and dazed, hitting badly and apparently way off their game. But the slump lasted for only a very few minutes. They soon got going, evened up the score, and from then on were never headed. They played brilliantly throughout, hitting with great vigor and accuracy, playing beautiful team-work and out-galloping the British almost without exception. I do not know of any detail of that first game that was so striking as the apparently far greater speed of the American ponies. Time and again in races up and down the field the American

animals drew clear. It was a revelation and I do not think that too much credit can be given to Lieutenant McCreery, who has watched over the destinies of the American mounts and who had them in such superb condition for this first game.

"It was quite obvious to anyone who had watched the Army play throughout the summer that all the four members of this American Army team were right on the top of their form, playing the game of their lives and perhaps a little better than they had ever played before. They rose to the occasion magnificently and by their individual work and the team-play that they developed were well worthy of all praise that they received.

"The second match between the two Army teams was played on the Saturday succeeding this first game. I think it was pretty generally felt that this was going to be a very tight match and that a distinct improvement would be noted in the play of the British officers. The line-up of the British team on both occasions had been with Colonel Melville at one, Captain McCreery at two, Major Hurndall at three, and Major Atkinson at back. Colonel Melville is spoken of as the best number one in England, Major Hurndall showed himself by his performances in the United States last autumn when he was a member of the Eastcott team, as one of the most brilliant and aggressive players in the game, and Major Atkinson is talked of among people who know what they are talking about as more than a likely candidate for England's next international four. It was a pretty sure thing that the British officers had not showed their best form in the first game and consequently an improved performance on their part seemed almost a certainty. If the United States officers kept up the same gait that they had struck in the first game, the match would be one worth going a long way to see.

"I do not rememember ever having seen a polo match in a more picturesque setting than was that second Army match. It was a perfect day. The Army, of course, was well represented, and for this second match, General Pershing had come down. The first match had been attended by the Secretary of War and so the interest of the Department in these games was evident. From West Point the cadets came and marched across the field and up into the stands, and shortly afterwards the game started. From the very bginning it was a vastly better one than the previous one. It was faster, the play was better on both sides, and what was of consequence from the point of view of the spectators, the result was in doubt until the very end. As in the first match, the British started the scoring, but the score was immediately tied by a brilliant run on the part of Major Wilson, the number one of the American team. Half-way through the fourth period the British were leading by one goal, when the Americans scored a goal which tied the score. Then

just before the end of the period a goal by Major Herr gave the American team a lead of one goal at half time.

"In the fifth period the United States Army scored twice to once for Great Britain, which gave the Americans a lead of two goals, the score being nine to seven. In the sixth period a goal by Major Wilson, after about two minutes of play, increased the lead of the United States to three goals. And that ended the scoring for the day, so far as the United States officers were concerned. Unfortunately the same thing cannot be said about the officers of Great Britain. With one game already lost, with only a little over a quarter of the second game left to play, and in the face of a three-goal lead on the side of their opponents, they started in to show their worth and the reason for the high reputations that they had gained. And no one can gainsay the fact that they made good with a vengeance.

"The United States Army failed to score another goal, but the British officers scored no less than five in those final periods, so that the final score was Great Britain twelve, and the United States ten. It was a brilliant victory for the foreign team. In the middle of the sixth period it looked as if the United States officers were certainly going to be successful again. They had a respectable lead and they were playing just as fast and just as well as their opponents. But Great Britain most certainly increased her pace in those final periods. They were attacking the greater part of the time and scored four goals by superior team-play and the fifth on a free shot for goal, which was given as a penalty against one of the American players. This free shot was taken by Major Atkinson, who played it superbly, hitting a terrific shot way over the heads of all the Americans defending their goal. As is always the case when an attack becomes overwhelmingly strong, the team game of the opponents is apt to become disorganized. This was strongly illustrated in the final periods of this second match. Major Wilson, who had played brilliantly throughout the first game and during the first six periods of the second, constantly kept coming back in those two final periods to help his team mates and in consequence left Major Atkinson alone.

"It is a great temptation for a number one to try and do it, and it is always a mistake. Major Wilson was helping on the defence when he should have left that to others, and he was leaving unmolested a player who was proving himself one of the longest hitters ever seen on an American polo field. I should feel as if I had done Major Wilson a grave injustice if I made this criticism, which I think is a fair one, if at the same time I did not lay stress on the really brilliant form that Major Wilson had shown throughout. He was the bright particular star of the first match and his sensational

goals in the second match were greatly applauded. He is without a doubt one of the best number ones in the United States, and if he corrects this fault that he has of going back into the game when the game is going against him, I think he will make himself more valuable than ever. I know from experience what an easy fault it is to get into and how a number one goes back when the ball is not coming up to him. But if the ball is not coming up, it isn't, and that's all there is to it.

"Among the British officers, the playing of Major Hurndall, I think, stood out. He is one of the most active players I know. He rides very light and he is quick as a cat in getting about. He was constantly feeding the ball up to his forwards and covering Major Atkinson. Colonel Melville showed a greatly improved performance, and it can very readily be seen why he is considered one of the best, if not the best, number ones in England. The English ponies were a different lot than they had been in the previous game. They are getting acclimatized and in this second game the American ponies showed no marked superiority."

The account of the third and final game below was written by Herbert Reed for the *Boston Transcript*.

"America's best army polo players on America's best army mounts, and courageous players and mounts they were, outplayed, outwitted and in some cases outpaced the best of the British service at Meadow Brook yesterday afternoon. They came home to victory on the International Field by a score of 10 to 3. The American Service thus took the final game, the odd game, and the game that undoubtedly will lead to more and more furious combats of this sort, next year no doubt on the other side of the Atlantic. It is going to be necessary from this point on to give Colonel Brown's team so much credit that perhaps the gallant British contingent will be willing to forgive if not forget.

"A fine lot of sportsmen, these, and great polo players, stacked up in this series of matches against a team playing for the future, and at the same time were fired up with the perfectly human instinct to win, and to win against odds.

"It was a different four that took the field for England yesterday, with Colonel Melville at No. 1, Major E. G. Atkinson, taken over from the Count de Madre's Tigers, legitimately enough since he is a British Army officer, at No. 2; Major F. B. Hurndall at No. 3, and the hitherto injured Major Vyvyan Lockett at back.

"This was a fine team that the American cavalrymen defeated in the final game, and before going further it might be well to say that it was as well mounted as one would care to see. Lieutenant McCreery, who has handled the American string through two junior championships, and now this triumph, was the first to pay tribute

to the superb British ponies. This great trainer of ours said that it was a collection he would have loved to handle himself, which is praise indeed.

"As it happened, I do not believe that the American Army people expected to do so well against this British string. The theory was, I believe, to race the American mounts all out to get a lead, hoping to cling to the lead through the game. It turned out that while the splendid animals were as superbly matched as any two sets that have come together in such an important engagement, there was more left in the American Army mounts than anyone had dared to hope.

"The sudden feeling of confidence in these animals led to a policy, apparently, of refusing absolutely to check them down, to rest them in any way, and at the last, or near the last, the American team did a dangerous and effective thing. Up to the closing periods Major Wilson, the slashing No. 1, had not figured as extensively as the crowd had expected. The great team-work handled by Colonel Brown, who was having his day of days on the polo field, shot the American four out into the lead and kept them there with what would have been in ordinary circumstances a sure margin. But the Americans never felt that their lead was sure.

"So, after the brilliant play by the other members of the team, notably by Brown and Herr, and the tremendous defence by Major Louis Beard, Wilson was turned loose. And he was turned loose for two periods in succession on the game little black animal, Peanut, the mount with the pace of the field.

"There was a time when Wilson on Peanut all but circled both teams for a score, and other times in plenty when the combination threatened. This, then, was no last effort of the Americans playing on the defensive, to hold their score, but a great sally to slap the attack up where it belonged, to score again if possible, and to turn defence into attack. It put the British themselves on the defensive where they remained to the finish, happy to get away with the score already hung up.

"Not that the Britishers failed in their judgment, save now and then. They had played for dragging minute after dragging minute a sound, and at times a furious defence, and they had unleashed against both Brown and the versatile Beard, who was putting on the play of his career, a combination of excellent execution and "savvy," but just one of Wilson's thrusts in the closing threshout on Peanut, caught the great Lockett napping. Lockett had Wilson, could have checked him, but he played the ball for the ultimate once, and let one of the most dangerous players in the world get free. The British morale broke a bit after that.

"Lockett made great and desperate strokes, but Atkinson was so thoroughly covered by Brown that only once did he work free, and even Hurndall was smothered when for a moment or so he was playing the British and not the American game. Melville, perhaps as finely mounted a player as there was on the field, broke away now and again, but always the answer was the same. The American defence, the great backfield play of Brown and Beard, shut down like a trap on the British attack.

"Colonel Melville is perhaps the greatest No. 1 there is in England, admittedly superbly mounted. Major Atkinson is one of the longest and truest hitters on any field. Major Hurndall is as fine a No. 3 as Great Britain will produce in a hurry. Major Lockett is a veteran internationalist. Yet this team, rated at thirty-three goals, was shut down on the flat to a total of three goals by a four that rated seventeen goals.

"It might be said that there was only one answer. Yet yesterday's one answer, the answer of team-work, would not suffice. There was another answer, and that answer was the statement that there was not a single American player who failed to outplay his opponent at one stage of the game and for a considerable period of time."

Hawaiian Polo

The Army team made a most creditable showing in the interisland tournament. On September 3rd, they defeated Oahu team by a score of 11 to 7. Playing a close and hard-fought game on September 15th, the Army went down to defeat in the final of the series with a score of 5 to 3. The Maui team was the victor and holds the Championship of the Islands.

The line-ups follows:

Oahu	Maui
No. 1. J. Spaulding	No. 1. Sam Baldwin
No. 2. H. K. L. Castle	No. 2. Edward Baldwin
No. 3. W. F. Dillingham	No. 3. Frank Baldwin
No. 4. A. Rice	No. 4. Caleb Burns

Army

No. 1. Major John Millikin
No. 2. Lieutenant Colonel B. F. Browne
No. 3. Major Carlos Brewer
No. 4. Captain Joe Swing

Washington Tournament

An invitation polo tournament is being played from October 13th to 20th. The teams and players with their army handicaps follows:

War Dept.	Army Hdcp.
Major J. C. Montgomery	6
Lieutenant C. C. Jadwin	6
Major J. K. Herr	8
Major H. D. Higley	8
Captain R. Wipprecht	2

Camp Bragg	Army Hdcp
Lieutenant W. A. Metts	2
Lieutenant John Gross	3
Lieutenant H. D. Baker	3
Major R. C. Batson	4
Lieutenant James Bevans	0
Lieutenant R. H. Knapp	3

2d Corps Area	Army Hdcp.
Lieutenant J. P. Neu	2
Major A. L. P. Sands	5
Captain W. I. Raser	2
Major J. A. G. Rudd	0
Captain C. W. Yuill	1

3rd Corps Area	Army Hdcp.
Colonel O. W. Bell	2
Captain T. E. Price	3
Lieutenant E. Herendeen	6
Major Shyreck	0
Captain L. H. Frasier	0

Ft. Myer	
Lieutenant B. G. Thayer	0
Lieutenant C. S. Berg	1
Lieutenant F. L. Hamilton	3
Lieutenant I. L. Kitts	3
Lieutenant M. E. Jones	4

Ft. Humphreys	
Major R. S. Thomas	2
Captain W. F. Tompkins	2
Captain E. F. Shaifer	3
Major I. E. Dorst	2

WONDERFUL HORSE

Quoted from the Sixty-second Cavalry Division

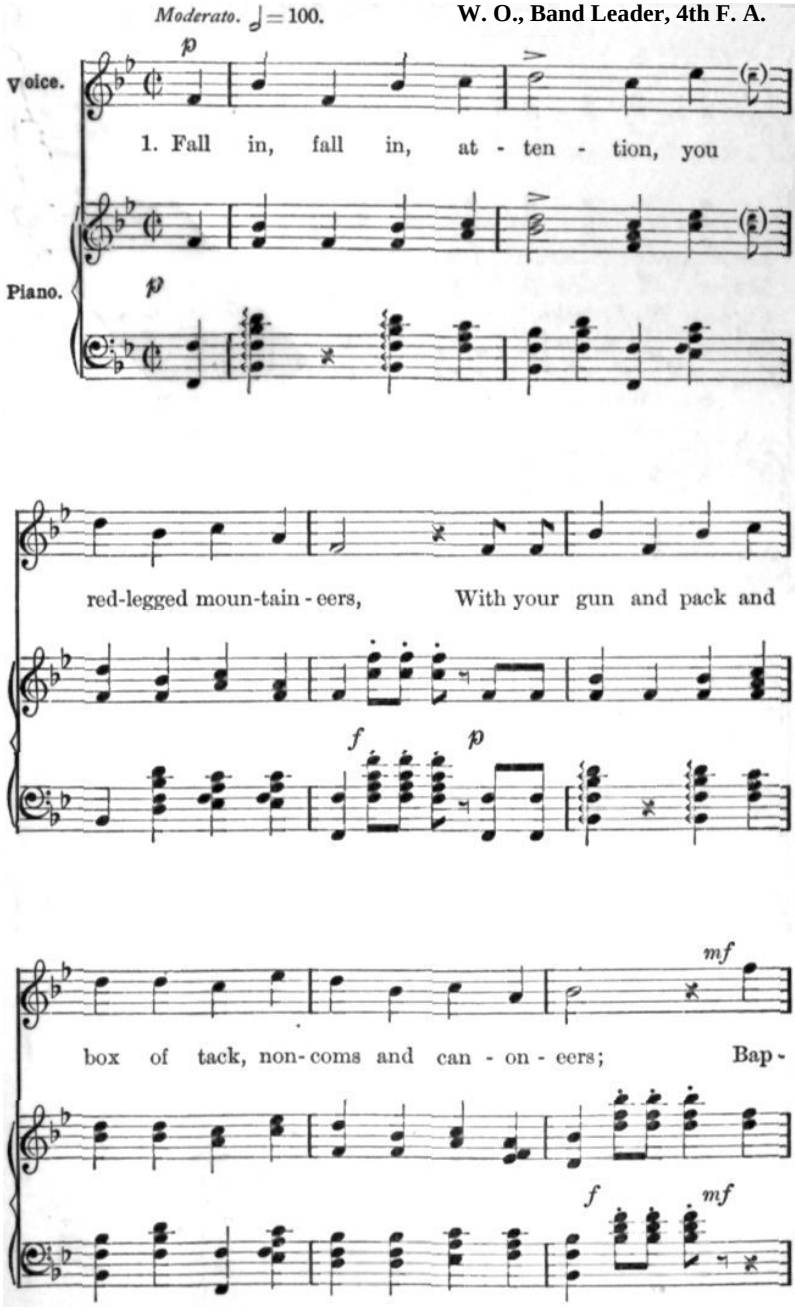
O Horse you are a wonderful thing,
No buttons to push, no bells to ring,
You start yourself with no clutch to slip
No spark to miss, no gears to strip,
No license buying every year
With plates to hammer on front and rear.

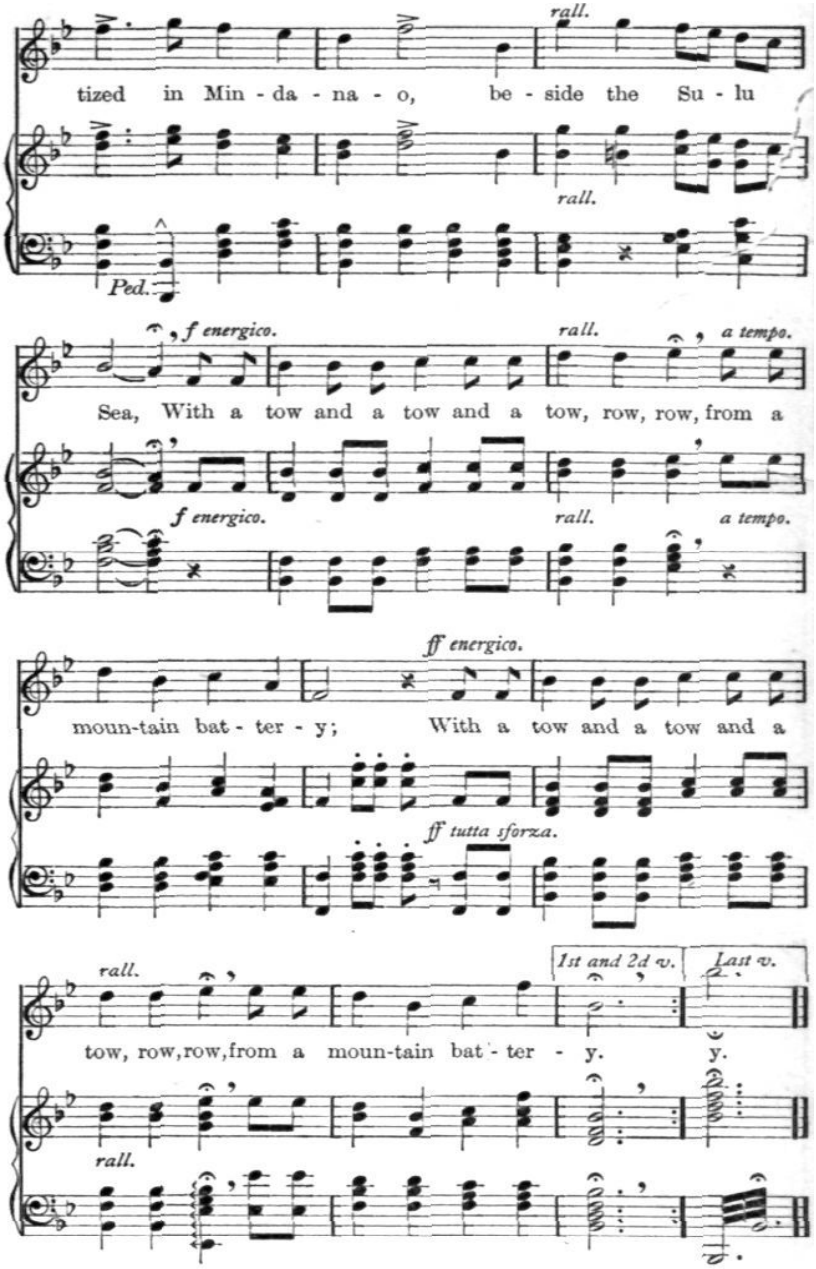
No gas bills climbing up each day,
Stealing the joy of life away;
No speed cops chugging at your rear
Yelling summons in your ear.
Your inner tubes are all O.K.
And thank the Lord, they stay that way.

Your spark plugs never miss or fuss,
Your motor never makes us cuss;
Your frame is good for many a mile,
Your body never changes style,
Your wants are few and easily met,
You've something on the auto yet!

THE MOUNTAIN BATTERY SONG

Music arr, by Jos. Studeny,
W. O., Band Leader, 4th F. A.

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