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TIDBALL CLEARING THE WAY FOR THE CAVALRY AT ALDIE
(An engagement between Pleasanton's and Stuart's commands, June 17, 1863)

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OPERATION AND MAINTENANCE OF MOTOR VEHICLES

BY CAPTAIN MALCOLM R. COX, F. A.

THE extensive use of motor vehicles for military purposes dates only from 1914. In the case of the United States Army, such use began with the Mexican Punitive Expedition in 1916. At that time, there was practically no personnel in the Army experienced in the operation and maintenance of motor vehicles in large numbers; in fact the first fleets employed by the Army were operated and repaired by civilians who accompanied the vehicles from the factories.

From that condition, a little more than a decade in the past, the Army has made remarkable progress in the use of motor transportation. It is at least now completely self-reliant in its operation of the new means of transport. Each year that passes discloses additional military utilization of motor vehicles. The ultimate in this utilization is not yet apparent.

Foreign armies, notably the English, French, and German, are several steps in advance of the United States in the actual adoption of motor transport to new military uses, which is rather paradoxical considering this country's unquestioned pre-eminence in the development and production of automotive vehicles. It is, however, perfectly in accord with our traditional conservatism in all things military. True to that policy, be it unwise or not, the Army will eventually adopt many schemes of motorization similar to and probably in advance of those now accepted as essential by foreign armies. The War Department experiments with the functioning of combined mechanized units of all arms and services in field tests of several weeks' duration are the beginning. Just what the test will lead to is, of course, problematical at this time.

From a tactical standpoint, the opportunity is presented to increase the range and rapidity of maneuver with motor transportation. The principle of massing larger bodies of men and material gains a point. Supply operations have already demonstrated extensive reliance upon motor vehicles. The cavalry has adopted armored cars, and the artillery feels the need of tractors to replace animals as the motive power for heavier guns. Little boldness as

a prophet is needed to predict a much greater military use of mechanical transport than is now considered feasible.

When so many signs indicate that the Army is to be faced with the necessity of using huge numbers of motor vehicles, it would be far remiss in its duty unless it prepared itself effectively to operate and maintain them.

As much as possible of this preparation must be accomplished in the piping times of peace. Naturally, the great bulk of the motor vehicles used will be thrust upon the Army when it takes to the field, or shortly thereafter. And contrary to the situation with respect to animals, whose numbers with the army in the field will rapidly decrease with each year of the war after the first, motor vehicles will be turned out in constantly increasing quantities as the factories reach their wartime stride. Tried and proven methods of operation, maintenance, and replacement must be well in mind before the event of hostilities.

Animals have been in use for military purposes for thousands of years. During that time, the methods of employing and caring for them, and of training the men to do it, have been developed and formulated into a highly systematized procedure which, having been incorporated into rules and regulations, has become the guide for the training of generations of military men in animal management and animal transport.

It is logical to assume that similar rules and regulations, almost exactly parallel in principle, must be formulated and be as rigidly enforced if the Army is to get justifiable returns from its motor transportation.

Although centuries may be counted as the time units in the evolution of present methods in animal management, their formulation and enforcement is entirely a product of modern times. Doubtless, the greatest progress has been made since the induction of an extensive and thorough school system into military training methods. This school system, in all armies laying any claim whatever to being other than an uninformed rabble, is all inclusive. Every phase and feature of military science, military art, and military duty has a place in the curricula commensurate with its relative importance. Training and instruction in the utilization of animals as a means of military transport has become most thorough. Every phase is covered from Veterinary Science in special schools down through general and special service schools, garrison and troop schools; all details, even to the proper way to fold a saddle blanket, are uniformly taught. Not the least important features of this program are the regulations and orders requiring strict compliance with the accepted principles and routine of animal management.

Such in outline is the system through which the Army has

reached its present enviable position as a leader in successful utilization of animals. A similar system is required in the case of motor transport.

It must not be inferred that the Army operates its motor vehicles with an utter lack of system; or that it has no rules and regulations to govern motor transportation. Much has been done in this respect during the few years that it has worked with motor vehicles, and in relief of the Army mule. The principal contentions here are: that there is very much more to do; that a change in some current practices is required; that general preparation by the Army for a much greater use of motor transport is urgent, and that the whole problem must be approached with an open mind ready to accept or reject every proposition solely on its merits or lack of merit, and without prejudice.

Before attempting to suggest what should be done in the way of improving operating and maintenance methods, it is well to outline these methods as they exist at present.

All motor vehicles owned and used by the Army come to it through the General Supply Services. The Signal, Engineer, and Air Corps purchase certain more or less specialized types for their own purposes. The general purveyors to the entire Army are the Quartermaster Corps and Ordnance Department.

Broadly stated, the Ordnance Department supplies tractor types and the Quartermaster Corps furnishes all the rest. These two branches maintain a varying degree of control over the vehicles they put into service, depending somewhat upon the circumstances of the ultimate assignment in each case. Because of a combination of factors more favorable to the result, the Ordnance Department probably exercises a closer supervision over its tractors than does the Quartermaster Corps over its cars, trucks, and motorcycles. There is a certain amount of dual or divided control between the two departments in some instances, and they also issue to each other.

The vehicles supplied may be separated into two general groups—this applies more particularly to Quartermaster vehicles, but is likewise applicable in certain circumstances to Ordnance types. The two groups are:

A. Those retained by the various elements of the issuing service itself for general transportation and supply.

B. Those issued to the combatant arms as a part of their basic unit equipment.

Examples of the first group are the various ammunition, supply, and transport trains pertaining to divisions, corps, and armies, the general transportation units in the theater of operations and in the

zone of the interior. Transportation furnished camps, posts, and stations also may be included in this group.

The second group is represented by the cars, motorcycles, trucks, tractors and tanks furnished to infantry, cavalry, artillery, engineer, air service, medical and other special troops for the purposes of mobility and combat.

The mere listing of these organizations to which vehicles in each group pertain readily indicates the wide divergence in the nature of the service expected of each group. In the case of the first group, transportation of men and supplies is the primary and practically the sole objective. Each unit, train, or truck company so employed can very well be composed of vehicles of a single type, identical in every respect. This is the ideal sought and generally fulfilled by the transportation service. Here again it is best to "pool" the vehicles under centralized control in order that the greatest efficiency and economy in transportation may be attained. Under these circumstances, the vehicles lose their identity as individual machines and come to be considered like a box car—as so much capacity, so much tonnage. In other words, each train becomes a definite amount of transportation and not so many trucks that are furnished a commander when he needs men or supplies, or when he must move his command to accomplish a certain mission.

The authority controlling this transportation can retain a reserve under his immediate orders to meet the numerous emergencies that are easily imaginable. Disabled trucks may be replaced from this reserve; even complete units can be laid up for reconditioning while a reserve unit replaces it in service.

Some trains, or at least certain units of them, must move from the rear to as near the front as conditions permit. But the very nature of their work implies that they will operate, for the most part, in the rear areas.

With all the above mentioned circumstances in mind, and based on such experience, the Quartermaster Corps has developed a system of operation and maintenance purposing to keep the maximum amount of transportation in serviceable condition with a minimum of lost vehicle time, wastage, and distribution of spare parts, labor, and expense. The system is designed to function under both peace and war-time conditions.

Operation and maintenance are inseparable factors in the utilization of motor vehicles. They dovetail so closely that experience dictates one authority must direct and control both in any sphere of operation. In other words, the authority directing the work the vehicles are to do must first know that they are in shape to do it; he will be responsible if they report in poor condition, so he must have the authority and the means of keeping them serviceable.

The Transportation Service of the Quartermaster Corps, the agency controlling transportation of all kinds for the Army, recognizes this principle and insists on its application with respect to all vehicles furnished by the Quartermaster Corps.

The system effecting repairs, or of insuring adequate maintenance adopted by the Transportation Service, is a progressive one from the front line to the rear. Minor repairs and adjustments are made by the operating organizations or by the Motor Repair Sections attached to operating units. Major repairs and overhaul jobs are done by Service Park Units further to the rear; reconstruction, complete reconditioning, reclamation and salvage cases are sent to Overhaul Parks still further back. These repair groups are operated by Quartermaster Corps personnel; they have an increasing amount of machine tools and other special equipment as they get further back from the front lines.

The only change in this policy since the war is the adoption of the unit repair and replacement systems which came into effect on July 1, 1926. The essentials of this system are the establishment of large repair centers fully equipped with special machinery, adequate stock of repair parts, and manned by specialized workmen. When a principal unit—an engine, for example—becomes unserviceable it is sent to the repair center and replaced by a serviceable engine supplied by the repair center, which has on hand in stock serviceable units of all types for all vehicles operating within its zone of responsibility. The unserviceable engine is then reconditioned at the repair center and placed in stock ready for re-issue when needed.

With the adoption of the unit repair system, vehicle repair ceased and the disabled unit rather than the vehicle went to the repair shop. Practically all supplies and spare parts for vehicle repair are denied to operating organizations and they are limited to adjustments and minor repairs of the chassis, such as the replacement of bolts, springs, shackles, wheel bearings, relining brakes, etc.

From the standpoint of the Quartermaster Corps in the operation of its trains under the circumstances heretofore set forth, and in the simplification of its other duties of providing supplies and spare parts for vehicles operated by the Army at large, this system of maintenance is ideal. But it does not fit so smoothly with the conditions of service demanded of the combat units.

The system, when applied to combat units, is first of all fundamentally opposed to the principle advocated and expounded by the Transportation Service itself, a principle which is rigidly enforced within its own organization; viz., that the operating authority must be responsible for maintenance.

Where is the operating authority of a motorized field artillery unit, for example?

Certainly not in the office of the Quartermaster General, the Chief of Ordnance, nor even the Chief of Staff or the Chief of Field Artillery. Would any of these attempt to delegate to themselves the duty of directing the route, time of starting, length of each day's march, nightly schedule of repairs and adjustments, places and duration of each halt, and the many other considerations effecting the movements of each motorized artillery organization in the field? These things are the intimate phases of unit operation in peace and war and most certainly rest with a succession of artillery commanders in the field, who are directly charged with the responsibility of the operation, and must have within their own hands all possible authority to insure its success, if it is to be a success. This fundamental military precept should apply as rightfully to motorized artillery as to any other combat unit. Yet one of the most important means of assuring a successful march has been denied the commander of a motorized artillery unit by keeping from him adequate means of maintaining his vehicles in serviceable condition.

Experience has convinced the Transportation Service and the Ordnance Department, as well as all others who operate motor vehicles, that the degree of success attained in their operation depends largely upon the day-to-day condition of the individual vehicles; also that the control of the means of this conditioning must be in the hands of the authority operating the vehicles. This conditioning is a degree of maintenance that varies in scope and in the nature of the work required, but it must be performed by the operating unit to the limit of its capacities in ability, time, spare parts, and other facilities.

Just what this limit should include has not been determined to the satisfaction of all concerned, except that all artillerymen who have operated motorized units under present restrictions are convinced that they are ruinous. In fact the restrictions are largely disregarded when such an organization undertakes a long march; the supply services furnish it with adequate supplies and spare parts, the organization mechanics make every possible degree of repair en route and the outfit goes and returns without further assistance.

The essential point is that each organic motorized artillery unit is an entity with respect to operation. It should, therefore, be considered as such with respect to facilities for maintenance. Take, for an example, any organization in Group B, a combat unit like a regiment of 155-mm. howitzers, tractor drawn. According to its tables of organization, this regiment is assigned a total of 384 vehicles, of which 88 are tractors issued by the Ordnance Department;

the 296 remaining cars, motorcycles, and trucks are Quartermaster vehicles. There are approximately 22 officers and 620 men, including non-commissioned officers, drivers, and mechanics charged with the immediate supervision of these vehicles. They are all artillerymen; no Quartermaster motor repair unit is attached to this regiment. A section of an Ordnance Maintenance Company is organically assigned; this normally consists of from six to ten gun and motor mechanics with an artillery repair truck (machine shop).

The artillerymen are charged with the job of getting the guns into position to deliver effective fire in support of the infantry, which includes the difficult task of keeping up with the infantry as it advances. If the expert assistance of Quartermaster and Ordnance mechanics could be always at hand ready to help with crippled vehicles, it would doubtless be a welcome relief to the artillerymen. However, experience has shown that as it gets closer to the front line and as the advance becomes more rapid and prolonged, the less can a motorized organization depend upon outside assistance. The Quartermaster and Ordnance units must, of necessity, be located in a reasonably quiet area in order to function; roads to the rear are congested; traffic is controlled, so that it becomes almost impossible to send vehicles or disabled units back for repair, even if transportation for this purpose could be spared.

Trains and similar organizations can abandon their cripples with considerable impunity and still function, but combat units, especially motorized artillery, would soon become immobile through adoption of that expedient.

It is therefore evident that the artillery organization whose personnel is resourceful, experienced, and diligent in effecting repairs, will have the better chance of staying in the fight, at least as far as mobility is concerned. And, to repeat, operation and maintenance go hand in hand; the authority charged with operation should control maintenance; officers and men are more considerate of equipment when they know they themselves must keep it in repair.

If the circumstances of war require motorized artillerymen to keep their vehicles rolling, should they not be trained to do it in times of peace?

No rules of the Supply Services should hamper this training; nor should any such restrictions interfere with the artilleryman's mission of getting his guns to the front and keeping them there. In fact the mission of the Supply Services should be directed toward aiding these things.

The reasons generally advanced for the adoption of the present methods of centralized repair, and the denial of spare parts and other repair facilities to motorized artillery are: it is more economical;

better work results; shop congestion is avoided. But is this entirely true? Even if it appears to be true now, would it ultimately be equally true?

The probable loss in efficiency of certain work when performed by operating units as compared to the maximum possible in well equipped central shops, and the expense caused by the wastage and distribution of spare parts and supplies should be *anticipated and charged to training*. This expense would be more than balanced by resultant benefits to the Army at large. What is to be gained from all the time and ammunition expended in teaching the artilleryman to shoot if he cannot get his guns into position? At present the motorized artilleryman is only half trained in marching; he can operate his tractors and trucks, but he is prevented from repairing them—operation and maintenance are inseparable.

One of the biggest problems to arise during the last stages of the last war was the shortage of qualified motor mechanics and other repair personnel. This shortage bids well to be even more acute in the next war, with the increase in mechanization now actually accomplished and contemplated. The Army can do much to help itself by giving this training to as many young men as opportunity permits. One sure way to do this is to train the personnel of the operating units to the fullest possible extent.

If in each corps, or army in the field, half of the units were so trained and equipped that they could do a majority of the maintenance work on their own vehicles, would this not relieve congestion in the central repair shops?

Of course, there is a limit to the repairs that can be made by an essential operating organization. Such an organization should be restricted by the natural, logical limitations imposed by the tools and equipment deemed expedient to take into the field. When such restrictions as these are established, and the personnel is trained to properly use the tools and equipment that can be readily carried with the organization, all repairs except those requiring the use of machine tools and the replacement of heavy, bulky parts can be accomplished by the operating units.

To be sure, a time limit enters strongly into what a front line outfit can accomplish in this respect, even though it possesses abundant ability and facilities; however, the time spent in sending a vehicle back for repair, or in waiting for the replacement of a vehicle or a unit to be sent from the rear, would be sufficient for trained men to accomplish much.

By no means the least advantage of training, permitting and requiring the operating organizations to make all possible repairs to their own vehicles, is the powerful incentive of self-reliance.

ORGANIZATION CHART OFFICE OF THE CHIEF OF FIELD ARTILLERY WASHINGTON, D. C.

CHIEF OF FIELD ARTILLERY
Maj. Gen. Fred T. Austin

EXECUTIVE
Lt. Col. Wm. Bryden

FIRST SECTION—PERSONNEL

Maintains liaison with the G-1 Division. WDGS, and with the office of the Adjutant General.

Makes recommendations concerning the assignment, transfer, classification, elimination, leave, and decoration of officers of the Regular Army, and keeps the records and correspondence concerning the same.

Makes recommendations concerning the assignment, transfer, promotion, classification and elimination of officers of the Officers' Reserve Corps (not commissioned in the National Guard) and keeps the records and correspondence concerning same.

Commands the Detachment of Enlisted Men. Office, Chief of Field Artillery.

Lt. Col. D. C. Cubbison
Capt. B. M. Sawbridge

SECOND SECTION—INTELLIGENCE

Maintains liaison with the G-2 Division. WDGS, and the Historical Section, AWC.

Collects and collates information relative to the Field Artillery of other nations; prepares literature pertaining to the Field Artillery of this and other countries.

Prepares, from data furnished by the several sections of the office, material for the Information Bulletin.

Supervises the technical library of the Office. Chief of Field Artillery.

Major J. M. Eager

THIRD SECTION—TRAINING

Maintains liaison with the Training Branch, G-3 Division. WDGS, and with the Field Artillery Sections of the General Service School and the Special Service Schools of other branches.

Supervises all Field Artillery training matters—including Correspondence Courses—which effect the Regular Army, the National Guard, the Organized Reserves, the ROTC, and the CMTC.

Supervises the work of the Field Artillery Board in matters pertaining to training, and the operation of the Field Artillery School.

Formulates and makes recommendations concerning Field Artillery training doctrines.

Supervises the preparation of Field Artillery Training Regulations and Field Manuals; reviews similar matter prepared by other branches and submitted for concurrence.

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FOURTH SECTION—MATERIEL, SUPPLY AND FINANCE

Maintains liaison with the G-4 Division. WDGS, and with the Supply Services.

Supervises the supply and development of materiel and equipment; compiles data and makes recommendations relative to materiel, supply, quarters, reservations, target ranges, and appropriations in so far as the Field Artillery Branch is concerned.

Reviews Technical Regulations submitted for concurrence.

Provides representatives on all service technical committees.

Chief of Section is a member of the Field Artillery Board.

Major E. J. Dawley
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FIFTH SECTION—OPERATIONS AND WAR PLANS

Maintains liaison with the War Plans Division, and the Operations and Mobilization Branches, G-3 Division. WDGS.

Prepares studies pertaining to the Field Artillery for incorporation in the various war plans.

Prepares studies and tables pertaining to the organization of Field Artillery units.

Prepares memoranda concerning troop movements of Field Artillery units of the Regular Army.

Prepares such miscellaneous studies, memoranda, and articles as may be directed.

Major E. P. King, Jr.
Major J. K. Bowles

RIDERS' LEG

BY MAJOR DEAN F. WINN, M. C.

THE WRITER has been impressed with the frequency of an injury to which the mounted man or officer is peculiarly subject. We refer to strain of the adductor muscles of the thigh, or what is generally known as "straining or pulling the jockey muscles," or "riders' leg." The accident probably occurs much more frequently than is commonly realized and is of considerable economic importance in the military service, as well as being a source of serious trouble for those afflicted. Although there are undoubtedly many instances of slight trauma of this nature for which no medical advice, or at best only casual advice, is sought and no record of the case is made, nevertheless the injury not infrequently amounts to a real disability, entailing a loss of time from duty of from two weeks to as many months, or longer. Even when the individual looks upon the injury as trivial and continues his duties in spite of the discomfort, a recurrence from time to time is rather certain to affect his efficiency.

The muscles most directly concerned with adduction of the thighs are the pectineus, adductor brevis, adductor magnus and adductor longus. They are especially used in riding, the sides of the saddle being grasped between the knees by the contraction of these muscles. The adductor longus is the most superficial of the group. Its tendinous origin from the front of the pubic bone can be differentiated from the other adductors; when in action its upper tendon stands out as a prominent ridge running obliquely downward and outward from the pubic bone. We believe the adductor longus to be the muscle most frequently traumatized.

Muscle strain usually occurs as a result of the stretching of a

muscle in its long axis with rupture of a few fibers. It is our opinion that the chief damage in severe strain of the thigh adductors occurs in the slow-healing tendinous portion, with possibly a separation of some of the fibers at their bony attachment. Repeated strain of this character is probably a factor in the production of riders' bone, which is an area of ossification in the adductor muscles of the thigh.

Strain of the adductors has been observed in enlisted men but in our experience has been more common among officer personnel. In attempting to account for this we are reminded that the former use the McClellan saddle and rather long stirrups perhaps bring the adductors into play in a manner different from that of the officer riding a flat saddle with somewhat shorter stirrups. It is also true that the enlisted man's horse is usually well schooled while horses used by officers are apt to be remounts, green jumpers, etc., or high-spirited animals which exact an active use of the adductors on many unexpected occasions. It is probable that the injury never results simply from prolonged periods in the saddle. In our case there has been a consistent history of sudden exertion of the muscles due to unexpected movements of the horse while taking a hurdle or a slide, or a sudden and forceful gripping of the saddle with the thigh in an effort to avoid becoming unseated when the rider is leaning far to one side as in the execution of a difficult polo stroke or in turning a pair of galloping horses.

When the accident happens there is usually the sensation of something "popping" in the injured thigh, followed by pain which may be so severe as to prevent further riding. Ordinarily, however, the rider continues mounted for a variable time before the pain becomes acute enough to be disabling. Pain is not usually a troublesome symptom unless the major function (adduction) is brought into play. Walking may not be painful, but a long stride causes definite discomfort. The partial loss of function and the pain on exertion inhibit proper suppleness and render riding, even at the simple gaits, alike unsafe and uncomfortable. There is acute tenderness on firm pressure over the upper tendon of the adductor longus, most marked at its bony origin high up in the crotch; this symptom persists long after the other complaints have subsided. There may be slight swelling and tenderness over the belly of this muscle. Ecchymosis (extravasation of blood beneath

the skin) sometimes is present in the pubic region and may extend along the inner surface of the thigh as far down as the knee, but in many instances there is a singular absence of visible signs of injury. Statistics would indicate that the condition occurs with about equal frequency in the right and left thighs and in a fairly high percentage is bilateral.

Many of the mild cases recover in from a few days to two weeks. Recurrences are not at all uncommon and their healing may require months. Return to duty before the acute process has subsided invariably prolongs the convalescence.

Sufferers with adductor strain have found that some relief may be obtained by shortening the stirrup opposite the injured side. This serves to diminish the strain on the damaged thigh as the major portion of the weight is thrown into the short stirrup when leaning in that direction. However, it is our opinion that riding should be interdicted while the acute symptoms persist and should be resumed gradually. In the early stages local heat is useful. Walking within reason may be allowed. The soreness and weakness in the adductors is persistent and annoying. Experienced hunters have learned that a stirrup strap, or similar appliance, placed tightly about the upper thigh gives a degree of support to the strained adductors. This has suggested the following supportive treatment, which we have used with gratifying results.

Adhesive tape, one inch wide, is applied in alternating and overlapping obliquely placed strips, beginning well up in the crotch, covering the upper half of the thigh, and reaching well around the anterior and posterior surfaces. The support given by this strapping appears to have a tendency towards preventing recurrences. In cases requiring prolonged support we have used with success an elastic thigh stocking. This is made from woven elastic stocking fabric and is fashioned to fit quite snugly the upper two-thirds of the thigh. The outer section of the stocking extends up as high as the trochanter and carries a vertical strip of whalebone to prevent wrinkling. The upper margin of the inner section is slightly rounded by padding covered with chamois to obviate pressure in the crotch. Two vertical strips of webbing pass upward over the iliac crest where they are buckled to an elastic suspender passed over the opposite shoulder.

HARD WORK FOR THE ADDUCTOR MUSCLES

(Pictures from Fort Riley, Kansas)

GENERAL FRÉDÉRIC GEORGES HERR

FIELD ARTILLERY: PAST, PRESENT, AND FUTURE

BY GENERAL HERR OF THE FRENCH ARMY

ELEVENTH AND LAST INSTALLMENT

(This treatise by General Frédéric Georges Herr, published in French by Berger-Levault, Paris, is believed to be an outstanding book on the subject of field artillery. In the belief that heretofore there has not been an opportunity to read this in English, it is hoped that its publication in serial form, beginning in the May-June, 1927, JOURNAL, will be the means of acquainting more of our officers with this excellent work. During the World War, General Herr was successively the commander of an artillery brigade, an infantry division, an army corps and of an army detachment. He then became Inspector General of the French Artillery.—EDITOR.)

UNITED STATES

WITH the methodical spirit which characterizes them, our American friends have occupied themselves in seeking out the lessons of the War, Different commissions have been constituted for this purpose, in particular the Westervelt Board, which was charged with determining the matériel, munitions and means of transportation necessary for the artillery of an army in the field.

In a general fashion, American artillerymen appear above all to be concerned with three questions: matériel, motor traction, and chemical warfare.

(A) MATÉRIEL

After the end of 1919, General Hinds, ex-commander of the artillery in the A. E. F., drew the attention of the American Senate to the necessity of forming important reserves of artillery matériel. This question appeared to him to be more important than the project for universal military service, for, although men can be trained in a few weeks and officers in a few months, it is, on the contrary, impossible to manufacture artillery matériel in a reasonably short time, after the beginning of hostilities. "If we could not have supplied ourselves with artillery matériel from the French and English," he said, "we would have been a negligible factor in the War until the end of 1918. At the time of the armistice, nineteen months after our entry into the conflict, with the exception of twenty-four 8″ howitzers manufactured from English plans by the Midvale Steel Co., we did not have a single piece of divisional, corps or army artillery which was built in America after the declaration of war." He added that, thanks to the program then being executed, the American artillery would soon have a reserve of matériel twenty times greater than before the War, or about 5,000 75-mm. guns and 5,000 heavy pieces, an armament superior in quantity to that of the German armies in 1914, and very superior in quality.

We know that the American army has many types of English and French matériel, which form a rather incongruous mass; e.g.:

English matériel: Vickers 2.95″ mountain gun; 6″ gun; 8″ howitzer; 9.2″ howitzer.

French matériel: 75-mm. gun; 155-mm. howitzer, C.S.; 155-mm.

gun, G.P.F.; 194-mm. gun, G.P.F.; 240-mm. and 400-mm. howitzers.

But America is attempting to replace all this foreign matériel by guns of national model and manufacture. It has already succeeded in putting out a 75-mm. pack howitzer, M-1920, and a 105-mm. howitzer, M-1920, and it has tested, at Rock Island Arsenal, a 3″ A.A. gun M-1920 E, which has all the qualities required today for an anti-craft gun: a vertical field of fire of plus 10° to plus 80°, 360° traverse, great rapidity of fire due to a semi-automatic loading device, the breech mechanism being operated by compressed air, muzzle velocity 2,600 f.s., automobile carriage. An auto-gun of 4.7″ caliber, which is only an enlargement of the other with the same characteristics, has also been tested with success.

The Westervelt Board demanded the construction of a light field gun and a light howitzer with big fields of fire, long range, both capable of using the same mount. The following matériel, already built, has in part these desiderata:

75-mm. gun, M-1920, range 13,800 m., field of fire 30°.
105-mm. howitzer, M-1920, range 10,900 m., field of fire 30°.

The same Board also demanded a gun of about 120-mm. and a 155-mm. howitzer for the medium artillery, capable of using the same mount. There are several test models in existence; in particular the 4.7″ gun, having a field of fire of 60° and a range of 18,700 m.

A 16″ gun and a howitzer of the same caliber have been built for the Coast Artillery. The gun can throw a projectile weighing 2,340 pounds more than 25 miles; the gun, with the breech mechanism, alone weighs 150 tons, but the balance is so well adjusted that one man can move the gun by hand for loading and pointing; the projectile is equipped with a threaded false ogive, of sheet steel, and is very long and pointed. There are two models, one destined for use in fixed coast batteries, firing from a barbette carriage, the other being a railway mount. The 16″ howitzer, M-1920, throws the same projectile a distance of 15 miles.

They have just started the test at Aberdeen Proving Ground of a 240-mm. howitzer, M-1918 (Schneider Type), mounted on a motorized carriage of the Saint-Chamond type with caterpillar track. The howitzer, which throws a projectile weighing 345 pounds more than 10 miles, was satisfactory, but the electro-mechanical mechanism of the carriage was not all that could be desired.

A heavy railway mount of 14″ caliber is being constructed for test. They are also planning a new motorized caterpillar mount for the 4.7″ gun and the 155-mm. howitzer.

In addition numerous studies are being made on questions of the greatest interest, such as:

Split trail carriages with very large field of fire.
Muzzle brakes.
Improvement of the shape of projectiles to increase their range.
Mechanical fuzes.
Supersensitive fuzes for anti-aircraft projectiles.
Smoke-producing equipment, etc., etc.

(B) AUTOMOTIVE TRACTION

In the previous chapter we have alluded to the numerous types of motor driven matériel. America, the country of great steel industries

and enormous gasoline production, could not fail to have a passion for this question. Since the end of the War, the tendency toward general motorization of the artillery has been manifested, and many reasons were cited to justify this idea; economy of personnel (a horse-drawn regiment of 155-mm. howitzers has 2,200 men, the motorized regiment only 1,800); fewer vehicles (308 in the horse-drawn regiment, 128 in the motorized regiment); greater strategical mobility (the motorized regiment can easily cover three times the daily march of the other); reduced vulnerability; lower eventual cost, etc., etc.

There is nothing astonishing in the fact that the Westervelt Board demanded general motorization of the artillery. In fact, right now aside from a few rare units which are still horse-drawn (one horse artillery battalion on the Mexican border, a regiment of 75-mm. pack guns at Panama, a regiment of 75-mm pack guns in the Philippines), all of the American artillery units are tractor-drawn;* 5-ton tractors (destined to be replaced by 3-ton tractors) for the 75-mm.; 10-ton tractors for the larger calibers.

Numerous tests of caterpillar mounts for different calibers have been made at Aberdeen, particularly the following:

The Christie caterpillar mount for the 155 G.P.F.†

Christie caterpillar mount common to both the 75-mm. gun and the 105-mm. howitzer.

Holt caterpillar mount for the same kinds of matériel.

Holt caterpillar mount for the 155-mm. G.P.F. and the 8-inch howitzer.

Combination caterpillar and wheeled mounts for all calibers from 75-mm. up to 240-mm.

In order to avoid the noise caused by these mounts and the wear of the tracks on the road, they have tried to use rubber on the shoes and rollers. This proceeding not having given good results, they are now experimenting with an entirely new model of track mounted on cables with removable rubber shoes (Chase track).

The great obstacle to the general use of automotive traction, especially in regions with mediocre country roads and where bridges are rare, is the impossibility of crossing deep streams with motor vehicles. So experiments have recently been made with special caterpillars which have succeeded, it seems, in running through water about 5 feet deep.

(C) CHEMICAL WARFARE

We know that the Washington Conference forbids the use of gas. This prohibition appears to the Americans as entirely idealistic. The technical committee on gases, which was consulted by the Conference, expressed the following ideas:

1st. It is impossible to regulate the use of gas by limitations on the physical properties of gases.

2nd. It is impossible to prohibit or even to control technical research concerning war gases.

3rd. It is impossible to prevent the production of these gases.

*This statement is now incorrect. The Army List and Directory gives the number and location of numerous horse-drawn units.—EDITOR.

†The Christie mounts have two means of operating; for roadwork they have four pairs of rubber-tired wheels; over rough country a caterpillar track is placed over the wheels, the steering wheels are locked and the vehicle runs like a caterpillar.

4th. An unscrupulous enemy can always use gases; it is necessary to prepare against their use in time of peace; therefore the study of gas masks requires the production of the very gases which we wish to prohibit. So the American army has continued, as in the past, actively to study the question of gas. A law of June 4, 1920, created the Chemical Warfare Service whose chief has considerable personnel under his orders and large credits at his disposal.*

We recall that at the end of the War the Americans announced that they had in their possession about 150 tons of a new product, "lewisite," called after Professor Lewis, its inventor; the product which is obtained in the form of an oily liquid, of amber color, having the odor of geranium, igniting in contact with water, was represented as having terrific toxic powers. Lewisite, which is probably chlorovinyldichloroarsine, has not in reality the terrifying properties with which it was credited. The Americans have continued their research. Their press recently announced that they have just tested a 12-inch gas projectile, partially filled with a new product called D.A., a solid resembling T.N.T. in appearance. The explosion of the projectile volatilizes this substance and gives off an extremely powerful gas.

The Chemical Warfare Service organized last year at Washington an exposition of war chemicals. The idea was "to show graphically how much national prosperity depends upon the development of chemical industries, and how these industries constitute, in time of war, the only adequate means of national defense." Charts showed the relationship between mustard gas, chloropicrine, picric acid, etc. Each visitor was given a propaganda booklet insisting upon the necessity of a strongly organized Chemical Warfare Service, the development of the chemical industries, and the appointment of specialists.

INSTRUCTION

In America the "man on the street" has absolutely no comprehension of the necessities of national defense. Congress, being obliged to take this into consideration, has had to reduce the personnel from year to year until at present they have only 125,000 men and 12,000 officers in the Regular Army. They have therefore returned to the prewar conception of a small peace-time army, reinforced in time of war by voluntary militia. The militia cannot be efficient unless, its military instruction is at least outlined and its officers and noncoms are of unquestionable professional and moral worth. This is the cause of all the measures taken to assure the instruction of officers of the Regular Army, National Guard and Reserves. The most interesting of these measures are:

The creation of nine centers of instruction (one for each Corps Area).

Calling young volunteers into camps of instruction to form part of the reserves. After 1922, there were 50,000 requests for such duty, but funds only permitted accepting 10,000 men. For 1923 they anticipate a credit of $2,700,000 which will permit acceptance of about 30,000 volunteers.

For the instruction of reserve officers, there was created an organization called the Reserve Officers' Training Corps, wholly analagous to the English Officers' Training Corps of which we have already spoken. It includes, like the English, two divisions into which the students of

* Successive reductions of the army effected since 1920 have naturally affected this service, but less than the line troops. The personnel, 1,500 men in 1920 and 1,100 in 1921, is still 776 in 1922. Credits have been reduced from $4,400,000 to $1,350,000.

public or private institutions of learning are grouped. Since 1920, 570 American colleges have furnished this corps with 110,000 volunteers from a total of 170,000 students. In 1921, 70,000 commissions were conferred upon students.

The budget of 1920 called for the expenditure of $5,000,000 for "professional instruction"; that is, for the free apprenticeship of soldiers. For example, at Fort Monroe, the center for the Coast Artillery, they teach artillerymen who are about to be discharged the trades of chauffeur, telegraphist, machinist, painter, electrician, engraver, draftsman, photographer, etc. The wind of economy which blows in America has caused considerable reduction of funds, but the principle has been maintained.

Organization of the Artillery.—The two large subdivisions of the arm, the Field Artillery and the Coast Artillery, each has a Major General as chief. As chief of branch, however, they rank with corps commanders, the highest grade after the Chief of Staff.

The Field Artillery only included until recently all light pieces of not over 155-mm. caliber. All other cannon belonged organically to the Coast Artillery.* The reorganization of 1921 leaves the Coast Artillery with siege and fixed matériel only, railway artillery, antiaircraft and trench weapons. The Field Artillery has henceforth all matériel destined for field combat with the armies, that is, aside from the matériel which it already had, the 155-mm. G.P.F., the 6″ gun, the 8″ howitzer, the 9.2″ howitzer and the 240-mm. howitzer.

The army of 1923 has only three complete divisions and four divisions reduced to one brigade. The country is divided into nine army corps zones, each of which should organize and mobilize 6 divisions in case of need: one from the Regular Army, two from the National Guard and one from the Reserve.

The active division, which includes four regiments of infantry, possesses one brigade of two 75-mm. regiments (French model).

A single brigade of corps artillery has been kept: it is composed of one regiment of 155-mm. howitzers and one mixed regiment of 155-mm. G.P.F. guns, 8″ howitzers and 240-mm. howitzers.

Thus the 155-mm. howitzer is classed as medium artillery, and it is claimed that the division should only possess light artillery. On mobilization, the division will receive one regiment of 105-mm. light howitzers, and all larger calibers will belong to the corps or to the army. We have seen that this is also the English solution. It is also the solution which we extol for the organization of our artillery.

The Coast Artillery contains:

Three tractor drawn regiments.
One railway regiment.
One anti-aircraft regiment.
One sound ranging company.

Ordnance.—As in England, we find in America a remarkable centralization of technical services.

The Ordnance Department is a veritable directorate of armament which is charged with all matériel and munitions for the army. It

* The United States, having nothing to fear on its terrestrial frontiers, have always put nearly all of their military effort on the defense of the seacoasts. For this reason the Coast Artillery has always been held in esteem in the United States; it was favored in the budget and its personnel were from the élite. This tradition, momentarily abandoned during the World War, has naturally returned today.

studies projects, regulates purchases, organizes manufacture, assures supply and maintenance of matériel; the proving grounds depots, arsenals, and government shops belong to it.

This service reports directly to the Chief of the General Staff; it is directed by a general officer, under whom there is a technical committee with far-reaching powers, which rules on all questions of production. The bureaus of the Ordnance include:

1st. The Manufacturing Service, which determines purchases, constructs and inspects matériel and which is divided into five divisions:

(*a*) Tanks, Tractors and Trailers.
(*b*) Artillery Matériel.
(*c*) Ammunition, Powder and Explosives.
(*d*) Small Arms.
(*e*) Aircraft Armament.

2nd. The Ordnance Field Service, which stores, maintains and issues matériel, and which contains three divisions:

(*a*) Ammunition Supply.
(*b*) General Supply.
(*c*) Maintenance.

The Chief of Ordnance also has under his orders a Technical Staff, charged with proof tests, investigations and research; and an Administrative Section which runs the Ordnance budget and centralizes questions of personnel.

The personnel includes officers, soldiers and civilian employees; the latter constitute the frame work of the Ordnance; their knowledge and their professional experience are "one of the strongest forces by which traditions are carried on" (General Williams).

In October, 1921, the General Staff estimated at more than a billion dollars, half for ammunition and half for artillery, the total value of stocks of all kinds to be maintained as part of the war reserves. This meant an annual expenditure of $37,000,000 to be included in the Ordnance budget to fully maintain these provisions. In view of the impossibility of obtaining any such sum, it was necessary to reduce these estimates and it was decided that only certain carefully chosen matériel would be maintained and that only in limited quantities.

The maximum output of the American arsenals does not reach 5 per cent of the anticipated requirements for a great war. It is necessary to fill up this deficit by the aid of industrial mobilization. But the latter can only produce if the private establishments already possess a certain amount of experience in special ordnance technique. So the Ordnance Department seeks to interest industry in its work by placing orders for ordnance matériel periodically. In addition, to insure procurement of the numerous reserve ordnance officers who will be needed upon mobilization, the principal scientific schools have included technical and practical military instruction in their programs. Students in metallurgy, chemistry, and electricity take during their four school years' courses in artillery matériel, explosives, analysis of raw materials and the application of these studies to the Ordnance service. At the end of their third year of study, they get a six weeks' tour at Aberdeen Proving Ground, during which they take part in firing courses in all types of matériel, learn the operation of tanks and tractors and take part in proof tests of different types of matériel, experimental firings and acceptance tests. Finally, on leaving school, they can obtain, by examination, a commission in the Ordnance

Reserve Corps at the same time they receive their engineering degrees.*

ITALY

The situation of Italy, situated as it is on a peninsula, the mountainous nature of all its terrestrial frontiers on one hand, and, on the other hand, the clearly pacific trend of its people give a special character to all projects for reorganization of the army, and to all theoretical studies. Italian officers apparently anticipate only defensive action in mountainous country, and operations from strongly fortified positions. The regulations on the use of artillery, which appeared in 1921, refer constantly to the regulations published in September and October, 1918, which included only defense and attack of fortified positions. Open warfare is only anticipated after the rupture of a fortified front in mountainous country, and they admit that it can only be carried on by troops whose burden is lessened by a reduced proportion of artillery. These regulations also content themselves with a new codification of the rules for employment of artillery similar to those we followed in France in 1918, bringing them into harmony with the reorganization of the artillery.

This reorganization effects the following points:

At the end of the War, the Italian artillery had a large stock of matériel of all types, of different origin and of all ages. In 1919, a choice was made from the stock: old matériel and modern matériel which was not entirely satisfactory, were resolutely eliminated, and they only kept the 65-mm. mountain gun, the 75-mm. field gun, the 100, 155-c.s., 203 English, and 240-mm. howitzers, and the 105, 119, 127, 155-G.P.F. guns, and the 254-mm. railway gun.

Their large artillery units have been reinforced, especially with pieces having curved trajectories. This is logical for trench warfare in mountainous country. Howitzers and mortars have been given the same proportion as the guns.

A general artillery reserve, including matériel of all calibers and all types, has been constituted under the Commander-in-chief.

Heavy artillery has been reorganized and modeled after field artillery. It is now entirely motorized, even the heavy divisional artillery.

All artillery groupments have been allotted large allowances of airplanes for observation of fire and liaison with the infantry.

Pack artillery has been provided for the divisions to replace infantry accompanying batteries.

In order to face the initial requirements of a future war, while awaiting the commencement of production, important reserves of matériel and munitions have been established.

In all, the number of peace-time batteries has been raised to 606 (The Bonomi law, April 20, 1920) against only 342 which made up the Italian artillery in 1914.† These 606 batteries are divided between:

27 regiments of horse-drawn field artillery.
14 regiments of heavy motor-drawn field artillery.
6 regiments of heavy motor-drawn artillery.
4 regiments of Coast Artillery.
1 regiment of portée.
3 regiments of anti-aircraft artillery.
3 regiments of mountain artillery.

* For greater details see the *Revue de l'Artillerie* of December 15, 1922.

† The Albricci law (1919), which was never applied, provided for 654 batteries.

The allowance for large units is actually as follows:

Division:

3 groups of 75-mm. horse-drawn.
1 group of 65-mm. pack artillery.
1 group of 100-mm. howitzers.

Army Corps:

2 groups of 119-mm. guns.
2 groups of 155-mm. howitzers.

It will be noticed here again, as in the English and American organizations and in the one which we propose, that the division has no matériel of greater caliber than 100-mm.

All matériel not cited in these allowances belong to the general reserve or to the war reserve of matériel and munitions.

An interesting article by Lieutenant Colonel Laviano, appearing recently in the *Rivista di Artiglieria e Genio,* advocates carrying the principles which led to this organization to their extreme conclusions, by asking that all small caliber matériel (below 100 mm.) be pack artillery in order to facilitate its use in mountain warfare, and that all medium and large calibers be motorized.

Aside from the mountainous character of the probable theaters of operation on which the Italian army will operate, Lieutenant Colonel Laviano also points out, in defense of his proposals, the extreme shortage of horses from which Italy suffers, and the hope that the problem of synthetic production of gasoline is about to be solved. Finally, Colonel Laviano questions the use of long range, flat trajectory weapons in mountainous country, and asks their replacement, for missions of interdiction, by bombardment from aircraft.*

Technical studies are still held in high esteem in the Italian artillery. The journal which we have just quoted, *la Rivista di Artiglieria e Genio,* so justly renowned for its great technical value, has published in its recent numbers some very remarkable articles on matériel, munitions, ballistics, detailed artillery tactics, new gun steels, explosives, motor traction, war maps, super-weapons, and such subjects.

A really remarkable new review, the *Rassegna del Esercito Italiano,* has been started since the War, and the articles which it publishes speak well for its future.

FRANCE

France was particularly well placed to pick up and exploit the lessons of the War, and she did not fail.

Personally, as Inspector General of Artillery in the Zone of the Interior and with the armies in the field, I thought that after the War it devolved upon the highest chief to seek these lessons very early, before memory is erased or deformed, and before legends could be created.†

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* This last proposition does not appear to have much chance of being considered. Italy constructed at the end of 1918, at Ansaldo, some 200-mm. guns which should have a range of 140 kilometers. It does not seem likely that these guns will be abandoned, and, on the contrary, the Italian artillery is interested in the study of a "turbo-cannon" of extremely long range.

† During our studies of the Manchurian and Balkan wars, I could see "the manner in which ideas, only a few weeks old, are changed and how they change with each telling" (*On the theatre of the war in the Balkans,* war diary of General Herr, 1913).

Immediately after the armistice, I requested that a study of the lessons to be gotten from the War as regards artillery be undertaken without delay, and I proposed that this study be intrusted to the Central Artillery Commission, of which I was president.* My proposal was approved by the Minister of War on November 30, 1918.

On the other hand, it appeared necessary to address a questionnaire to the executors themselves, to all the chiefs of artillery with the armies, no matter in what echelon they were. This was the subject of a note to the Marshal of France, Commander-in-Chief of the Armies of the East, dated December 5, 1918.

The chiefs of the artillery corps, the generals commanding the corps artillery and the army artillery and the commanding general of the general artillery reserve sent to the Central Commission, in response to the questionnaire which was addressed to them, some important works, daily notes from the different echelons of artillery hierarchy which served as the basis of priceless documents.

Sub-commissions, appointed by the Central Commission and presided over by specially qualified general officers of the arm, submitted a series of detailed reports on the following questions:

1. Employment of Artillery.
2. Organization.
3. Matériel.
4. Munitions.
5. Vehicles.
6. Manufacture.
7. Methods of fire.
8. Instruction.

Also a general report was compiled by the president of the Central Commission under date of October 1, 1919.

The general conclusions of this report were as follows:

"No matter what importance must be attributed to the study of past campaigns, military art is always in the course of evolution; the army should have close contact with science and industry; the art of destruction, like that of construction, cannot be developed without a knowledge of scientific and industrial application which is constantly being modified.

"An intimate union, a permanent liaison should be established between the technical organizations of the army and the High Command. This liaison was partially realized during the War; it should be maintained and further strengthened in time of peace.

"Technique should be open to all who are competent and not confined to a small group of specialists who are always the same, boasting about their art of production and their theories, and drawing dangerous conclusions. All industries, all scientific centers, all laboratories, all ministerial departments concerned should place their common knowledge at the service of the nation.

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"If, in time to come, through causes beyond its power, France is again obliged to take up arms, the war which she will wage will perhaps be as different from that of 1914 as the latter was from the war of 1870."

In concluding, the president general expressed the wish that "the future laws of organization of the army would organize that evolution, that much attention would be given it in inspections and technical studies,

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* Commission instituted by an order of the ministry dated May 24, 1917. (See Part I.)

even by reducing the number and importance of the so-called troop commands. The army of tomorrow, with its reduced personnel, will draw its value from the perfection of its preparation and from the amount and extent of its knowledge."

In the way of detailed conclusions, we will cite only a few of the most important:

"In combat there is no arm which should be subordinate to another."

"Among the improvements to be realized, the most urgent is that of range. . . . Studies must be undertaken immediately to improve the range of existing types of matériel by modification of the powders, the form and weight of projectiles, the use of muzzle brakes, by autofrettage, and so forth."

"The increase in artillery personnel is the consequence:

"(*a*) Of strengthening the organic formation of the artillery of the large first line units (division and army corps), the necessity for which has been shown.

"(*b*) Of additions made in war strength tables of organization of small units of the arm (groupments, groups, batteries) because of the requirements formulated by the armies."

"Accompanying artillery should be entirely on caterpillar mounts, light, and protected as much as possible."

"The 105-mm. caliber is characteristic of the heavy divisional artillery; the 155-mm. caliber is, in the same way, characteristic of the heavy corps artillery."

"The exterior shape of projectiles should continue to be studied with a view to obtaining greater range and more accuracy."*

"Artillery officers should not specialize in any particular subdivision of the arm, but, on the contrary, they should be detailed during the course of their career for appropriate periods, successively in the field artillery, the heavy artillery, horse-drawn and motorized artillery, and fortress artillery. This is the surest means of combatting this ever troublesome form of specialization and of developing general education of young officers."

"The artillery, whose personnel has more than doubled, never ceased to increase and to develop its faculties and its technique during campaign. Its development shows profound modifications in the use of artillery as well as in its organization; it should also constitute a lesson in the preparation for future war."

Like all other armies, the French army since the War rearranged, or tried to rearrange, all its general and detailed regulations. The first which appeared was the *Provisional Instructions on the Service of Artillery in the Field,* which was completed in June, 1919, and is consecrated to the great principles of fire power, the necessity for liaison between the arms, the importance of mass action and concentration of fire. A proposed *Firing Instructions* has been submitted "in referendum" to all artillery officers and tested on the firing field; as a result of reports furnished by all the regiments of the arm, this work has been perfected, and has given birth to definite Firing Instructions, which codify in clear

* Experiments with the best shapes for projectiles, commenced during the War, at the instigation of the Central Commission, were stopped. The projectiles manufactured for these tests are still unused.

and precise form the rules and methods of fire learned during the War. The regulations for maneuver of different sub-divisions of the arm are about to appear.

The General Inspectorate of Artillery, created during the War, which proved to be so effective, has been definitely maintained; and, modeled after it, have been created the General Inspectorates of all the other arms, infantry, cavalry, engineers and aviation.

The Center of Artillery Studies, an organ for the diffusion of doctrines for the employment of the arm, not only for artillerymen, but also for other officers and for the High Command, has been kept. It has an amplified program, and continues to render the same excellent service which gave it such deserved popularity during the War. Following this example all the other arms have instituted similar Centers. The reunion of all these Centers at Versailles constitutes a sort of great Military University. It is charged with keeping unity of policy and coordinates technical and tactical instruction of all officers in the different stages of their careers.

The old Practical School of Fire at Camp de Mailly has been reorganized on a new basis. Today it is common to all sub-divisions of the arm, heavy artillery as well as light artillery, pack artillery and tractor-drawn artillery as well as horse-drawn artillery. Alongside of this school and as a concurrent part of it, there exists a school for commanders of artillery groupments.

A certain number of artillery officers receive each year, in an organization recently created near the Center of Artillery Studies, the instruction necessary for artillery staff officers.

Lastly, schools for radio officers and orientation officers will begin to function this year and will form indispensable auxiliaries.

To permit the reduction of the term of military service, a measure imposed by imperious economical considerations, preparatory military instruction of young men has been organized on a large scale in all the secondary and higher educational institutions.

Procurement and instruction of reserve officers have been assured under the best conditions; it was only necessary to recommence and develop methods already adopted before the War, which have given proof of their value.

A great effort has been made to perfect the preparation of industrial mobilization by the creation of the Office of the Secretary General of National Defense, and of the Permanent Inspectorate of Artillery Production.

In the matter of technical studies, tests and experiments, projects for modification or complete redesign of artillery matériel, it must be understood that we are bound to be extremely discrete. It is sufficient to say that the work has been well started, that it is being actively followed and that it promises to give excellent results.

OTHER COUNTRIES

It does not seem necessary to push our investigations further. The newer armies of the countries which became independent by the Treaty of Versailles, the Belgian army, recently reorganized although tried and experienced in war, the Roumanian army which is undergoing a complete reorganization, and the armies of neutral countries, are, after all, imbued by the same principles and seek the same results as their big sisters.

We must, however, point out in passing the remarkable activity of the Skoda factories at Pilsen, in Czechoslovakia, which without doubt hold a rank apart from the shops which construct artillery matériel the world over. Both during the War and since the Armistice, these factories have produced types of matériel which put into effect nearly all the improvements demanded by artillerymen.

Without going into details, we will limit ourselves to citing:

A field gun of 83.5-mm. caliber, having a weight in battery of about 1,400 kg., and which gives particularly interesting ranges, at the same time keeping excellent accuracy at all ranges. During tests made in Switzerland last summer, this gun gave ranges of 16 kilometers with the super-charge. These tests were so conclusive that Switzerland placed an order with Skoda for 48 pieces.

A 76.5-mm. anti-aircraft gun, range 13,600 meters.

A 150-mm. gun transported in two loads, range 20,500 meters.

A coast gun of 150-mm. caliber, range 25,000 meters.

A 240-mm. gun, range 29,000 meters.

A complete series of very successful mountain guns, ranging from 75-mm. to 210-mm. caliber.

Some heavy amphibian matériel, traveling at will, and under their own power, over the road or on rails.

This simple summary, although brief, is nevertheless quite eloquent.

RESUMÉ

In summing up all which precedes, it is fair to conclude that the nearly unanimous opinion of the artillerymen of all countries is as follows:

The three great revelations of the War are:

The terrifying power of modern fire.

The value of mechanization, and, coincidentally,

The importance of science and industry.

Note that the first two factors are associated in an ancient arm, the artillery, and in the two new arms, aviation and tanks. Also on all sides we see efforts bearing on these three arms at the same time. As we are only concerned with artillery here, we will content ourselves with retaining the following conclusions:

Everyone expects to see a further increase in the power and mobility of artillery.

Everyone consequently increases the proportion of artillery in his army. It is understood every where that the reduction of standing armies requires, as a counterbalance, the incessant development of military machines. "It is necessary to economize lives and to increase the efficiency of fire," according to the strong statement of Colonel Fuller of the British army.

Everyone works to increase ranges, to use scientific methods of preparation of fire, and to assure mass action.

Everyone tries to increase mobility by perfecting motor traction.

Lastly, everyone asks of his officers, particularly of artillery officers, greater scientific and technical ability; everyone seeks assurance of the defense of his country by close cooperation between the army, science and industry.

CHAPTER II
CONCLUSION

In the course of this very sketchy and very insufficient study we have rapidly reviewed the principal problems of the artillery.

We have traced the evolution brought about by ideas on the subject of the use of the arm after the prodigious experience of four years of war, an evolution which by its extent and its rapidity has all the characteristics of a real revolution. We have noted at the same time the transformation in matériel and organization which was logically brought about by this evolution; we have shown that this evolution was interrupted by the Armistice before it had reached its zenith and before it had borne all its fruit.

Next we have seen what remains to be done to profit fully by all the lessons of the War; how we must plan for the best system of matériel; what the rational organization of the artillery should be in the next war, and lastly how this war-time organization should be prepared and primed by the organization to be given the arm in time of peace.

We have shown what measures have been taken since the War in the principal armies of the world, and we have tried to construct a truly modern artillery: mobile, powerful, adapted to mass action and surprise, occupying in the army as a whole the place to which its ever-increasing and already preponderant effectiveness entitles it. This rapid examination has permitted us to bring to light a certain number of tendencies and principles with which everyone is in unanimous accord.

It would seem that our task is ended and that we can put the final period here. However, there is one more word to be said.

As time passes, as the War gets further away and its memories fade in a thickening fog, we see appearing an inevitable and well-known phenomenon: the teachings of experience are forgotten; the conclusions which have been drawn from them are again questioned; the principles which were evolved are disputed and often even denied with passion.

During the struggle, when danger made everyone see more clearly, everyone demanded range, more range, and still more range; every kilometer gained immediately seemed insufficient; another was needed without delay to catch up with our adversaries who were always ahead of us in that respect.

Today, certain individuals begin to question the advisability of increases in range. "If artillerymen can fire farther, they say, will they not be tempted to place their batteries farther to the rear? Nothing will be gained and liaison, already so difficult, will be rendered nearly impossible." To this we reply that artillerymen have shown sufficiently during the War that they do not merit such a reproach. How many times we have seen the guns with the longest range, the 105-mm. and the 145-mm., for example, pushed forward! Besides, this is a question of command; the mission and the objectives assigned determine the emplacements to be occupied; the artillerymen will place themselves where they must be to fulfill that mission and to destroy those objectives.

It is also said: "These famous teachings of the war were, after all, the lessons of a trench war. It is certainly true that stabilization provoked and favored an enormous increase of artillery. But, immediately after war of movement was recommenced in 1918, it was necessary to leave all the slightly heavy matériel in the rear; we could not be encumbered with such impedimenta during rapid marches. The next war will begin with a period of movement and we certainly intend that this period

of movement will be followed, not by a period of stabilization, but by the defeat pure and simple of the enemy. It is, therefore, useless to keep the monstrous artillery which fortuitous circumstances, never to be repeated, led us to produce for exceptional needs."

There, it seems, is the most usual objection. It is easy to reply to it.

What is the characteristic of modern combat? It is the intensive use of fire and its dissemination over the terrain. As has been said, "Offensive is fire which advances; defensive is fire which arrests." Are we then going to reduce our fire power?

Do they say the artillery does not follow? Then let us improve its mobility and its range. Does the 155-mm. howitzer slow up the division? Let us construct 105-mm. howitzers, like the Americans, the English, and the Germans, and develop transportation facilities. Does the artillery accompany the infantry poorly? Let us perfect communication facilities; it is certain that in this way we can obtain the greatest advances with the least expense.

Will we commence the next war by a rapid advance with a chance to overcome the enemy before he can organize his fortified lines? We certainly hope so, but nothing is less sure. Probably our aviation alone can permit us to do it; but will it not find before it an air force practically as strong? And then, will the French democracy take the offensive? She will wish, on the contrary, to await a definite aggression so as to have righteousness on her side and so as not to quarrel with her friends and her allies.

Besides, if we should take the offensive, except to profit by a complete surprise and possession of secret arms,* we would not be long in finding before us that same line of machine guns which we know too well and which can only be pierced with good assistance from the artillery.

Not only should the artillery keep the place which it occupied in battle in 1918, but it seems to us certain that its rôle must increase. In fact, the task of the artillery should grow greater again for many reasons: the increase of its range will extend its action, enlarge its field, and will permit realization of more numerous and more powerful concentrations of fire; the increase of its output will increase its effectiveness; the ever increasing general use of surprise and mass action, the value of which was already appreciated at the end of the war, will give terrible results.

In addition we are menaced by new arms: deadly gases, toxine, microbes, acoustic or electrical waves, radio operated mechanisms, electrocution from a distance, etc., etc. Now, who will combat these new arms if it is not the artillery? For, without doubt, they will be brought close to the field of battle in order to function efficiently, or they will be sent over by that excellent vehicle, the projectile. In either case they will be vulnerable to our cannon.

During the last war that is what happened with gases: Gas waves were abandoned as soon as the artillery learned how to destroy the necessary preparations for their emission while they were still in preparation,† after that gases could only be usefully employed when transported in projectiles.

Aircraft brought about anti-aircraft artillery. The answer to the

*We would certainly not take the initiative in the employment of poisons or microbes.

† During the summer of 1917, our artillery, by powerful concentrations released at the proper time on gas installations which were being placed on the Champaigne front, prevented the *Sommererntе,* an enormous poison wave from which the Germans expected important results.

tanks was anti-tank guns. Inversely, the tank was armed with guns, and aircraft guns have been considered, not only from pursuit planes, but also for fire against terrestial objectives. Should we not then admit, by analogy, that the deadly inventions with which we are menaced will only be put in action with the aid of the artillery, and that they will only be effectively combatted with the cannon, thanks to its increasing range, power, output and mobility.

In the domain of technical progress we should pay especial attention to rapid and incessant perfection of transport and means of communication. These means, which are necessary to man in time of peace as well as in time of war, are naturally the object of constant research, the success of which insures to the inventor immediate and profitable remuneration. Moreover, the artillery profits directly from all improvements in transport or communications.

In these two matters progress is incessant. Wireless telephony has scarcely made its appearance and it has already been developed in an unforeseen manner. In 1918, it was possible to talk between airplanes in the air; an English aviator talked with a moving tank from the air; in the United States, the perfection of the radio telephone equipment for tanks, commenced in January, 1918, has been followed with success, and conversations from tank to tank, from tank to post of command, from tank to airplane have become current practice. Every day in France the Eiffel Tower and other radio broadcasting installations send concerts, press news and meteorological reports through space. In America, political and patriotic speeches are heard at the same time in the principal cities of the Union. It is true that protection against interferences and the design of portable sets remain to be studied; but our radio officers have solved many other more difficult problems during the war. France, which is today in the lead in radio-telegraphy, owes it to herself speedily to terminate this work.

The day when the wireless telephone will be perfected, the capital problem of liaison between infantry and artillery will perhaps be solved. And do not many of the problems of tactical combat come back to this simple question of liaison?

Other problems find their solution in the perfection of means of transport; the question of the accompanying gun and that of its supply of munitions is proof of that.

The procedure of a horse-drawn accompanying gun is certainly heroical; but it belongs above all to another age. The Germans who tried to use them systematically at the end of the war, reaped only trouble, and we were no more fortunate than they in the few attempts we made. It is a delusion to wish to operate a device to be maneuvered by a crew, like a cannon, in the open in a region covered by enemy rifle fire. To do this is to condemn oneself at once to cruel losses and negligible returns. The solution of the problem is in a caterpillar weapon, protected, but remaining nevertheless light enough and flexible enough to pass anywhere. This is a question of progress in means of transportation.

It is the same thing for supply of these weapons. Ammunition supply by man power on the field of battle leads to lamentable waste of human energy. This task could be done by a mechanical device maneuvered by a few protected men.

We have just alluded to the use of projectiles to send toxic gases at the enemy. It is a fact that the cannon is an excellent means of transport,

flexible, economical and powerful.* The airplane alone can compete with the projectile, but only in certain cases, and with inferior efficiency. Besides it is logical to use the airplane only to continue the action of the artillery beyond the useful range of its weapons.

A simple calculation shows the efficiency of the cannon from this point of view. A 155-mm. howitzer, for example, can fire in a single day more than 400 projectiles each weighing 43 kg.; that is, it can throw 20 tons at the enemy in twenty-four hours, or six times its own weight, and two crews of six men are sufficient to serve it. The use of improvements which are being studied (cooling of the tube, jacketing, etc.) will certainly permit a still further increase in output. In this respect the heaviest matériel is always the most advantageous: the most efficient is the railway gun, since it throws projectiles, brought directly to it by rail, without handling from the zone of the interior to the battery position. This is done with the aid of a very few men who are not greatly exposed to fire and who have at their disposal mechanical means which reduce their labor to a minimum.

We in nowise wish to draw from these remarks the conclusion, evidently absurd, that men should no longer appear on the battlefield, nor even that the cannon is the only weapon to use, nor yet that all cannon should be placed on railway mounts. We seek only to show conclusively that, thanks to mechanization, it is possible today to obtain *the greatest efficiency of armament with a minimum expenditure of human energy and the greatest economy of blood.*

France, so cruelly affected in its "human matériel" by the last war, so badly served by its decreasing birth rate, can less than any other nation afford to forget these lessons. Its army should no longer be an "army of personnel"; alas, it could not be if it wanted to! By good fortune we have arrived at a period where matériel is becoming more important day by day, is rapidly being perfected, and is acquiring ever increasing efficiency compared with that of the human machine. Thanks to this reversal of factors we can now cope with the danger which the insufficiency of our population would otherwise present.

As we have already remarked, it is not a question of not using all of our available personnel, but to use them in a different manner. Instead of exposing the major portion in the front line, as has been done, in the arm which suffers most in battle, it is necessary on the contrary to calculate the proportion of men to be assigned to the infantry with the strictest economy. The majority of the effectives should go to the "matériel arms," which perform a great many tasks with very few men, and among the "matériel arms" we must show preference for those which have the greatest efficiency. There is no doubt that from this point of view the artillery today† holds the first place. It is the artillery which produces in battle the greatest effects of brutality, instantaneousness,

* In this connection, we cannot think without emotion of the heroic pioneers who were sent in 1914 to cut the enemy barbed wire with pliers or destroy it with torpedoes. Happily, the artilleryman soon came to relieve his comrade of this mission of death. The projectile then carried the necessary explosive into the midst of the enemy defenses which had to be destroyed.

†We say "today" because nothing proves that this priority which the artillery has just acquired will long remain its lot. The middle age was the heroic era of chivalry; the infantry has been the queen of battle in modern times; the war of yesterday saw the artillery pass to the first rank and that arm will without doubt still remain the principal arm in the war of tomorrow. But its preponderance will probably only last awhile, and some new arm will perhaps surpass it in the more or less distant future.

variety, and depth. It is the artillery which, with least expense, throws the greatest tonnage of destructive engines at the enemy, steel, explosives, gas, poisons and toxines. It is the artillery which, while taking the maximum advantage of the force and blood of its men, offers to the other arms the most complete and effective protection.

But to obtain this result the artillery should not resemble what it was in 1914; it must fulfill many new conditions which we have enumerated and discussed throughout this work: composition, organization, instruction, assignment, method of employment and mass action. To realize all of these conditions it should have an armament possessing simultaneously the three essential qualities of range, output and mobility, and including all necessary types of weapons in sufficient quantity. We have seen what this sufficient quantity means.

Here, for a certainty, is the stumbling block: the immediate and complete construction of all this matériel would demand a financial effort of which no state is capable today; no nation will ever have in time of peace all the matériel which it would need to make war.

Here we see an entirely new aspect on the great question of preparation for war. Before this material impossibility against which we bump, urgent measures must be taken. If we cannot provide in time of peace the enormous stock of matériel which is required for victory, we must be in a position to supply it with the least possible delay in time of need: this is the reason for industrial mobilization.

Industrial mobilization, the preparation of national industry for war, has today become an element as essential for the defense of the state as the military instruction of its citizens. Private industry should be able to adapt itself instantly, without shock and without effort to the needs of war, and this faculty of adaptation should be increasingly developed in proportion to the ever decreasing amount and modernization of armament in time of peace.

At a time when the French Parliament is about to discuss a new law for the organization of its personnel, when the vote will so gravely affect the future, it was perhaps not useless to draw attention to this very important question of organization and armament of the artillery.

THE END

HAND-TO-HAND FOR RICKETTS'S GUNS

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FIELD ARTILLERY: PAST, PRESENT AND FUTURE

BY GENERAL HERR OF THE FRENCH ARMY

THE 1928 KNOX TROPHY

THE Chief of Field Artillery announces that the winner of the Knox Trophy for the year 1928 is Battery "F," 16th Field Artillery, 75-mm. horse-drawn, stationed at Fort Bragg, North Carolina, and commanded by Captain H. E. Tisdale. This trophy is presented annually by the Society of the Sons of the Revolution in the Commonwealth of Massachusetts to that battery of Regular Army Field Artillery which shall have the highest rating in efficiency—this rating to be based on firing efficiency, tactical mobility, proficiency in the use of Field Artillery means of communication, and on interior economy.

The winner of the Knox Medal, awarded by the same society for excellence as an enlisted student at the Field Artillery School, is Sergeant Ray B. Maynard, Battery "D," 1st Field Artillery, Fort Sill, Oklahoma.

The batteries selected to represent the commands of which they were a part, and to take the final competitive test, were:

1st Corps Area—Fort Ethan Allen, Vt	Battery A,	7th F. A.
2nd Corps Area—Madison Barracks, N. Y.	Battery F,	7th F. A.
3rd Corps Area—Fort Hoyle, Md.	Battery C,	6th F. A.
3rd Corps Area—Fort Myer, Va.	Battery C,	16th F. A.
4th Corps Area—Fort Bragg, N. C.	Battery F,	16th F. A.
4th Corps Area—Fort Benning, Ga.	Battery A,	83rd F. A.
5th Corps Area—Fort Benjamin Harrison, Ind.	Battery C,	3rd F. A.
6th Corps Area—Camp McCoy, Wis.	Battery E,	18th F. A.
7th Corps Area—Fort Robinson, Neb.	Battery C,	4th F. A.
8th Corps Area—Fort Sill, Okla.	Battery F,	1st F. A.
8th Corps Area—Fort Bliss, Texas	Battery A,	82nd F. A.
8th Corps Area—Fort Sam Houston, Texas	Battery F,	12th F. A.
9th Corps Area—Fort D. A. Russell, Wyo.	Battery C,	76th F. A.
9th Corps Area—Presidio of Monterey, Cal.	Battery E,	76th F. A.
9th Corps Area—Fort Lewis, Wash	Battery B,	10th F. A.
Hawaiian Department—Schofield Barracks	Battery C,	11th F. A.
Panama Canal Department—Camp Gatun, C. Z.	Battery C,	2nd F. A.

The scores considered in making the award were as follows:

Firing efficiency	*Mobility*	*Communications*	*Interior economy*	*Totals*
99	99	93	100	391
98	97	93	100	388
92	100	95	100	387
95	100	90	100	385
97	97	83	100	377
86	89	97	100	372
96	100	72	100	368
82	96	87	100	365
74	97	89	100	360
79	100	81	100	360
69	100	87	100	356
94	87	72	100	353
80	88	89	92	349

80	91	57	100	328
96	58	68	100	322
72	62	72	100	306
60	73	47	100	280
—	—	—	——	——
Av. 85	90	81	99+	356

The test for the calendar year 1929 will be similar to that for 1928—changes being introduced to insure thorough preparatory training, and to meet constructive suggestions made by the 1928 rating boards. Initiative as to the method of selecting the battery to represent any command in the test is left to the local Field Artillery commanders, but the method must be such as to insure that the organization selected shall be truly representative. One test battery will be selected from among the Field Artillery units conducting their summer training at Camp McCoy, Wisconsin, local commanders cooperating in making the selection. The test may be held at any time after receipt of the yearly instructions, but the test battery must complete its test so that the report of same may be mailed in time to reach the Office of the Chief of Field Artillery on or before November 20.

Interest in this annual test continues to grow throughout the Field Artillery, and this interest is resulting in increased efficiency, as is shown by the high marks made this year. That the present test is not more favorable to one category than to another is evidenced by the fact that the Trophy has been won at least once by pack, portée, motorized, horse, and horse-drawn Field Artillery. Also, it has been won by batteries operating under different conditions of service.

A FEW WORDS FROM THE WINNING B. C.

Our greatest handicap at Bragg is the enormous turnover of men. It means that we have to train three, four, and even five times the number of specialists called for in the table of organization. One must be certain that the too numerous special duty men are thoroughly trained, because they descend upon you like a "ton of brick" a few days before the test and have to be carried along.

Of all the tests I believe mobility is the most trying. The mental strain of "carrying" all the soldiers, animals, and harness, and other vicissitudes along is tremendous, and it is here that the lone "buck" does his stuff or drops his battery in a slough. Not a tender spot or an abrasion on an animal speaks well for their condition.

One canteen became unfastened from its tab and the unfaltering eye of the board member trailing our column deducted one point: score, Mobility, 99.

Communications and Instruments: We dropped seven points in this test. The detail worked smoothly and well. I thought we'd max this, but 93 was our score. Some of the points were lost because a Southerner was talking over a telephone line to a Northerner. The words changed en route. I have never tried the reverse; I imagine it might work.

Firing: We could only get 99 out of a possible 100. The day was clear, but no sun appeared and the targets of the first two problems were very difficult to see. It was a great relief after checking up on the day's casualties to figure a "possible." The battery behaved in great shape. Second Lieutenant Stanley B. Bonner crashed through in perfect style and I lost one point. That was a great day for Battery "F."

Interior economy gave us a "possible," making a grand total of 391 out of 400 points.

Then came the days, then weeks of anxious waiting. Did we make the highest score? I think a few more gray hairs were added during the weeks of waiting for the coveted telegram. At last it came and we had won. Telegrams and letters just flowed in congratulating us on the win. It's a grand and glorious feeling to win a Knox Trophy Competition. Try it some time and see. There is only one way to do it and that is to make the highest score.

CHARGE OF ALEXANDER'S ARTILLERY.

SOME ASPECTS OF MECHANIZATION

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

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

CHAPTER II

COMMAND

THOSE who followed in the Press the doings of the Experimental Mechanized Brigade last year may remember that *The Times* correspondent reported the difficulties of direction and umpiring to be almost insurmountable. Captain Liddell Hart, writing on the same subject in the *R.U.S.I. Journal,* says, "Control is the real problem . . . of a mechanized force, because of its very fluidity, the distance it covers and the speed which marks both its movements and its engagements." That the same problem has been exercising the minds of the authorities concerned was evidenced in the speech made by the C.I.G.S. at the conclusion of the manœuvres, in which he remarked that* "the problem of command and control was still unsolved, but it was *at least*† clear that, as with cavalry, the commander must be very far forward and that it would probably be essential to supplement his wireless orders by the personal direction of staff officers who knew his mind." From the above it is obvious that the question of controlling a mechanized force is one of the principal, if not *the* principal problem that has to be faced in connexion with mechanization; for the best machines and organizations in the world are of but little worth unless adequately commanded.

The advice of the C.I.G.S. will no doubt ameliorate matters under the conditions for which it was given, namely, a mechanized force acting against an unmechanized force. But, though we may hope in the initial stages of a campaign to be more highly mechanized than our opponents, the period of this superiority is unlikely,

*Daily Telegraph, September 10, 1927.

†The italics are the writer's.

in an industrial age, to be of long duration unless a decisive victory brings the war to a rapid conclusion.

We have therefore to prepare ourselves also for a battle between two highly mobile forces, when the difficulties of control as compared with those experienced on Salisbury Plain last year will be greatly multiplied. The General Staff is said to aim at a rate of movement of 100 miles a day; the pace of the faster vehicles will certainly reach 50 m.p.h. and the basic speed of columns perhaps 10 m.p.h. Estimation of probable direction of enemy attack is rendered difficult, not only by this increased speed, but also by the power of cross-country movement possessed by tracked vehicles. With rates of approach varying from 20 to 100 m.p.h. and with directions of approach more than ever doubtful, how is a commander to form a plan of battle?

In the first place, if he is a good commander, he will, to some extent at least, have already formed his plan and will endeavour to force his opponent to conform thereto. Granting that, let us picture his position and action as the hour of battle approaches.

He is in a mobile headquarter office probably some 10 miles ahead of his heavy tanks and covered, apart from reconnoitring bodies, by a screen of tankettes. It is a summer morning about 7 o'clock. The country is mildly undulating with occasional small woods. Shortly before dusk on the previous evening his aeroplanes had spotted large enemy forces 50 miles away and had picked them up again at 6 a. m. moving towards him. His armoured cars were in touch with enemy light vehicles last night and are falling back slowly before them now. By 8 a. m. the light troops on both sides are fighting in open formation spread over a wide extent of country seeking for an opening "On cherche par-tout et on voit." A few dragon-guns are in action about the centre of the field but without satisfactory targets. Above, the opposing aeroplane groups, each seeking to attack hostile heavy formations in rear, are themselves engaged in battle, with reconnoitring machines watching both flanks. The main bodies, consisting largely of heavy tanks, are now 10 miles apart and closing on each other at the rate of 20 m.p.h. In half an hour a collision may be anticipated. Again, what is the commander's plan; what are his possible modes of action?

The following courses are open to him:

(*a*) He may remain in his office where he has every convenience for the receipt of information and the issue of orders, and either (1) order up his heavy tanks to join him, or (2) having studied the ground and settled on his probable manœuvres, join his heavy tanks and lead them into action; or

(*b*) He may take up his position on high ground and endeavor, either in or out of his tank, to direct the battle from that vantage point; or

(*c*) He may direct the action from a rear headquarters.

Under (*a*), after ordering his light vehicles to clear to one or both flanks, he leads his main body to the attack. At 8.45 a. m. he receives his last report, the enemy main body being then 5 miles away, and travelling directly towards him. At that moment enemy tankettes retiring before him throw out a thick smokescreen. He then takes a closer order and proceeds slowly—perhaps by compass. His tankettes in the meantime endeavour to pierce the smoke-screen on both flanks and gain contact. At 9 a. m. large forces are reported moving against his right flank. He swings round; but will he be in time?

Or, under (*a*), he might alternatively have acted as did the enemy. But in that case would he have found and struck his objective?

There is no answer to either of these queries. The whole matter, like the field of battle, is wrapped in fog. No real plan can be executed. The combatants reach blindly at each other. The issues of the combat depend solely on chance. Are we to stake the national fortunes on such a risky encounter?

Under (*b*), having chosen his vantage point, the commander finds the enemy has changed direction to such an extent as to render observation and command from that point out of the question. Such an eventuality is so likely that this method may be ruled straight out without mentioning other obvious drawbacks inherent in it.

As regards the last method mentioned—control from a rear headquarters—however rapid means of communication become, however well trained the signal *personnel,* and however capable the staff, it is hardly conceivable that, between the receipt of information of a nature sufficiently definite to justify the formation of a final plan and the occurrence of the first great clash, there

will often be time to frame and issue the orders necessary to give effect to the plan. It is even less likely that a commander will be able to follow the fortunes of his forces in the succeeding phases of the battle and direct their purpose.

There appears, therefore, to be no method of ground-control that can be satisfactorily applied to the motorized force. It may perhaps be objected that as, in the Navy, for the rapid movements of a fleet-action, control is exercised efficiently from sea-level, it should be equally possible to control a highly mobile army from ground-level. Such an argument, however, carries but little weight. In the first place, the controversy that has for a decade raged round Jutland indicates the question of command in a fleet-action to be by no means finally settled. Is it not possible that with the improvement in flying boats, the admiral of the future will seek a wider view and a more direct contact with his whole fleet? In the second place, at sea visibility is greater, communications are simpler and manœuvres less restricted than on land.

As, then, ground-control is impossible, it remains to consider the feasibility of air-control. This is a method which has long been advocated by the writer. It suffers from the following serious drawbacks:

(1) Personal danger to the commander and consequent likelihood of having to find and send into the air one or more new commanders in the course of the battle.

This is a very real objection, especially in view of the recent improvement in anti-aircraft work; and the replacement of the commander in such a rapidly moving battle will be no easy matter. It might be possible to keep a second-in-command or a senior staff officer in the air to take his place, but this is an extravagant method, and a better solution would be to allow (successively if necessary) one of the other officers who would normally be in the air at the time to take command—the C.R.A., the officer conducting reconnaissance, or the senior formation-leader in the R.A.F.

(2) A special aeroplane will be needed, so built that—

(*a*) The pilot can act as gunner as well as driver.

(*b*) The commander has facilities for really good observation, quick communication with pilot, writing, study of maps and speaking on wireless telephone.

(*c*) It can carry a signaller and his equipment. (Only required if it be found that the commander cannot issue orders on the 'phone in addition to carrying out his other duties.)

As pilots act as gunners in single-seaters, and machines are built equal to the transport of twenty-five men, no impediment should arise with regard to (*a*) and (*c*); but there is said to be a real difficulty in building a machine in such a form that any one but the pilot can obtain the good observation essential to the execution of air-control. In a service, however, that represents the solution of the major problem of "flight," is it likely that the lesser problem of "observation" will remain long unsolved? In neither France nor Germany does the pilot observe.

(3) The need of a special escort.

One fighting plane will certainly be required for the protection of the commander; and, on the rare occasions when no air unit is specifically allotted to the Force, a whole flight for his protection and that of the other military officers in the air; for these people would be performing duties from the execution of which they should, if possible, not be distracted by the attack of enemy planes.

(4) Observation and direction may be impossible owing to the prevalence of low clouds and mist.

This is not as serious a drawback as might appear at first sight; for it is one that handicaps both sides equally. A motor-battle in a mist would be a pell-mell affair that no commander would willingly undertake unless he knew that his opponent was riding unprotected at anchor in a tank-harbour or committing some equally heinous tactical crime. It is much more probable that each commander would endeavour to profit by the mist either to effect repairs, of which there will be a continual need, or to gain a strategic advantage either by breaking contact or by placing himself, unobserved from the air, on his enemy's flank or line of communication.

(5) It will not always be possible to find suitable landing grounds from which the commander can take to the air when required.

This point involves the consideration of two other matters. In the first place the air army and the mechanized army need for

the execution of their common tasks an association so close that no action undertaken by the one can be considered extraneously to its effect on the other. The question of landing grounds in the immediate vicinity of Force H.Q. will therefore be one that can never be out of mind for a moment, and it may often influence the actual route taken. In the second place the auto-giro or some form of helicopter may be expected at an early date to solve the problem of landing in restricted areas.

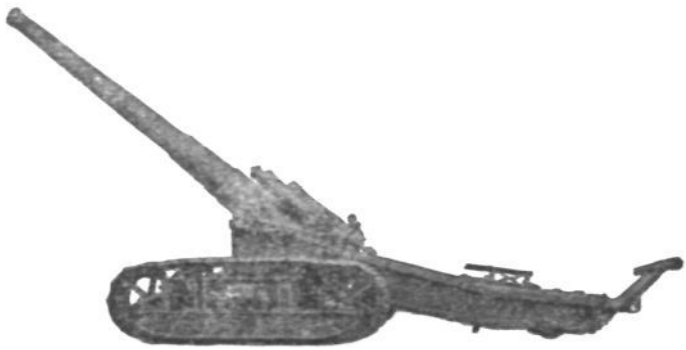
These are the obstacles to air-control. They are by no means insurmountable; and in the opinion of the writer they are outweighed by the prospective advantages of such a system, which may now be stated.

In the first place, the commander obtains a clear view of all the preliminaries to the battle and can either impose his plan on his opponent or adjust it to meet the needs of the situation. Secondly, he can command during the various stages of the battle, however fast they may move, handling his heavy tanks, his light tanks, his field-guns and taking advantage of any mistakes committed by the enemy, in a way quite impossible on the ground. Thirdly, he is in close touch with his air-commander. And, lastly, he is in a position to conduct the pursuit.

On the ground he is blind; in the air he can see. This is also true in operations of to-day; but the difference between the two forms of warfare, that renders air-control essential with the army of the future, is the speed-factor. The slow development of battles in France enabled command to be exercised, not only from the ground, but actually from positions far in rear of the fighting troops. But, even there, on occasions, such as the Canadian victory short of Passchendaele and in the battle of August 8, 1918, the presence of a commander or a responsible staff officer in the air might have changed relatively barren victories into decisive successes. In the battle of the future no other method of command will be possible, so the sooner officers are trained to it the better. It is a matter that cannot be postponed for fifteen years, when mechanization, if peace conditions continue, may be completed; for, long before the end of that period, there will be sufficient mechanized vehicles available for the formation of strong, independent, armoured forces, which must be commanded from the air. Moreover, should any great war take place in the *interim,*

whether we are engaged in it or not, the rate of mechanization of all armies will be greatly enhanced.

According to Press notices, one officer actually did command an armoured force from the air for a single operation during last summer's training. It was not stated, however, whether he was successful or not; but this is not a matter of importance. In India, a few years ago, the C.R.A.'s of opposing forces were sent up to control their guns from the air. One reported strongly against the method; the other was doubtful as to its value. Neither, however, had any previous air experience, and neither had thought the matter out beforehand; nor is the need imperative for such a form of control in a mildly mobile warfare. Before a method with such obvious difficulties and such decided advantages can be shelved, it must be thoroughly tried out; and the most careful investigation must be made of its merits and demerits, the type of planes to be used and the code of signals to be employed. It is not a question of sending up an officer to see what he thinks of it, but of years of endeavour to find the right system by a process of continual trial and error.



BRITISH ARMORED FORCE PLANS

THE *Army, Navy and Air Force Gazette* under date of December 6, in an editorial by Major W. E. deB. Whittaker, from which the following is an extract, gives the future plans for the British Armored Force:

"Sir Laming Worthington Evans, Secretary of State for War, replying to a question in the House of Commons on November 27, stated that the units of the experimental mechanised force were to be dispersed and that two new groups or mechanised units were to be formed, one in the Aldershot Command and the other in the Southern Command. Thus will one experiment end and two more begin. The Experimental Armoured Force provided many valuable lessons for the soldier and some degree of sensation for the Press. The greater mass of information gained was negative, but it was not less valuable than positive information. The deficiencies of many vehicles and parts of vehicles were discovered and some knowledge was acquired as to the feats which an armoured force then in being could not perform. The dreams of theory were put to the hard test of practice, and in each successive today the routine of experiment brought new details of knowledge to the troops engaged.

"The Experimental Armoured Force, though it did satisfy the more advanced upholders of the mechanisation school, did probably rather more than could fairly be expected of a new formation which, imperfect in itself, was necessarily a herald of a revolution in military thought. Its work during two training seasons was sufficiently exact to convert large numbers of soldiers into belief in the high value of armoured fighting vehicles in mobile as well as static warfare.

"During the last training season the troops in the Southern Command had the opportunity of operating under conditions which resembled—even if faintly—the warfare which is now inevitable. They were supported by, or were attacked by, armoured fighting vehicles in sufficient numbers to give an air of realism. In other Commands the troops lacked that advantage. Therefore the decision to form two new experimental armoured forces for the Aldershot and Southern Commands will be welcomed. The pleasure will be a little dimmed by the knowledge that the existing formation is

to be dispersed. There are many who will feel that though changes might be necessary the body of the old force might remain and an entirely new one be formed in Aldershot. Why not carry the experiment further and form a third armoured force in the Scottish Command? Salisbury Plain is not entirely suitable for tank operations. It presents too few difficulties to modern tracked vehicles, and it does not resembled the type of country in which future warfare is likely to be waged. Moreover, its whole expanse is so well known to soldiers that the expected always happened. In Scotland there is great variety of terrain and vast spaces adequate for the testing of armoured columns in prolonged movements.

"The creation of two experimental armoured forces in place of the original force will widen the area of trial. There is no reason why the two forces should be similar in organization, and there is little likelihood that the two General Officers Commanding-in-Chief will adopt the same theoretic schemes. There will be diversity, and next year it may be that raids will be made from one Command into the other. Such raids would add to the excitements of exercises and they would supply a valuable element of surprise.

"The Army owes a debt of gratitude to the officers who have directed the fortunes of the now-dying Armoured Force, for surely no experimental formation has ever worked in such harmony through trying times. The varying views of officers engaged have not been permitted to affect the general progress of the force to efficiency, and throughout there has been a general air of intelligent enthusiasm in all ranks. An important chapter in military history is closing, and it is to be hoped that the next chapter will be still more important."

PERMANENT MECHANIZED FORCE RECOMMENDED FOR UNITED STATES ARMY

A RECOMMENDATION for the organization, effective in the fiscal year 1931, of a Mechanized Force as an integral part of the United States Army, is being considered in the War Department. The recommendation was made by the War Department Mechanized Development Board as the result of a study of the experimental Mechanized Force assembled at Fort Leonard Wood, Maryland, during the past summer.

The opinion of the Board is indicated by the following statement in the report:

> "We must recognize that we are living in a machine age and in the interest of National Defense the Army must 'cut its cloth' accordingly. In the commercial world the machine has largely replaced man-power; so, in the Army must we, to the fullest practicable degree, use machines in place of man-power in order that our man-power can occupy and 'hold' without terrific losses incident to modern fire-power.
>
> "Our country, of all the world, is best able to take advantage of this."

The force recommended by the Board would have eventually a Force Headquarters, two battalions of Infantry, one battalion of Field Artillery, one Armored Car Detachment Cavalry, one Antiaircraft Machine Gun Unit, one Chemical Warfare Service Company, one Engineer Company, and one Light Tank Battalion. One Medium Tank Company would be attached initially, making a total of about 2,000 enlisted men. This force was designed to keep equipment requirements at a minimum and yet permit the possibility of the development of tactical methods. The Board recommended that the force be furnished each of the first three years with approximately one-third modern equipment, so that by the end of three years the equipment of the entire force would be of modern design.

The Board suggests the detail of a General Officer to supervise, organize and command the Mechanized Force. This General Officer would have the authority to represent the Mechanized Force's view in all development work, conferring both with interested Chiefs of the Combat Branches and with the manufacturing service.

Fort Leonard Wood, Maryland, appears to the Board to be a suitable location for such a Force from the standpoints of the extent and nature of the terrain, the climate and the availability of shop facilities of the Ordnance Department, Quartermaster Corps, and Chemical Warfare Service, at Aberdeen Proving Ground, Camp Holabird, and Edgewood Arsenal, all in Maryland.

Prior to formation of a Mechanized Force, the Board recommends a few tests of tank armor and anti-tank weapons. Such tests could be accomplished by a small detachment during the summer of 1929.

Following are extracts from the reports of the Board:

"The Board has carefully considered the extent to which mechanization is practicable in our Army.

"In any war of sufficient import to demand the use of mechanized forces, the theater of operations will be so extensive as to include much terrain, possibly entire sectors, where forest, mountains, and great rivers predominate. When tactical movement, faster than that of infantry, is demanded in such sectors, it must be supplied by cavalry. On the other hand, history shows that the heavy fighting takes place in the terrain of easy movement. Here again will be found the highly organized battlefield. Parts of it will be suitable for attack by armored forces; parts will not.

"We must be prepared to use armored units to the full extent that the tactical terrain permits.

"We must be prepared to defend ourselves against the attack of such units.

"We must think more in terms of fire-power than manpower. We must recognize the fact that fire-power has become the predominant factor on the modern battlefield.

"Unless the fire of the defense in position is neutralized by armor, by cannon fire, by bombing, and all possible means of increasing fire by automatic or mechanized weapons, flesh and blood can *not* advance over a modern battlefield without tremendous loss.

"There is no question but future wars will see mechanized units used to a far greater degree than the average officer visualizes. Accordingly we must face this situation in time of

peace to assure development, test, and final decision as to what such forces will be.

"Any great nation which fails to provide for the utilization of mechanization to the utmost practicable degree must suffer the consequences of neglect in future war. Furthermore, failure to prepare to meet an attack by a mechanized force will result in certain defeat by troops organized and equipped as of today."

The War Department has under consideration the continued and orderly development of a mechanized force in the future based upon the following:

(*a*) Continued tactical and organizational research.

(*b*) Development of tests of pilot matériel.

(*c*) Procurement of matériel for service test in the Mechanized Force in such increments as are within the War Department's financial program.

(*d*) Organization of the force in such increments as the provision of equipment permits.

It is now anticipated that such a force will receive its first increment of modern equipment in sufficient quantity to justify a considerable assemblage of troops before the fiscal year 1932.

The War Department has under consideration, however, the usage of approximately one platoon of infantry, one platoon of tanks and one battery of Field Artillery to carry out some specific tests bearing on mechanization during a very limited period in the late summer of 1929. These tests, if held, will be conducted at Fort Leonard Wood or Aberdeen Proving Grounds.

Other than the above, there will be no assemblage of a mechanized force in the summer of 1929.

The Commanding General, Third Corps Area, has been notified that the Sixth Field Artillery, Fort Hoyle, Maryland, will be organized into a mixed regiment, with one battalion of two experimental motorized batteries and one battalion of two horse-drawn batteries. The two batteries of the Sixth Field Artillery to be motorized are those which received training as a motorized unit of the Experimental Mechanized Force at Fort Leonard Wood during the past summer. The horses of these batteries were sent in April to the Remount Depot, Front Royal, Virginia, where they now are available for issue to organizations.

THE FIELD ARTILLERY SCHOOL MAILING LIST

WHILE it is intended to continue the publication from time to time of the Chief of Field Artillery's Information Bulletin, this Bulletin will not hereafter, as a rule, contain the instructional matter issuing from the Field Artillery School.

In order, however, to make the School's instructional matter available to the service at large, there is being established a Mailing List, to be distributed to subscribers approximately four times a year at an annual cost of $1.50 per year.

The subject matter included in the Mailing List will contain problems and Field Artillery School Notes illustrating and amplifying principles already in training regulations or new methods being used experimentally by the various departments of the School and provisionally approved by the Chief of Field Artillery for test at the School.

The first issue of this Mailing List will be mailed to subscribers during the first week in January, 1929. It is desired that subscriptions reach the Book Department, the Field Artillery School, Fort Sill, Oklahoma, as soon as practicable so that sufficient copies of the subject matter to be included can be printed and ready for mailing.

The Information Bulletin will contain personnel orders as heretofore covering all appointments, promotions and changes in status of all Regular Army, National Guard and Reserve Corps Field Artillerymen; information on the status of Training Regulations; and such other matters as it is deemed advisable to issue to the Field Artillery in bulletin form.

NATIONAL GUARD NOTES

Service Schools and the National Guard

THERE are many reasons why the National Guard requires the benefit of attendance at the General and Special Service Schools, and why these schools will always remain an important link in the training scheme for the Guard. A few of the more important reasons may be summed up briefly as follows:

(*a*) The necessity for earning a livelihood.

(*b*) The personnel turnover.

(*c*) Need for National Guard personnel trained as instructors to augment the small corps of Regular Army officers assigned to such duty.

(*d*) The dispersion of units of organizations over wide areas in some cases.

(*e*) The limited time available for training of the National Guard.

The first requires little or no discussion. It must be conceded, and rightly, that the individual's livelihood and advancement in his civil pursuits must always remain his first responsibility; service in the National Guard a secondary but patriotic duty to be performed in his spare time. It would not be reasonable to class the National Guard with the Regular officer with respect to the acquisition of military knowledge. With his own support and the welfare of his family as his first duty, the National Guardsman will normally have more or less limited time and opportunity for military study or drill. Since the National Guard officer is on a part-time basis in acquiring a military education, any plan that will afford an opportunity for intensive training with remuneration sufficient, to some extent, to relieve him of personal responsibility will prove an immense benefit to him in his military career. This opportunity is presented only by the General and Special Service Schools.

The turnover in commissioned personnel in the National Guard is approximately 25 per cent annually. This makes it highly essential to provide some additional means for insuring proper training of the constant inflow of new material. These new officers cannot all be sent to the service schools, so it becomes necessary to bring the schools to them. This is being done by the Militia Bureau by

sending as many selected officers to the service schools each year as the available funds will permit and returning them to their organizations better qualified as instructors. Unless these officers become themselves part of the turnover immediately after graduation, they reimburse the Government many times the cost of sending them to the service schools by the instructional value of the work they do with their organizations.

It is impossible for the small corps of Army officers on duty as instructors with the National Guard to conduct schools where all National Guard personnel could attend. There are rarely more than two Regular officers with a regiment, and sometimes there is only one. The funds available to instructors for travel are limited. The best an instructor can hope to do in most cases is to advise and assist in the preparation of training plans, giving his personal services in the conduct of schools and practical instruction whenever requested to do so. Their help is greatest, it is believed, when the National Guard personnel avail themselves of the instructor's knowledge of the service school methods and doctrines in planning instruction.

Only a few regiments in the National Guard are located wholly within one city or town. The regimental area usually covers several towns, separated to a more or less degree. This makes it necessary for instructors to travel from town to town to their work. They can make only such visits as limited travel funds permit. The number of these visits vary with the cost of travel and the distance between towns. A regiment with units dispersed in several towns has practically no opportunity to assemble the officers for group instruction. Usually schools are conducted locally in these regiments, or the officers avail themselves of the Army correspondence courses. If the latter are used, the instructors on duty with the regiment can handle the distribution of the lesson sheets and mark the papers submitted. However, if local schools are held the officers at the home stations must shoulder the bulk of the instruction, unless the instructor is located in the same town. Where a service school graduate is available, a most satisfactory solution to the local school problem is provided. He is admirably equipped to conduct such instruction and carry it to a successful conclusion. Where the units of a regiment are scattered it is desirable to have more than one service school graduate in each regiment.

Limited time is the bugaboo of all concerned with the training of the National Guard. With only one and one-half hours available on forty-eight evenings, and two weeks' field training in the summer, it is absolutely necessary that all instruction be planned to give the maximum benefits. The service schools specialize in training methods, and it is reasonable to assume that the graduate of such a school is perhaps better qualified to employ the limited time available for the training of the National Guard to a greater advantage than a non-graduate. The graduate is in a position to teach his fellow officers the methods by which the service schools attain a maximum of instruction in the time allotted to any subject. With so little time for the training of himself and his unit, the officer who is unable to attend a service school is greatly handicapped, and he should be encouraged to rely upon his fellow officer who has attended such a school to assist him in acquiring the knowledge he must have to be successful.

The following personnel of the Field Artillery, National Guard, attended Army service schools during the fiscal year 1928:

Ten attended the Field Officers' course, six weeks, May 1 to June 9, 1928. Fort Sill, Oklahoma.

Forty-eight attended the Battery Officers' course, three months, September 15, 1927, to December 15, 1927, and January 30 to April 28, 1928. Fort Sill, Oklahoma.

Twenty-seven enlisted men attended Communications Course, four months, February 1 to June 14, 1928. Fort Sill, Oklahoma.

All personnel sent to service schools do not graduate for various reasons, such as relief on account of ill health of student, sickness in his family, relief on account of business reasons or failing to successfully complete the course. Past records show there is an average of about 10 per cent of students each year who fail to complete the courses. During the past years this large percentage of failures has been due partly to the large number of failures at Air Corps Flying Schools, there being about 50 per cent in each class who did not graduate. The sending of National Guard officers to Air Corps Flying Schools has been discontinued by the Militia Bureau and such personnel now go as Flying Cadets and not on National Guard funds. This will tend to reduce the percentage of failures in the future.

About 2,000 National Guard officers have attended the service schools during the fiscal years 1921-1928, inclusive. Approximately 1,800 of these graduated from the service schools, and 1,311 are still in the service. These numbers are for all the branches of the National Guard.

During the fiscal year 1929 it is contemplated that the following National Guard Field Artillerymen will go to service schools: Eight to the advanced course; fifty to the Battery Officers' course; twenty-five to the enlisted men's communications course. All these classes are at Fort Sill.

General Orders for Individual Qualifications

The following General Orders were issued by the Headquarters New York National Guard and are considered by the officers on duty in the Militia Bureau as an excellent method for National Guard units to publish and record qualifications obtained by individual members of their commands:

HEADQUARTERS NEW YORK NATIONAL GUARD

829 Municipal Building
New York City, October 15, 1928.

General Orders
No. 8

1. Every regiment or separate organization of the New York National Guard will, before December 31st of each year, publish an organization general order giving the names and record of qualifications of all members of the organization who qualified on the target range with any weapons or in gunners' examinations and tests and authorizing such individuals to wear the prescribed badge for the qualification. Brigade Headquarters will publish a similar order covering the Brigade Staff and the Brigade Headquarters Company. Headquarters New York National Guard will publish a similar order covering the 27th Division Staff and the State Staff.

BY COMMAND OF MAJOR GENERAL HASKELL:

EDWARD MCLEER, JR.,
Colonel, Infantry, N. Y. N. G.,
Chief of Staff.

The Annual Armory Inspection, 1928

The results of the Annual Armory Inspection of the National Guard for 1928 have recently been published in the annual report of the Chief of the Militia Bureau. These reports show the condition of the National Guard during the armory training period in which the preparatory instruction for field training is given. In addition to the progress of training, these reports furnish other valuable data which assist the Militia Bureau in formulating suitable policies.

The following summary of results applies only to the Field Artillery of the National Guard; it represents a consolidation of the reports for all units. This consolidation presents a composite picture of the Field Artillery component which it is believed should prove of interest to all concerned with the development of the Field Artillery of the National Guard.

The reports show that 2,455 officers, 44 warrant officers, and 25,461 enlisted men of the Field Artillery were actually present with their units when the inspections took place. In addition, there should be added the following groups for which credit for attendance at the inspection is authorized by reason of attendance at the training activities shown: Army Service Schools, 22 officers, 1 warrant officer and 25 enlisted men; enrolled in the R. O. T. C., 236 enlisted men.

Adding these to the figures shown above for the men actually in attendance at the inspection, 2,477 officers, 45 warrant officers, 25,722 enlisted men were present or accounted for in other training activities during the period of the armory inspection.

The reports further show that the average strength of the Field Artillery of the National Guard during the inspection period was 2,596 officers, 46 warrant officers, and 30,828 enlisted men. About 95 per cent of the officers, 98 per cent of the warrant officers, and 83 per cent of the enlisted men were, therefore, present or accounted for during the period of the inspections just concluded.

The reports also show that 62 officers, 3 warrant officers and 11,503 enlisted men credited as present for the inspection, 2 per cent, 6 per cent and 37 per cent, respectively, were men who had less than one year's service at the time of the inspections.

The average attendance at the armory drills for the year previous to the inspection is given as 2,299 officers, 45 warrant officers,

and 21,307 enlisted men; while the average strength for the same period is shown as 2,630 officers, 46 warrant officers, and 31,612 enlisted men. Hence an average attendance of 87 per cent of the officers, 98 per cent of the warrant officers, and 67 per cent of the enlisted men was maintained during 47.7 drills, the average number held by all units during the year. Of the average number of drills held, the officers received pay upon an average of 45.5, which is indicative of a growing attendance throughout the units.

It is interesting to note the encouraging reaction to the policy requiring inoculation and vaccination of the personnel of the National Guard. The reports submitted show that 939 officers, 13 warrant officers, and 11,196 enlisted men were protected during the year prior to the inspection through antityphoid inoculation, while 710 officers, 11 warrant officers, and 8,441 enlisted men were successfully vaccinated. This is a healthy improvement over previous years.

A unit mobilization plan was found on hand in 658 units, while only 35 were found to be lacking in this respect. In all probability the latter number included some new units for which time was not available for the preparation of such plans. This excellent compliance with instruction naturally justifies the average rating of "Very Satisfactory" given all units in discipline, esprit, and morale.

The armory situation, an important one during the armory training period, also shows a marked improvement; at present 141 are owned by either State, county, or city, 26 by units themselves, and the remainder, 196, by private parties. Of the total number reported, 321 were found to have adequate facilities for training the entire command, while 38 were found inadequate. Also, 352 were reported as affording adequate protection for Federal property, while 14 were found to be lacking in this respect. However, despite the latter, the average general rating for the care and storage of property is shown to be "Very Satisfactory." The condition of the records of the units might also be properly shown in this group, the general rating for the entire Field Artillery in this respect being "Satisfactory."

The stable situation, care and use of animals as shown by the report indicates that improvement is being made. There were 190 armories having adequate stables, while 23 were classed as inadequate. The average status as to care and use of animals is shown

as "Satisfactory." The average status as to care and use of motor vehicles is rated as "Satisfactory."

It is also encouraging to note that a specific training objective for the armory training period was set for 638 units, while 35 failed to have such an objective; a similar objective was set for the entire training year for 612 units, while 61 failed to have such an annual objective. This leads to the statement in the reports that 633 units had schedules which would reasonably assure the attainment of the objectives set, while 22 did not. A file of schedules was maintained in 640 units, and 31 failed to have such a file.

The average degree of proficiency in the following items is shown to be:

Training of Individuals:	Basic	Satisfactory
	Specialist	Satisfactory
Organization training as to:	Use primary weapon equipment	Satisfactory
	Use auxiliary weapon equipment	Satisfactory
	Fire control	Satisfactory
	Communications	Satisfactory
Organization training in other general subjects applicable to each arm:		Satisfactory

One cannot help but look at these figures with a great deal of encouragement, for they represent a highly satisfactory condition. A glance back over previous reports shows a steady trend of improvement each year. This year the number of units rated as "Unsatisfactory" or "Very Unsatisfactory" has been greatly reduced.

AFTER PICKETT'S CHARGE

THE UNITED STATES FIELD ARTILLERY ASSOCIATION

ANNUAL MEETING

PURSUANT to the call of the Executive Council, the eighteenth annual meeting of the Association was held at the Army and Navy Club in Washington on December 15, 1928. It was called to order at 4:30 p. m. by General Austin, President of the Association.

The Secretary-Treasurer read the call for the meeting as furnished by mail to all active members of the Association. He reported that a quorum for the transaction of business was present in person or by written proxy.

A motion was adopted approving the minutes of the last annual meeting as published in THE FIELD ARTILLERY JOURNAL.

The Secretary-Treasurer presented and read his annual report and financial statements, attached hereto and made a part of these minutes.

The President stated that he had appointed Major Marshall Magruder and Major A. W. Waldron as a committee to audit the financial statements of the Treasurer. The Secretary then read the written report of the auditing committee, which stated that it had performed its duty and the financial statements had been found to be correct. Thereupon a motion was adopted approving the report of the committee.

The chair announced that the expiration of the term of office of Major General Fox Conner left a vacancy in the Executive Council, and called for nominations. Lieutenant Colonel William Bryden was nominated, and on motion was unanimously elected as a member of the council.

The chair then laid before the meeting the proposed amendment to Section 3 of Article V of the constitution of the Association, notice of which had been published to the active membership and printed in the JOURNAL in accordance with the constitutional requirements governing amendments to the constitution. The Secretary-Treasurer called attention to the fact that a three-fifths vote of the active members of the Association is required to amend the constitution, and stated that, as the number of members present with the number of proxies held by him and others did not equal

three-fifths of the number of active members, the proposed amendment could not be adopted at that time. A motion was made and seconded that the meeting be adjourned for a period of ten days and that the Secretary be instructed to correspond with a sufficient number of members who had not sent in their proxies to insure getting enough affirmative votes, but this motion was lost. The chair then announced that the proposed amendment to the constitution had failed of adoption.

No further business appearing, the meeting adjourned.

ANNUAL REPORT OF THE SECRETARY-TREASURER

The finances of the Association during the past year have continued to gain, as shown by the following:

Assets—November 30, 1927		
Cash on hand	$3,655.39	
Securities on hand	19,990.00	
		$23,645.39
Assets—November 30, 1928		
Cash on hand	$2,721.41	
Securities on hand	22,000.00	
		24,721.41
		$1,076.02

A detailed statement of the receipts and expenditures during the last fiscal year is as follows:

RECEIPTS

Cash on hand November 30, 1927	$3,655.39	
Membership dues	6,559.08	
Advertising	4,179.49	
Interest and profit on securities	1,456.23	
Sale of books and binders	524.30	
Securities sold ($7,000)	7,000.00	
Miscellaneous receipts	5.00	
		$23,379.49

EXPENDITURES

Printing and mailing THE FIELD ARTILLERY JOURNAL	$7,305.54	
Miscellaneous printing	281.23	
Postage	297.01	
Services	1,607.04	
Office supplies	128.13	
Books and binders	395.20	
Telephone and telegraph	80.92	
Authors, translators, draftsmen and photographers	645.28	
Rent	383.54	
Miscellaneous expense	249.83	
Securities	8,766.41	
Service advertising	517.95	
Cash on hand—November 30, 1928	2,721.41	
		$23,379.49

Expenditures for the year ending November 30, 1928, were	$18,648.08
Total receipts were	19,724.10
or a gain of	1,076.02

Outstanding obligations and amounts receivable are approximately the same as on November 30, 1927. The only outstanding obligation of any importance is the printer's bill for the November-December number of the JOURNAL which has not yet been received. This obligation was also outstanding on November 30, 1927. Small amounts are receivable consisting of current advertising, dues and book department bills.

At the last annual meeting a resolution was adopted directing the Executive Council to prepare suitable resolutions expressive of the sentiments of the Association on the retirement of General Snow, President of the Association.

The Executive Council prepared and adopted suitable resolutions and directed that they be spread upon the minutes of the Field Artillery Association and published in THE FIELD ARTILLERY JOURNAL. This has been done.

It was also directed that an engrossed copy of the resolutions, signed by Officers and Members of the Executive Council of the Association, be furnished General Snow. A very handsome engrossed copy of the resolutions was made up and sent around to members of the Executive Council for their signatures. It has not yet been returned as it had to be sent to Officers of the Association and Members of the Council in Panama, Fort Leavenworth, etc.

J. M. EAGER,
Major, F. A.,
Secretary-Treasurer.

PHILIPPINE SERVICE

COMPILED IN THE OFFICE OF MAJOR T. K. BOLES, F. A., FORMERLY A. C. OF S., G-2, PHILIPPINE DEPARTMENT, PRINCIPALLY BY CAPT. H. C. BRENIZER, F. A., AND CAPT. R. T. SOTHERN, F. A.

[The following extracts from an article, published in the August, 1928, *Infantry Journal*, are reprinted by request of the Chief of Staff of the Philippine Department in order to assist in disseminating information concerning service in the Islands.—EDITOR.]

SINCE the days of 1898, the Army has contributed much towards constructive work and progress in the Philippines. The foundation for the present systems of education, health and sanitation, public improvements, roads, and so on, was laid by the Army in the early days. Medical research by Army Medical personnel has contributed greatly to the improved health conditions. Nothing can lower the prestige, thus acquired, more than a slovenly military appearance or improper deportment on the part of officers on duty in the Philippines. A smart dress and bearing and a dignified and proper appearance are demanded by the department commander. The small cost of uniforms and the excellent laundry facilities afforded make it always easy to appear in well-laundered uniforms; while leathers and brasses can be kept brightly polished by one's houseboy. Officers should insist on a correct fit of uniform—a proper fit costs no more than an imperfect one. The "chit system" of charge accounts in vogue in the Philippines makes it extremely easy to incur obligations beyond one's means.

BEFORE THE TRIP

Clothing Segregation: Clothing should be segregated, putting heavy or medium weight in one trunk and light weight in another. This is considered necessary, inasmuch as but one steamer trunk is allowed in a stateroom for each passenger, other trunks being held in the baggage room.

Firearms: Firearms should be thoroughly cleaned and greased prior to packing for shipment. Be sure to note the serial numbers appearing on these arms, as it will be necessary to declare and register (see below) the same before landing in the Philippines, although no duty is charged.

Automobiles: Gasoline and water must be drained and batteries

should be disconnected and terminals taped. It is recommended that tires be removed from the car before loading on transport. Should they be left on the car, they should be fully inflated and carefully examined for leaks, otherwise they may be flat and ruined upon arrival in Manila. Springs should be oiled, parts cosmolined, and every precaution taken against rust and corrosive action of salt water. Crating cars is not recommended. Accessories, such as tools, spotlights, motormeters, etc., should be removed and packed separately.

Horses: There is little or no call for purely a riding horse, except in army circles. Jumpers and horse show animals have practically no civilian market. No horse shows of any prominence are held. Polo ponies have a good demand, as the Manila Polo Club has two civilian teams playing. The top price for tournament ponies will not go over 800 to 1,000 pesos. Competition is very keen between army and civilian teams, and as the standard of public mounts is far below that of the Manila Polo Club string, an officer desiring to play polo will find it a great advantage to mount himself before coming to the Islands. Private mounts can be taken back to the States from the Philippine Islands.

Household Furnishings: Heavy furniture should not be brought to the Philippines as the glue fails in damp weather and veneering comes off. Heavy upholstered furniture suffers from mildew. Books deteriorate through insects and mildew unless varnished—only professional books should be brought. Photographs and pictures deteriorate in a similar manner. Wicker furniture of the best quality can be purchased in the Philippines at a very reasonable price. China, all silver, glassware, etc., should be brought. Woolen rugs are not recommended, as they are liable to mildew; native mats are cheap and serviceable. Heavy or expensive draperies or hangings should be left in the States, as light and less expensive material more suitable for the climate may be obtained after arrival. Window shades are not used in the Philippines. Bed linen and pillows should be brought, together with a minimum of heavy coverings. Quartermaster beds are available for issue so far as the supply allows. Kitchen utensils should be brought, as the quartermaster has not sufficient for issue. All government quarters are equipped with officers' furniture, ice-box, etc. Electric stoves are not used in the Philippines.

DURING THE VOYAGE

Clothing: Medium weight clothing will be needed for about two or three days out of New York City, when a change to light, or tropical weight, is advisable. The medium weight will be needed again about two days prior to arrival at San Francisco, as well as during the sojourn there, irrespective of the season of the year. Halfway from San Francisco to Hawaii change will again be necessary to light weight, which will be worn for the balance of the trip. Ladies will find very light-weight dresses most comfortable.

Transport: Full directions concerning the transport trip are transmitted by the Transport Service immediately on issuance of an officer's orders for overseas service. They give all information concerning accommodations, recreational facilities, laundry, medical attention, etc.

Honolulu: Honolulu being a landlocked harbor, mosquitoes prevail at some seasons of the year. It is accordingly recommended that officers and their families sleep ashore during their stay there.

Laundry: No laundry facilities exist aboard transports. In some instances laundry has been done during the stops at Panama and Honolulu. Confer with the transport quartermaster in this connection.

Uniform: Changes in A. R. 600-40, published in Section 11, Circular No. 23, W. D. 1927, require all members of the Army traveling on transports to wear the uniform. Standing orders, Philippine Department, require all officers to land at Manila in uniform. The service cap is not worn in the Philippines at any time. Hongkong khaki is the prescribed uniform material for officers and warrant officers. If purchased in the Philippines uniformity in color is assured.

Delay in Reporting: Officers are authorized to delay forty-eight hours after arrival of transport in reporting at their respective stations, but most find it advantageous to proceed at once to their stations so as to secure quarters and uniforms as early as possible.

THE PHILIPPINES

Health and Climate: The climate of the Philippines is among the best in the tropics. The average temperature for the year is about 80 degrees Fahrenheit in Manila and neighboring posts. At Corregidor and Stotsenburg the temperature is lower. The rainy

season begins about the first of June and continues until about the middle of November. The months of December, January and February are nearly ideal. The average annual rainfall in Manila is 95 inches. During the rainy season inundations of rivers are frequent and traveling in the interior is at times interrupted. The climate of the Philippines is apparently satisfactory to most persons, particularly young children. The death rate per thousand whites in Manila in 1920 was 13, compared with 14.6 for Washington, D. C., 14 for San Francisco, 14.1 for Los Angeles, 13 for New York City, and 12 for Chicago. In order to safeguard health the following suggestions are made:

Food: Food should be eaten only where it is known to be of good quality and properly prepared. All are advised not to eat uncooked vegetables, as due to the manner of raising at some places they may carry such diseases as cholera, dysentery, and typhoid. Exceptions may be made of cucumbers and tomatoes, provided they are properly scalded and peeled. Many of the native fruits are good and should be eaten; however, green or over-ripe fruits should be avoided. It is advisable to scald the native fruits before peeling and if the end of the banana peeling is broken, that end of the fruit should be discarded.

Water: Only artesian, distilled, or boiled water should be used for drinking or cleansing the teeth. Drinking water, either artesian or distilled, is furnished to the Army and Navy Club and to officers' quarters in Manila upon request made to the utilities officer, Manila. No drinking water should be used unless its quality is *known* to be satisfactory. There are such bottled waters as Isuan, Tansan, Red Rock, Royal, etc., which are good.

Mosquito Bars: All persons sleeping, either during the day or at night, should have the mosquito bar down and tucked under the mattress. The anopheles mosquito, which carries malaria, is a night flier and bites after sundown; however, the mosquito which transmits dengue bites during the day as well as at night, and especially in the afternoon. Persons living in unscreened houses will find mosquito punk useful.

Personal Hygiene: Upon exertion perspiration is excessive during most of the year. For this reason extreme care must be taken to prevent chilling.

A sweater or other heavy garment should be worn after exercise

until one has bathed. Whenever possible, the bath and rubdown should be taken immediately after exercise. Iced drinks should be avoided until the body has cooled. *Never* sleep in the blast of an electric fan. During sleep the abdomen should be covered at all times—either with a special flannel belt or by insuring against the ordinary garments being open.

Children should be examined by an Army surgeon soon after arrival for possible physical ailments as well as for suggestions as to diet, etc. "Klim," "Eagle Brand" condensed milk, etc., are obtainable at the general sales store (QMC), Manila. A full line of children's patent foods, etc., is carried in stock at Manila drug stores.

Solicit advice from older army residents as to method of making purchases from native stores.

Clothing and Uniforms: The usual prices for clothing in Manila average as follows:

	Pesos
White uniforms	16.00
Khaki uniforms	16.00
Mess jacket and vest	16.00
White duck civilian suit	16.00
Palm beach civilian suit	30.00-40.00
Pongee silk civilian suit	45.00-65.00

Standard articles of officers' equipment are available at the quartermaster general sales store, the various regimental exchanges and at shops on the Escolta in Manila. In addition to being worn as authorized by Army Regulations, the white dress uniform is prescribed for wear before retreat, for social functions, and on Sundays and holidays. It may be worn for informal occasions in the evening. The mess jacket and black trousers are worn for formal evening functions. Sweaters and heavyweight clothing are needed at Camp John Hay, Baguio, inasmuch as this resort is over 5,000 feet above sea level. Lightweight raincoats for all members of the family should be brought from the States for use during the rainy season. Oilskins are not recommended, due to climatic conditions.

Ladies, in the Philippines, usually wear very lightweight clothing; light also as regards color. All articles of ladies' apparel can be secured in Manila. Paris gowns and embroideries are much cheaper than in the United States.

Mail: The Director of Posts, Manila, P. I., should be furnished with your address upon arrival, in order that mail may not be delayed. Until correspondents are advised as to your new address, mail may be addressed you at Manila, using care that your grade and branch of service appear.

Hospitals: Excellent hospital facilities are provided in Manila at the Sternberg General Hospital, as well as at other posts in the Islands.

Banking and Currency: It is advisable to institute a banking account in Manila, inasmuch as checks drawn on U. S. banks are very difficult to cash. The par value of the Philippine currency bears a ratio to that of American money of two to one; i. e., one Filipino peso equals 50 cents in American currency. The peso contains 100 centavos, each worth one-half of the U. S. cent.

Clubs: In addition to strictly military clubs maintained at the various posts, the following are principal clubs of Manila and environs of interest to the Service:

Army and Navy Club, facing the Luneta, Manila. Initiation fee ranges from fifty to ten pesos, and monthly dues from eight to one and a half pesos, depending on station to which assigned. During most of the season hops are given weekly, though dancing may be enjoyed every night during the dinner hour. This is the social center of the Army and Navy. All officers are given two weeks' guest cards upon arrival.

Manila Polo Club, situated on the Bay about 3 miles south of the center of Manila and accessible to Fort Wm. McKinley and Camp Nichols. A salt water pool, polo, tennis and golf are the activities supported by the club. Army members pay no initiation fee but have monthly dues of ten pesos.

Caloocan Golf Club, about five miles north of Manila. An excellent eighteen-hole golf course is maintained. Army members pay no initiation fee, but have monthly dues of ten pesos. This is probably the "sportiest" course in the Islands.

Manila Tennis Club, adjacent to the Luneta. Monthly dues six pesos, with no initiation fee to army officers. Eight excellent courts are available.

Hotels: About seventy-two hours before arrival of a transport, a radiogram is sent to the commanding officer of troops, containing an itemized list, by hotels, of all available rooms in Manila. This

list is then posted and passengers are given the opportunity of making reservations desired.

Entertainment: Boxing bouts are held every Saturday night at the Olympic Stadium, Manila. The Constabulary band plays every Wednesday and Sunday evenings on the Luneta. A golf course is available between the Army and Navy Club and the Manila Hotel. Native caddies are obtainable at a nominal fee. There are several first-class moving picture houses in Manila.

Filipino Goods: Goods of Filipino manufacture are admitted free of duty in the States. In mailing same to the U. S., it is recommended that a certificate of origin be secured at the post office, in order to obviate delay in passing customs in the States.

Calls: The official hours for calling are between 5:00 and 7:00 p.m. The white dress uniform is worn.

Standing Orders: All officers are urged to acquaint themselves promptly with the standing orders of the Philippine Department available at each post.

Libraries: An up-to-date library is maintained at Fort Santiago, Manila, having over 25,000 volumes, together with American magazines and newspapers. Libraries are also maintained at other posts.

Transportation Rates in Manila: Vehicle rates are very low. Special motor rates are given to members of the Army and Navy Club, or those holding guest cards, provided that the car is secured through the club.

Servants: The prevailing wages in Manila are:

	Pesos
Filipino cook	30.00 to 40.00 per mo.
Filipino houseboy	10.00 to 20.00 per mo.
Filipino combination cook-houseboy	30.00 to 50.00 per mo.
Filipina *lavandera* (washwoman)	15.00 to 20.00 per mo.
Filipina amah (nurse)	15.00 to 20.00 per mo.
Filipina combination *lavandera*-amah	20.00 to 30.00 per mo.

Chinese servants are higher priced.

Before employing servants, it is recommended that they be taken to the provost marshal to ascertain whether or not they have a criminal record. In event recommendations are submitted by applicants, if possible, check up with the previous employer, so as to obviate chance of forged letters of recommendation. Cooks and amahs should undergo a physical examination of army surgeons before acceptance.

Automobile Licenses: Automobile licenses must be secured from the Bureau of Public Works within seven days of arrival of automobile, at two pesos per year. No one is allowed to operate a motor vehicle without a driver's license. These cost two pesos each in addition to the auto license.

Rental of Houses and Apartments: Unfurnished houses and apartments may be rented for seventy-five pesos to one hundred and fifty pesos per month.

Quarters: As there are always more officers assigned to duty in Manila than there are available quarters, it is necessary for many to rent quarters. All officers at Corregidor and Camp Stotsenburg, and all but a few at Fort Wm. McKinley, occupy government quarters. Most officers assigned to Manila and Camp Nichols are on a rental allowance status.

Foodstuffs: Groceries may be obtained directly from the quartermaster general sales store or commissary. This includes meats, staples and oranges, grapefruit and lemons. A personal call is necessary in order to arrange credit. Vegetables are imported from the States, though many are now grown locally, particularly in the highlands near Baguio, which compare favorably with the similar varieties of the States.

Glassware: Glassware and mirrors, etc., are obtainable at slightly higher prices than those prevailing in the United States.

Schools: There is a central public school for children in Manila for which no tuition is charged. Americans and the higher class of mestizos attend. The American school is exclusively for Americans and is taught by American teachers. A tuition is charged. Both of these schools teach through the high school grades. There are several preparatory schools for boys, and many girls attend the local convents. Schools are maintained at several of the posts.

Automobiles: Automobiles will be found exceedingly useful in the Philippines with the exception of Corregidor, where it is a convenience, but not at all necessary. Closed cars will be found more satisfactory than open ones, by reason of protection during the rainy season and dust in the dry season. The bringing of a new car is not recommended, inasmuch as the heat and rain rapidly deteriorate the upholstery and body. Contrary to the general belief, the second-hand value of cars is scarcely higher than in the States. However, sometimes cars may be turned in to the local distributors

before return to the States, and credit thus obtained applied on the delivery of a new car in the States. Gasoline is expensive unless purchased through the quartermaster. Repairs and spare parts cost about the same as in the United States, but quality of work is, on the average, not as high. Tires are usually cheaper than in the United States.

Leaves, Detached Service and Travel: Officers stationed in the Philippines enjoy exceptional opportunities for sightseeing. The policy encourages officers to visit all parts of the Philippines. All officers, warrant officers and nurses are entitled to one month of detached service for each year of service in the Philippines. This enables one to travel within the archipelago without being on leave status. Many use this time for visit to Camp John Hay (Baguio), which is situated in northern Luzon in the mountains, at an altitude of 5,000 feet. This resort is open throughout the year. Public quarters are available and a central mess maintained at an average cost of three and a half pesos per day for adults. The southern islands also offer detached service attractions, such as Zamboanga, Jolo, and the Sulu Islands with their pearl fisheries and interesting native life. Trips may be taken to China, Japan, Borneo, etc., on a regular leave status. Full information as to routes, cost, etc., may be obtained at the office of G-2, Department Headquarters, Fort Santiago, Manila.

Fort Wm. McKinley: Headquarters of the Philippine Division, nine miles south of Manila. Troops here are Infantry and the Antiaircraft Coast Artillery. Passengers for Fort Wm. McKinley will be met on the wharf by an officer from that station with transportation for passengers and baggage. All but a few officers assigned are furnished government quarters. No public schools are maintained, children attending in Manila. Lower grades are taught in local schools and busses furnished for transportation to Manila. A local commissary is maintained. Climate same as in Manila. Wood is used as fuel for cooking.

Camp Stotsenburg and Clark Field: A Field Artillery and Cavalry post with one squadron of Air Corps at Clark Field (adjoining Camp Stotsenburg). About fifty-seven miles north of Manila, in the foothills of the mountains and connected with Manila by train and an excellent motor road. All officers occupy government quarters. Free phone in all quarters for post use only. Communication

with Manila by radio and telegraph only. A commissary is operated. Fruits and fresh vegetables are obtainable at the post exchange or from local hucksters. Ice is issued to all officers' quarters. Artesian water is furnished free by the post quartermaster. Motion pictures are shown nightly. A standard post library is available. Climate is cooler than Manila. A post laundry is maintained by the quartermaster. Interesting trips may be made in the mountains over trails cut through tropical forests. Coal and wood are used as fuel for cooking. The post supports a central officers' club, a swimming pool and golf course; polo and tennis are also played. Automobiles are useful but not a necessity. Dogs are not allowed on the post. Automobiles may be registered through the provost marshal, and all personally owned firearms must be registered with him. The bringing of American servants is discouraged and this practice has been found very unsatisfactory due to their lack of friends and the availability of experienced native servants.

Camp John Hay, Baguio: In the north central part of Luzon, 170 miles from Manila, at an altitude of about 5,000 feet. Railroad fare, eleven pesos. Daily trains from Manila at 8:00 a.m. Change at Damortis to army motor transportation. See department standing orders for particulars regarding this health resort. An excellent motor road from Manila over some of the most picturesque scenery in the world (Benguet Highway). Application for transportation requests to cover commercial transportation should be made to department quartermaster.

FOREIGN MILITARY JOURNALS: A CURRENT RÉSUMÉ

Revue d'Artillerie, July, 1928

In this number Major Péchot completes his study, **"Office Management."** He outlines a method of classifying and handling documents which in its essentials has a familiar ring to one acquainted with our Army correspondence and office work. It is to be hoped that the French Army is not to depart from the simple and direct channels of the old yellow paged copying book, the mucilage pot, and the one bushy bearded "dactylo"—seen in so many offices from corps on down—to follow the paper strewn trail made by the typewriters, mimeograph machines, decimal filing systems, and the multitude of clerks of our highly organized offices.

Lieutenant Barré presents an article, **"A Fire Preparer,"** in which he describes a mechanical computer for use by battery commanders in the preparation of data. The instrument gives Y azimuth, map ranges, wind components and permits the rapid calculation and application of the various corrections. Such instruments are not new in our service. A mechanical computor of the same type was devised by the Ordnance Department for the Field Artillery some years ago but has never been adopted for issue.

In Lieutenant Colonel Buchalet's **"A Contribution to the Study of Counterbattery"** he states that General Faugeron's recent article on counterbattery (see Résumé, FIELD ARTILLERY JOURNAL, March-April, 1928) does not, perhaps, show in sufficient detail the importance of *method of adjustment* and *nature of observation* in determining the size of zone to fire on, and the amount of ammunition required. A further study of these factors may be useful. As a basis for his study he assumes that only high explosive shell will be used and that the enemy batteries are not casemated. He accepts the figures of 80 meters by 20 meters given by General Faugeron as the space occupied by one battery and makes the further assumptions that the battery personnel is poorly sheltered, that the battery does not, in general, reveal itself until just prior

to or during the attack, and that it will usually be located by aerial, rather than ground observation.

I. ZONE TO BE COVERED

In determining the zone to be fired on, an 80 per cent probability of covering the target is considered sufficient for all practical purposes. Two cases are visualized: where the fire is or is not observed. The inaccuracy of map firing imposes on all artillery the use of high burst adjustments, particularly on the heavy guns. The accuracy of the fire in direction is taken as within 3 mils.

(*a*) WITH AIRPLANE CONTROL.

Hasty bracket adjustment. Increase target area on each side of center by 1 mil in width and ½ per cent of range (about 1 probable error) in depth. Total area at range of 10,000 meters equals 1.2 hectares (12,000 square meters) computed as follows:

$$\left.\begin{array}{l}80+20=100 \text{ meters in width}\\ 20+100=120 \text{ meters in depth}\end{array}\right\} =12{,}000 \text{ square meters}$$

(*b*) NO AIRPLANE CONTROL.

Map firing. Increase on each side by 1 mil in width and 1 per cent of range in depth.

(1) *Target located by flash or sound ranging* (location accurate to about 20 meters). At 10,000 meters, zone is as follows:

$$\left.\begin{array}{l}80+20+2(20)=140 \text{ meters in width}\\ 20+200+2(20)=260 \text{ meters in depth}\end{array}\right\} =36{,}000 \text{ square meters}$$

(2) *Target located and signalled by airplane observer* (accuracy not closer than 100 meters). This is the usual case. At 10,000 meters, zone is:

$$\left.\begin{array}{l}80+20+2(100)=300 \text{ meters in width}\\ 20+200+2(100)=400 \text{ meters in depth}\end{array}\right\} =126{,}000 \text{ square meters}$$

These zones are the minimum required to cover a mean of 80 per cent of the battery areas fired on. The necessity for airplane observation is obvious.

II. METHOD OF FIRE

The author accepts General Faugeron's plan of firing two minute concentrations at the most rapid practicable rate of fire

and of separating successive concentrations by from 15 to 30 minutes.

(*a*) CONTROLLED FIRE

Zone to be covered: 12,000 square meters. Considering the probable error at 10,000 meters about 50 meters, we have for the tonnages of ammunition consumed in neutralization per concentration:

2.4 tons (240 rounds) to counterbattery one battery with the 75 mm. (1 battalion).
4 tons (192 rounds) to counterbattery one battery with the 105 mm. (1 battalion).
6 tons (120 rounds) to counterbattery one battery with the 155 mm. (2 battalions).

(*b*) FIRE NOT CONTROLLED, TARGET ACCURATELY LOCATED.

Zone to be covered: 36,000 square meters. Using two limiting elevations, ¾ of a fork apart, about 14 per cent of all rounds will fall outside. Tonnage of ammunition consumed in one concentration:

4.2 tons (420 rounds) to counterbattery one battery with the 75 (2 battalions).
7.1 tons (324 rounds) to counterbattery one battery with the 105 (2 plus battalions).
10.5 tons (210 rounds) to counterbattery one battery with the 155 (3 battalions).

(*c*) FIRE NOT CONTROLLED, TARGET HASTILY LOCATED FROM AIR.

16.5 tons (1,650 rounds) to counterbattery one battery with the 75 mm. (6 battalions).
29 tons (1,325 rounds) to counterbattery one battery with the 105 mm. (9 battalions).
41 tons (827 rounds) to counterbattery one battery with the 155 mm. (12 battalions).

These expenditures are prohibitive. Hence, the absolute necessity of control on the target or, at least, on an auxiliary target. The smaller calibers are clearly superior for neutralization.

III. NEUTRALIZATION WITH SHRAPNEL

The expenditures required with shrapnel against unsheltered personnel would not be so prohibitive. The principal difficulties which limit the use of shrapnel seem to be the relatively long ranges at which counterbattery will be executed and the difficulty of manufacture in war. It is certain that a heavier ball must be provided if shrapnel is to be used effectively for counterbattery.

IV. INFLUENCE OF RATE OF FIRE

In order to cover a suspected zone in two minutes, other things being equal, the weapon capable of the most rapid fire is preferable.

However, the radius of action must be considered. The densities per 10,000 square meters laid down for neutralization in the regulations are:

100 for the 75 mm.
80 for the 105 mm.
50 for the 155 mm.

To cover 20,000 square meters in two minutes would require 8 to 10 pieces of 75 mm., 10 of 105 mm., and 25 of 155 mm.

The more rapid rates of fire are much better when it comes to airplane adjustment. The number of adjustments per hour is in the proportion of three for the 75 mm. to one for the 155 mm.

V. COUNTERBATTERY BY DESTRUCTION

Destruction requires two things: Observation and a sufficient expenditure of ammunition.

(*a*) *Observation*. This must be continuous, if not on the target, at least on a witness target somewhere near. The observation will normally be from the air; the witness target, a high burst adjusting point. The observer will only need to adjust the fire at the beginning and subsequent control will be by means of high bursts.

(*b*) *Expenditures*. The regulations give the following data for destruction:

800 rounds of 75 mm. (8 tons) at 10,000 meters
400 rounds of 155 mm. (20 tons) at 10,000 meters

The 75-mm. gun can only attack batteries in the open or with hasty cover. Most of the attacker's batteries are of this sort. Against such batteries the 75 is more economical both in ammunition and time.

VI. EMPLOYMENT OF DIVISIONAL ARTILLERY IN COUNTERBATTERY

Counterbattery is rightly a corps problem. The divisional artillery can assist at times but only when not needed in its primary mission of infantry support. In the defensive, lack of superiority in artillery and aviation will require that counterbattery be greatly reduced, if not entirely eliminated. The small number of batteries acting over a wide front can not be taken from their principal work with the infantry. In the offensive, on the other hand, the divisional fronts are smaller and the artillery and air

service are reinforced. Just prior to the attack, some help in counterbattery may be obtained from the divisional artillery. However, not much assistance may be excepted, for the light artillery has numerous other missions during a short preparation—destruction of wire, interdictions, smoke missions, etc. Since some light artillery is needed for counterbattery work the conclusion is evident: a certain number of light units, preferably all of one caliber, must be incorporated in the corps artillery.

VII. NEUTRALIZATION OR DESTRUCTION?

The expenditure of ammunition for neutralization during a two hour preparation is about the same as that required in theory for destruction. Is not destruction preferable? Before H-hour, the question is one of availability of guns and reliability of communications. Destruction might at times be more useful. After H-hour, the importance of acting as quickly as possible on every enemy battery makes neutralization the sole method to use. The necessity for instant action on any battery signalled precludes the employment of several battalions in a concentration. One battalion may readily control its concentrations by the fire of one battery, thus rendering simple and easy the maneuver of its fire in liaison with the airplane.

For these reasons and for the main reason that combined action with the infantry will be facilitated, the counterbattery maneuver should be handled, after H-hour, by battalions rather than groupments. In general, neutralization will be the rule and destruction the exception.

VIII. TANK ARTILLERY

The author believes that the adoption of self propelled armored artillery will be of great advantage in so far as invulnerability to counterbattery is concerned.

August, 1928

In his article **"Gas Defense for the Civil Population,"** Major Grenouillet writes interestingly of the measures being taken in Europe to prepare the civil population for meeting possible gas attacks. He makes a special study of the situation in Russia and

Poland. It is significant that Russia, having no part in the Washington agreements of 1921, has particularly occupied itself with this question.

Russia appears to have no illusions as to either the probability of future war or the use of gas in war. Her publications, military and civil, abound in clichés asserting that agreements only, whether Hague or Locarno, will never prevent war; that future war will be between entire populations; that international contracts tending to prohibit so-called barbarous methods or weapons of war are entirely vain; that aerial bombing and gas attacks on a vast scale will be the rule; that great cities will never be completely secure against attack from the air under present conditions, whatever the means of defense; and that each citizen must consider himself as likely to be exposed to the action of enemy explosive or gas bombs from the moment when war is declared. The trend of thought in Russia seems to be toward a change in city planning and in the construction of individual buildings in order to meet the menace which will exist even under the most favorable conditions of active air and ground defense.

As in the middle ages each house or group of houses must become a fortress against enemy attack; and since the possibilities of destruction increase with the number of buildings in a given area and with their height, cities of the future must develop along new lines. Congestion and skyscrapers must alike be avoided. Trees, parks, and gardens must be increased in order to hide the houses. Streets must be widened and straightened, houses spaced widely and set back from the streets, lakes or fountains provided in parks and at the intersections of various roads. Public buildings will have to be inconspicuous and scattered and there must be lack of uniformity and geometrical regularity in the plan as a whole. Extension of construction in individual buildings must be below ground, instead of above. Houses of more than three stories will be prohibited as being too vulnerable to air attacks. Large underground gas proof shelters must be provided. Public services must concern themselves with air purification, buried conduits of all sorts, and the construction of bomb proof water and power works. From the above, it will be seen that New York, in particular, is a type of city to be avoided in future planning; also that a city built

in the manner indicated would be cleaner, quieter, and more healthful and attractive, as well as safer.

While these ideas may appear fantastic at present, it must be remembered that the chimaera of today becomes the reality of tomorrow. In Russia, especially, with its scattered population, its vast territory, and its soil belonging wholly to the state, we may expect developments that would not be possible in other countries in Europe. A section of the *Aviachim,* a national defense society organized under the auspices of the Russian government, has been assigned the study of plans for the protection of cities against aerial bombardment and the collective protection of buildings against gas.

Among the more practical studies of this nature is one by an architect, Truchatskow, who realizes that no measures are likely to be undertaken unless they have some useful application in time of peace. He recommends for large cities the construction of deep underground railways of large capacity which may be used both to evacuate and to shelter the population in case of attack. In addition, he believes it practicable to locate and repair existing cellars, to select places and prepare plans for digging shelters, to bury conduits for both water and electricity, and to begin the planting necessary to hide important groups of buildings. He visualizes a system of forced ventilation for underground railways, shelters, and for the streets. Such a system, utilizing compressed air, might be used in time of peace by the postal service for the distribution of letters and small packages.

With Russia as her near and none too well disposed neighbor, it is natural that Poland should devote considerable attention to the defense of her population against gas. For some time this subject has occupied an increasingly important place in her plans for aerial defense. In order to show the public just what a modern bombing attack implies and to give a practical demonstration of the means used for protection, large scale simulated attacks have been staged. At one of these, held near Warsaw, more than 30,000 people were present. Anti-gas devices were shown and demonstrated; an attack was made on a defensive position with smoke and tanks: a light cloud of tear gas was put down on the spectators; and finally a specially constructed village was attacked

by airplanes. Troops were used to represent the inhabitants who were alerted and guided to shelters, where they remained during the bombardment. After the bombs were dropped, special gas troops, firemen, and civil sanitary units carried out their duties of disinfecting the streets and houses, fighting fires, and caring for the wounded.

As in Russia, a society for defense against gas has been formed under the inspiration of the government. It maintains a research department, aids industrial research in chemical warfare, subsidizes the manufacture of protective devices, and carries on an intensive program of public instruction in anti-gas measures. Its instructors are recruited by local chapters from their own firemen, railway men, police, and school teachers.

In his **"Notes on Counterbattery"** Captain Morel presents a study of the subject so ably outlined by General Faugeron in the *Revue d'Artillerie* for August, 1927. (See F. A. JOURNAL, March-April, 1928, p. 221.) Captain Morel adopts the theory of General Faugeron it its entirety. He seeks to bring out the details involved by means of tables which combine the various cases arising from different methods of identification and of adjustment.

Table I classifies under three heads the various combinations of methods for locating targets and of adjusting fire on them. Class A comprises the combinations of relative inaccuracy; Class B those of greater accuracy, particularly as regards the location of the objective; and Class C those which correspond to the best conditions of stabilized warfare. The dimensions of the zone to be fired on are given in the table, both as prescribed by the regulations and as reduced by the author within the limits of effective fire. The ratio of these two zones is tabulated. The three remaining lines of the table require no explanation.

General Faugeron recommends a constant zone 180 meters wide and 150 meters deep at all ranges while the author makes allowance for the range in calculating the area of his reduced zone.

Table II gives the number of range probable errors contained in the depth of (80+10K). If this number is greater than 4, two range settings differing by ¾ of a fork are used; if less, fire is delivered at a single range setting. This table also gives the number

TABLE I (To be used in executing counterbattery missions)

I. NORMAL COMBINATIONS OF MANNER OF LOCATING TARGET AND METHOD OF ADJUSTMENT

Class A Conditions of greatest inaccuracy		Class B Conditions of greater accuracy		Class C Conditions of great accuracy.
Case 1 a. Enemy battery's coordinates obtained by air reconnaissance. b. Battery laid by compass, map data.	Case 2 a. Enemy battery located as in Case 1. b. Adjustment by transport of fire. K_1, K_9, or V_o methods (when outside of limits for K).	Case 3 a. Enemy battery located as in Case 1. b. Adjustment by high bursts or by dV_o method within K limits, i.e., ¾ or 4/3 range 300 mil angle.	Case 4 a. Enemy battery located by sound or flash—(flank pieces not distinguished). b. Adjustment as in 3b.	Case 5 a. Enemy battery located by aerial photo—(flank pieces determined). b. Adjustment as in 3b
II. DIMENSIONS OF TARGET AREAS AS GIVEN BY REGULATIONS FOR CONDITIONS AS ABOVE				
Width 80+80+100+20K Depth 20+20+100+4%P	Width 80+80+100+10K Depth 20+20+100+4%P	Width 80+80+100+4K Depth 20+20+100+2%P	Width 80+80+40+4K Depth 20+20+40+2%P	Width 80+20+4K Depth 20+20+2%P
NOTE: K means range in kilometers; P means range in meters.				
III. DIMENSIONS OF TARGET AREAS WHICH ARE CONSIDERED SUFFICIENT				
Width 100+10K Depth 80+10K	Width 100+10K Depth 80+10K	Width 140 m. at all ranges. Depth 80+10K	Width 140 m. at all ranges. Depth 80+10K	Width 110 m. at all ranges. Depth 80+10K
IV. RATIO OF SIZE OF AREAS AS PER REGULATIONS (R) TO THOSE CONSIDERED SUFFICIENT (S)				
R at 4,000; 6.7	5.35	3.6	2.0	1.0
–				
S at 13,000; 7.1	5.32	4.2	2.9	1.97
V. PROBABILITY OF REACHING THE ENTIRE ENEMY BATTERY USING REDUCED AREAS CONSIDERED SUFFICIENT				
From 4,000 to 13,000 54.5% to 61%	62% to 68.3%	69.5% to 70.5%	83.6% to 92.5%	81 to 100%
VI. PROBABILITY OF COVERING AT LEAST 3 GUNS OF ENEMY BATTERY				
61% to 77.5%	65.5% to 80%	88% to 89.5%	94.5% to 100%	95% to 100%
VII. PERCENTAGE OF ENEMY GUNS EFFECTIVELY COVERED				
61.5% to 75.5%	65% to 78%	86.3% to 87.6%	92% to 98%	84.5% to 100%

TABLE II (To be used in executing counterbattery missions)

NUMERICAL DATA FOR USE IN GETTING THE EFFECTS DESCRIBED IN TABLE I

Range	Number of range probable errors in (80+10K)				Number of range settings required	Class A Number of rounds required and how fired*				Class B Number of rounds required and how fired*				Class C Number of rounds required and how fired*			
	75 mm.	105 mm.	155 how,	155 L17		75	105	155H	155L	75	105	155H	155L	75	105	155H	155H
4,000	6	5	5		Inclusive use two range settings, ¾ of a fork apart; a single range setting for more distant zones. For 75 m. and 105 mm. from 4,000 to 5,000 155 How. from 4,000 to 6,000 155 L'18 from 4,000 to 6,000 155 L'17 up to 11,000	288	192	144		288	192	144		192	168	96	
5,000	4.5	5	5			2-6	1-8	2-3		2-6	1-8	2-3		1-8	1-7	2-2	
6,000	3.5	4	4.5			288	240	144		288	240	144		240	168	96	
7,000	3.5	3.5	4			2-6	2-5	2-3		2-6	2-5	2-3		1-10	1-7	2-2	
8,000	3.5	4	4	6		360	288	144		288	288	144		240	192	144	
9,000	3.5	3.5	3.5	6		3-5	2-6	2-3		2-6	2-6	2-3		1-10	1-7	2-3	
10,000	3	3	3.5	5		360	336	216		288	288	144		240	240	144	
11,000	3	2.5	4	4.5		3-5	2-7	3-3		2-6	2-6	2-3	216	1-10	2-5	2-3	144
12,000		2		4		504	360	216	216	366	288	216	3-3	288	240	144	2-3
13,000				4		3-7	3-5	3-3	3-3	2-7	2-6	3-3	216	2-6	2-5	2-3	144
14,000				4		576	432	288	288	432	336	216	3-3	336	288	144	2-3
15,000				4		3-8	3-6	4-3	4-3	3-6	2-7	3-3	216	2-7	2-6	2-3	144
16,000				4		576	432	288	288	432	336	216	3-3	336	288	144	2-3
17,000				4		3-8	3-6	4-3	4-3	3-6	2-7	3-3	216	2-7	2-6	2-3	216
						720	576	288	288	504	360	216	3-3	384	288	216	3-3
						3-10	3-8	4-3	4-3	3-7	3-5	3-3	216	2-8	2-6	3-3	216
									360		504		3-3		384		3-3
									5-3		3-7		216		2-8		216
									360				3-3				3-3
									5-3				288				216
													4-3				3-3
													288				216
													4-3				3-3
													288				216
													4-3				3-3
													288				216
													4-3				3-3

* NOTE: The two numbers separated by a hyphen in columns under Classes A, B, and C have the following meaning: First figure indicates number of two-minute battalion concentrations to obtain neutralization of one enemy battery. Second figure indicates rate of fire in rounds per piece per minute.

of rounds required for neutralization at any range and the rate of fire to be used.

The author proposes regulations for counterbattery as follows:

> "The neutralization of artillery is obtained by means of successive battalion concentrations fired on each enemy battery. The same objective should be given, in general, to at least two battalions, preferably of different caliber. All concentrations should be of two minutes duration.
>
> "At short ranges with the 75 and 105, one concentration may be sufficient, in theory. But, if the ammunition supply permits, a second concentration should be fired, the 155 being used in order to vary the effect and to increase the probability of covering the target. The front to cover, the number of concentrations, and the method of fire—all of which vary with the range and the accuracy of adjustment—are given by Tables I and II which are provided for the use of the groupment, battalion, and battery commanders.
>
> "The enemy artillery situation, the exactness of target locations, and the accuracy of adjustments being known, the use of the tables permits a rapid estimate of the number of battalions needed for counterbattery, the ammunition required, and the probable degree of effectiveness of the concentrations fired.
>
> "The concentrations should be fired so as to cover as large a number of enemy batteries as possible within the shortest possible time."

The latest French official document on artillery is **"Artillery in Combat,"** which has only recently appeared. This document stresses the importance of counterbattery in battle and makes it a function of the corps under the direction of the corps artillery commander. Groupments comprising both light artillery and heavy guns are visualized. The author believes that such a grouping is faulty for the reason that changes of objective by the heavy types are much too long to permit their being shifted to new targets along with the lighter pieces. General Faugeron's plan of grouping only battalions with the same relative speed of shift seems preferable.

It is interesting to note that the new regulations call for the participation of the divisional artilleries in the neutralization of enemy batteries during the preparation. The great assistance which they can render in counterbattery is apparent from even a hasty examination of Table II.

September, 1928

Major Pot's article, **"The Light Howitzer in Foreign Armies,"** gives the characteristics of the various weapons of this class and shows the organization of the various divisional artilleries in which they are incorporated. See table of characteristics.

Major Pot gives the following data on artillery organization in foreign armies:

England: Divisional artillery: 3 battalions of 4 batteries each (3 guns and 1 howitzer).

Germany: The contemplated proportion in the divisional artillery is 1 howitzer battery to 2 gun batteries.

The corps artillery is also to contain the light howitzer.

Austria: The reinforced brigade comprises two regiments of infantry and one battalion of field artillery (1 battery of field or mountain guns, 1 of light howitzers, 1 of 10-cm. guns, and 1 of light trench mortars).

Belgium: Divisional artillery: 3 battalions of 75's and 1 battalion of light howitzers.

Spain: Divisional artillery: 1 heavy regiment of 2 battalions 155 H, 1 light regiment of 2 battalions of 75's and 1 battalion of light howitzers.

Greece: One type of weapon only, the 85-mm. Schneider gun-howitzer.

Holland: One regiment of 3 mixed battalions per division.

Italy: One regiment of 4 battalions (1 light howitzer) per division.

Japan: No light howitzers at present. A Schneider 105-mm. under test.

Poland: One light and one heavy regiment per division. The light regiment has 2 battalions of 75's and 1 of light howitzers.

Roumania: One brigade of one gun regiment and one light

TABLE OF CHARACTERISTICS OF LIGHT HOWITZERS IN VARIOUS ARMIES

Country	Calibre	Issued	Carriage	Weight of Projectile	Weight in Battery	Max. Range (meters)	Vertical Field of Fire	Horizontal Field of Fire
England	4.5 inch (114.3 mm)	1912	Box trail	16 kg.	1,370 kg.	6,300	–7° to +50°	6°
Germany	105 mm	1916	" "	14.81 to 16.4 kg.	1,380 kg.	9,500	–9° to +40°	6°
Austria	100 mm (Skoda)	1914	" "	16 kg.	1,430 kg.	8,000	–5° to +70°	7°
Belgium	105 mm (captured German matériel)	1916	" "	14.81 to 16.4 kg.	1,380 kg.	9,500	–9° to +40°	6°
Spain	105 mm (Vickers)	1922	" "	12 kg.	1,577 kg.	12,000	–5° to +37.5°	9°
U. S. A.	105 mm	On trial	" "	15 kg. (apx.)	1,500 kg.	10,900	–8° to +65°	6°
Greece	85 mm (Schneider) (gun-howitzer)	1927	Split trail	8.8 to 10 kg.	1,970 kg.	15,000	–6° to +65°	54°
Holland	120 mm (Krupp)	1909	Box trail	20 kg.	1,610 kg.	6,100	–4° to +43°	6°
Italy	100 mm (Skoda) (captured Austrian matériel)	1914	" "	16 kg.	1,430 kg.	8,000	–5° to +70°	7°
Poland	100 mm (Skoda) (captured Austrian matériel)	1914	" "	16 kg.	1,430 kg.	8,000	–5° to +70°	7°
	121.92 mm (Schneider) (captured Russian matériel)	1906-09	" "	22.8 kg.	1,280 kg.	8,000	–3° to +45°	4° 30′
	105 mm S N (captured German matériel)	1916	" "	14.8 to 16.4 kg.	1,380 kg	9,500	–9° to +40°	6°
	121.92 mm (Schneider)	1906-09	" "	22.8 kg.	1,280 kg.	8,000	–3° to +45°	4° 30′
Roumania	(Russian matériel)							
	105 mm (Schneider)	1910	" "	16.4 kg.	1,150 kg.	7,500	–3° to +43°	6°
Russia	121.92 mm (Schneider)	1906-09	" "	22.8 kg.	1,280 kg.	8,000	–3° to +45°	4° 30′
Sweden	105 mm (Krupp-Bofors)	1910	Box trail and revolving top carriage	14.5 kg.	1,070 kg.	6,200	–5° to +45°	10°
Turkey	120 mm (Krupp)	1909	Box trail	20 kg.	1,610 kg.	6,100	–4° to +43°	6°
	105 mm (Schneider)	1910	" "	16.4 kg.	1,150 kg.	7,500	–3° to +43°	6°
	100 mm (Skoda)	1914	" "	16 kg.	1,430 kg.	8,000	–5° to +70°	7°
	4.5 inch (Vickers) 114.3 mm (English)	1912	" "	16 kg.	1,370 kg.	6,300	–7° to +50°	6°
Czechoslovakia	100 mm (Skoda)	1914	" "	16 kg.	1,430 kg.	8,000	–5° to +70°	7°
Yugoslavia	120 mm (Schneider)	1907	" "	20.5 kg.	1,410 kg.	8,000	–3° to +43°	5°
	100 mm (Skoda)	1914	" "	16 kg.	1,430 kg.	8,000	–5° to +70°	7°

howitzer regiment per division. The howitzer regiment comprises 2 battalions of 2 batteries each.

Russia: Three battalions per division. Two battalions have 2 gun batteries and 1 howitzer battery; the other has 2 gun batteries and 2 howitzer batteries; all batteries have 3 pieces only.

Sweden: The divisional artillery comprises: 1 regiment of 3 battalions of 2 batteries of 4 guns and 1 howitzer battalion of 2 batteries.

Switzerland: Divisional artillery; 1 brigade of 2 regiments of 2 battalions of 3 batteries of 4 guns and 1 howitzer battalion of 2 batteries.

Turkey: Each of the 18 divisions comprises: 1 regiment of 2 battalions of 3 batteries of 4 guns and 1 battery of light howitzers.

Czecho-Slovakia: 3 mixed battalions (10-cm. howitzers and 8-cm. guns) per division.

Jugo-Slavia: Each division has 1 brigade of 2 regiments. 1 regiment comprises 3 battalions of 2 batteries (2 battalions of field guns and 1 of mountain guns). The other regiment comprises 2 battalions of 3 batteries (1 battalion light howitzers and 1 of field or mountain guns).

The use of light howitzers as divisional artillery is seen to be very general. Also the tendency seems to be towards the adoption of a caliber around 105 cm. This caliber meets the various requirements of mobility, range, and weight and power of ammunition. The ability of the light howitzer to fire from any position and the powerful assistance that it can render in close support of the infantry are two tremendous assets that are recognized by all.

Translator's Note: The French divisional artillery at the end of the war comprised 1 regiment of 75's and 1 battalion of 155's.

General Herr considers this insufficient and unbalanced. In his book "Artillery: Past, Present, and Future," he recommends 2 battalions of 75's, 2 battalions of light howitzers, 1 battalion of accompanying guns and 1 battalion of long range guns of the same caliber as the light howitzers. A reserve of light howitzers and field guns are made part of the organic corps artillery to provide reinforcing artillery for the divisions when necessary.

CURRENT FIELD ARTILLERY NOTES

Division Light Artillery To Remain Horse-Drawn

In order to inform the service as to the present attitude of the War Department toward the question of the use of horses in divisional light artillery, the following announcement is made by order of the Secretary of War:

> The War Department contemplates no departure at present from the principle that divisional light artillery is horse-drawn. Experimentation with other forms of traction for field artillery is being considered in the light of developing such for special uses and assignment.

Promotion of Graduates of R. O. T. C. in the O. R. C.

Heretofore graduates of senior units of the R. O. T. C. have been issued a certificate of capacity under the provisions of paragraph 6b (4), AR 140-21, which prescribes that R. O. T. C. graduates who have successfully completed the course of instruction within five years of date of application for certificate of capacity for promotion to First Lieutenant will be excused from all tests. The new regulations recently issued by the War Department state:

> "No promotion will be made upon a certificate of capacity issued because the holder thereof has graduated from the Reserve Officers' Training Corps unless the officer has earned 200 hours of credit, during the preceding five years, or credits at the rate of forty hours a year since original appointment if such period be less than five years."

Also, there is the further requirement that the reservist must attend at least one period of active duty training. Second Lieutenants are eligible for promotion after the expiration of three years' service and under the above new regulations they must have accumulated 120 hours' credit during that period. A fourteen-day period of active duty carries with it 98 hours of credit; therefore, assuming that the officer has attended one period of active duty, he must accomplish a minimum of 22 hours by some other means.

12,264 Officers of Regular Army in World War

A careful recheck by name of all commissioned officers who served in the Regular Army at any time between April 6, 1917, and December 31, 1918, including retired officers on active duty, was made by The Adjutant General's Office during the last fiscal

year. These statistics show that altogether 12,264 individuals served as commissioned officers in the Regular Army during the World War, of whom 6,448 served overseas. Of the latter number, 6,283 served in the American Expeditionary Forces in Europe at some time prior to December 31, 1918, and 165 in the American Forces in Siberia. Of the total World War strength of Regular Army commissioned officers, 3,349 were graduates of the United States Military Academy, of whom 1,633 served overseas. In addition to these figures, 95 graduates of the United States Military Academy, who resigned from the Regular Army prior to the World War, served as emergency officers, and one served as an enlisted man of the National Army during the World War. The whole number of graduates of the United States Military Academy in the Army during the World War was, therefore, 3,445. Three officers attained the rank of general; four the rank of lieutenant general; 112, major general; and 315 that of brigadier general; a total of 434 general officers, of whom 365 were graduates of the Military Academy and 69 were non-graduates; these figures, however, show the highest grade held, whether Regular Army or emergency.

75 Per Cent of Federally Recognized National Guard Officers Are Members of Officers' Reserve Corps.

With reference to that portion of Section 38, National Defense Act, providing for the appointment of National Guard officers as Reserve officers for the period during which their Federal recognition shall continue, a recent examination of the records of the Militia Bureau showed that on June 30, 1923, 3,680 National Guard officers, or about 38 per cent of those who were federally recognized, hold appointments in the Officers' Reserve Corps. This figure has increased at an approximate rate of 7 per cent a year, and on June 30, 1928, 9,154, or about 75 per cent of a total of 12,244 recognized officers, had been so appointed. Further progress has been made since June 30, and nearly one-half of all the States of the United States now have more than 75 per cent of their National Guard officers appointed in the Officers' Reserve Corps.

In addition, the records also show 669 warrant officers and enlisted men of the National Guard now hold appointments in the Officers' Reserve Corps, which is a very marked increase over former years. Nearly all of these officers are in the grade of second lieutenant and the largest number are in the Infantry branch,

though there is a representation in nearly every branch. These officers are also quite well distributed throughout the country, as only a very small number of the States do not have some of these officers in the ranks of their National Guard forces. They are appointed under the provisions of paragraph 8 *b,* Army Regulations 140-10, and it is contemplated that they will be available for assignment to the National Guard in case of an emergency requiring an expansion to war strength.

The policy of permitting National Guard officers to hold commissions in the Officers' Reserve Corps in addition to their National Guard commissions was incorporated in the National Defense Act in order to simplify their call to active duty in time of an emergency and to permit of elasticity of assignment to organizations and duty.

Reappointment in the Reserve

The following warning published by the 79th Division (Philadelphia) should be of interest to all Reserve Corps officers:

> "Recent experience of two of our most active officers, one of whom was almost dropped and the other actually dropped from the Reserve because of failure to accept reappointment in the Reserve within the specified time limit, should serve as a warning. Both of these officers went abroad and, because of misunderstanding on the part of others who should have, but did not, forward all their mail to them, their notices of reappointment were not received and in consequence were not accepted within the proper time. One case required a direct personal appeal to the War Department in Washington. Both Division Headquarters and Corps Area Headquarters found themselves unable to help in this matter. Every officer should know the date of the expiration of his commission, which is, of course, five years after date of his appointment. Usually the reappointment is sent to him for acceptance about a month prior to the termination of his previous appointment, and, if the reappointment is not accepted before the final expiration of his first appointment, he is automatically dropped from the Reserve and cannot under the letter of the law be reappointed unless he takes a written examination for appointment, and even then he may be met with the statement, as was the case with one of our officers above referred to, that there is no vacancy for him in the grade he previously held and that if he

desires a new commission in the Reserve he would have to accept one in a lower grade. Such action is obviously not pleasant, and it behooves each officer, if he intends to be absent from his home for any considerable length of time, either to make sure that his commission is not going to expire during his absence or to make doubly certain that his military mail, as well as his other mail, are duly forwarded to him so that he will receive notice of his reappointment and will be able to execute his acceptance and oath of office within the proper time."

Enlistment of Boy Scouts in the National Guard

The Secretary of War recently received a letter from James E. West, Chief Scout Executive of the Boy Scouts of America, in which he stated that reports from some State Scout Executives indicate that some units of the National Guard are enlisting and urging boys as young as thirteen to enlist and to give false date of birth.

In reply, the Secretary of War called attention to the fact that the state authorities are responsible for the enlistment of members of National Guard units of the respective states, but that any violation of National Guard Regulations governing such enlistments might subject the offending state to withdrawal of Federal aid and recognition. He further suggested that the names of the officers alleged to have violated enlistment regulations be secured and submitted, and promised that a thorough investigation would be made of the specific cases reported.

It is not believed in the War Department that any widespread violation of the minimum age limit for recruits exists. Such a practice is unnecessary in view of the fact that no shortage of available personnel exists in any state. In fact, all states are desirous of securing an increase in the authorized allotment of strength, indicating that sufficient personnel is available all the time to care for expansion, without the obvious undesirable resort to enlistment of young men under the age of eighteen.

The Boy Scouts of America is an organization which has a distinct place in the lives of boys, and National Guard officials lend every aid to its development. But the National Guard has a mission entirely different from the Boy Scouts, and their activities can never overlap. For that reason alone there should never be a dual relationship of personnel. Without disparagement of the Boy

Scouts, no National Guard officer should do anything to warrant having his organization dubbed "Boy Scouts."

Army Transport Service Pays Its Way

During the fiscal year 1928, the Army Transport Service transported 48,568 passengers, 179,919 cubic tons of cargo, 680,264 pounds of mail and 510 animals at a total cost of $4,144,173.74. Had the same service been rendered by commercial transportation the cost to the Government would have been $6,753,610.46.

During the year six passenger transports, the *U. S. Grant, Thomas, Cambrai, Chateau Thierry, Somme* and *St. Mihiel,* and two freight boats, the *U. S. Meigs* and *Kenowis,* were in operation on a regular schedule of sailings from San Francisco to Honolulu, Guam and Manila; San Francisco to Honolulu; San Francisco to New York; New York to San Francisco; and New York to Porto Rico and the Panama Canal Zone.

Regulations To Prescribe Precedence for Military Personnel Entering and Leaving Automobiles

Conforming in principle to Naval Regulations which prescribe precedence on boarding and leaving vessels, Army Regulations soon to be issued will prescribe precedence for military personnel entering and leaving automobiles as follows:

> "Upon official occasions, unless otherwise directed by the senior officer present, officers will enter a conveyance, automobile, or small boat in the inverse order of rank, the right rear seat being reserved for the senior, and will leave the conveyance in the order of rank. The advantage of having a senior leave the conveyance first permits him to immediately acknowledge the salute of his escort or his host."

Army Housing Program

Twenty-five thousand of the 40,000 enlisted men of the Army, who, as late as 1925, were still quartered in wooden cantonments of wartime construction, will be installed in permanent barracks as soon as the construction now under way, authorized, or for which money has already been appropriated, is completed. Since the beginning of the Army Housing Program in March, 1926, Congress has appropriated $21,000,000 for this work, in addition to which the Secretary of War has been authorized by Congress to enter into

contract authorizations for almost $5,000,000. The money now authorized and appropriated and included in the 1927, 1928, and 1929 programs will provide housing for the following Army personnel:

Officers	1,190
Non-commissioned officers	1,355
Enlisted men	25,415
Patients in hospital	1,897
Nurses	311

By provisions of the Act of Congress approved March 12, 1926, the Secretary of War was authorized to dispose of 43 military reservations or parts thereof. This Act provides for the use of the proceeds of sales of surplus War Department property for permanent housing construction in such amounts as may be authorized by law, from time to time, by Congress. The office of The Quartermaster General estimates that the total receipts to be derived from the sale of these surplus properties will amount to about $24,821,367, the sales to be consummated by 1933.

All projects included in the 1927 program, the cost of which is to be $7,020,000, have been contracted for and are either completed or in the course of construction. All projects of the 1928 program involving an expenditure of $5,277,000 are now under contract or being advertised. Most of the 1929 program projects are either under contract or being advertised, while the remainder will be contracted for before work starts under the 1930 program. The money appropriated for the 1929 program totals $6,469,000.

Besides the Housing Program, the Quartermaster General has under consideration 49 miscellaneous construction projects to cost over $16,000,000, for which money is already available. Approximately half of this latter amount, or $8,184,342, goes to the Air Corps for new construction under the provisions of the Five-Year Program. The new Air Corps Training Center at Randolph Field, San Antonio, Texas, gets the greater part of this appropriation of $5,605,600. Another appropriation of interest is that of $400,000 for the grading of the new Air Corps field at Albrook, Canal Zone.

The building of monuments and the restoration of historic forts and buildings occupy a prominent place in the list of construction. Among the notable ones are:

Restoration of the Lee Mansion, Arlington National Cemetery	$10,000.00
Tomb of the Unknown Soldier	2,500.00
Kill Devil Hill, Kitty Hawk, North Carolina	25,000.00
Restoration of Fort McHenry, Maryland	110,200.23
Repair Roof of Arlington Amphitheatre	10,000.00

Construction work for The Field Artillery included in the Housing Program and Miscellaneous Projects is as follows:

1927 HOUSING PROGRAM

Post	*Appropriation*	*Type of Building*	*Capacity*
Ft. Bragg, N. C.	$360,000	1 F. A. Bn. bks	456 men
Ft. Lewis, Wash	800,000	F. A. barracks	1,111 men
1928 HOUSING PROGRAM			
Ft. Bragg, N. C.	310,000	2 F. A. Bn. barracks	912 men
Ft. Sill, Okla	72,000	7 Co. Offs. quarters	7 families
1929 HOUSING PROGRAM			
Ft. Bragg, N. C.	262,000	1 F. A. Regtl. Hqrs. bks.	149 men
		1 F. A. Bn. barracks	432 men
MISCELLANEOUS PROJECTS			
Ft. Benj. Harrison, Ind.	375,000	Barracks	521 men
Ft. Sill, Okla.	30,000	Hospital ward	

Member of Army Central Polo Committee Designated

The Secretary of War has designated Major Ernest J. Dawley, Field Artillery, as a member of the Army Central Polo Committee vice Lieutenant Colonel E. H. De Armond, who was relieved, because of a change of station to the Hawaiian Department.

This committee has supervision of polo activities throughout the Army.

Army Adopts Rayon Hat Cord

After a successful extended service test by the 29th Infantry, the 2nd Cavalry and the 16th Field Artillery, a rayon hat cord, for use with the service hat, has been adopted and approved as standard by the War Department.

The rayon hat cord costs less than the present type, which is made of a mixture of cotton and mohair. In addition, when dyed with fast dye, it retains its luster and color for a much greater length of time.

Reserve Regiments To Receive Training Through the Conduct of Citizen Military Training Camps

The Secretary of War has directed the extension to all Corps Areas of a system of training of Organized Reserve regiments through participation in the conduct of Citizens' Military Training Camps. Such a system was put in effect last summer with the 349th Infantry, Organized Reserves, with headquarters at Cedar

Rapids, Iowa, and the 350th Infantry, Organized Reserves, with headquarters at Corning, Iowa. Those regiments assumed the conduct, during successive periods of 15 days, of the C. M. T. C. at Fort Des Moines, Iowa.

All Corps Area Commanders have been instructed to organize similar camps in their corps areas in so far as they consider the plan practicable in cases where Reserve regiments are available for the purpose.

The commanding officers of such Reserve regiments will draw the schedule for the camp with the cooperation and advice of the commanding officer of the station at which the camp is to be located. The permanent personnel of the station will be used in the preparation of the camp and the installation of supply arrangements. However, Reserve officers will be used in supply and mess capacities so far as deemed practicable by corps area commanders.

The training objectives of the Citizens' Military Training Camps will remain unchanged, except that Reserve officers will be utilized in the capacities formerly occupied by C. M. T. C. candidates of the fourth year course. Instruction will be given in the afternoons to officers of the Reserve regiments in those subjects which are not included in the schedule of the C. M. T. C.

In order that these camps may be successful, Corps Area commanders are directed to inform immediately the regiment designated to conduct the camps, so that their personnel may be properly prepared in advance to carry on the intensive instruction required in Citizens' Military Training Camps. The work of special preparation for the conduct of the camps will probably be in addition to that of normal conference and correspondence courses for Reserve officers.

Corps area commanders are instructed to follow personally the conduct of these camps. At the termination thereof a special report will be submitted as to the value of this training, both to the Organized Reserves and to the personnel of the Citizens' Military Training Camps.

The War Department hopes that the C. M. T. C. will prove a suitable agency for the practical instruction of Reserve officers in the actual command and handling of troops. In the past, such practical instruction has been commensurate with limitations in the strength of available troops.

THE R. O. T. C. AT STANFORD UNIVERSITY

BY "STANFORD"

IN THE fall of 1916, the late Colonel Jens Bugge established an Infantry R. O. T. C. unit at Stanford University, California, which soon became very popular due to the ability, enthusiasm and personality of that officer, and to the impetus which the war gave to military training throughout the country. At that time an Infantry battalion of 340 students was formed and was patriotically supported until the United States entered the war. Of the 687 students who had served in the Stanford battalion up to April, 1917, 143 served as commissioned officers, 257 had enlisted service, 7 served in the Navy, 7 in the Marine Corps, 2 in the British service, and 202 had no war service, principally because of being under age.

Shortly after the Field Artillery unit was started in the fall of 1919, the Infantry unit, which had been reorganized immediately after the war, was discontinued, it then being deemed best to concentrate on the training of reserve Field Artillery officers, for which Stanford, on account of the ideal climatic conditions and the available extensive and varied terrain, is probably better fitted than any other university in the country. It may be of interest to state that during the last academic year daily out-of-door instruction was interfered with only three times by inclement weather.

The pioneer Field Artilleryman at Stanford, Major Leroy P. Collins, very soon overcame most of the obstacles that are generally found in the way of such new enterprises. He and his successor, Major W. D. Geary, slowly but surely built up a lasting foundation for mutual understanding and good-will with the university authorities and the people of the community, and placed the unit on a firm footing for future expansion and development. The growth of the unit, under Major Collins, was most satisfactory, especially when one recalls the antagonism to military training which existed at that time. That sentiment was one of the real difficulties that the Regular Army officer had to combat in the years immediately following the war.

Under Major W. D. Geary, who followed Major Collins at Stanford, the unit continued to flourish, and during his tour of duty here he had the satisfaction of seeing the enrollment of the unit increase to three times that of 1923.

The physical plant of the R. O. T. C. is adequate and very satisfactory. The headquarters and the exceptionally well-equipped ordnance laboratory occupy one of the spacious stone buildings in the Engineering School section. The gun park and stables are in the immediate vicinity of the 10-acre drill field and the two polo fields. The stables and gun sheds are temporary structures of the type usually found in temperate climates. In the same area are extremely comfortable quarters for the enlisted personnel, supply rooms, saddle rooms, forage sheds and all other buildings pertaining to the artillery unit. The picket lines, corrals and riding pens are well constructed and meet every requirement. In the summer months ample and suitable pasturage with water is available for the seventy public animals on the Stanford farm immediately adjoining the campus. The campus contains about 1,500 acres and the farm surrounding it slightly more than 7,000 acres.

The R. O. T. C. has long since become a popular and well-established part of the university life. However, there is no more apparent enthusiasm for military training than for any other course in the university. The students look upon R. O. T. C. instruction as a matter of course, and take the military work in their university stride, so to speak. As elsewhere the students are keenly interested in polo and equitation in general, and the facilities for this sort of training are almost perfect at Stanford. The terrain is admirably suited for cross-country riding, and the permanent installations of the Northern California Horse Show Association on the campus, in addition to the other facilities already mentioned, are at the disposal of the unit. The annual R. O. T. C. horse show, which is staged in May, is one of the principal events of the spring quarter. The entrants go into the competition with the keenest enthusiasm and put in a lot of hard work and extra time in preparing themselves and their mounts for the various events. The university and surrounding country turn out in large numbers to witness the show, which is always worth seeing.

In the annual Military Ball, sponsored by the military student

fraternity "Scabbard and Blade," the R. O. T. C. contributes its full share toward the outstanding social events of the university year.

An Ordnance unit was established at Stanford, by Major Frank J. Atwood, Ordnance, in the fall of 1925, and has been most successful. This course is open only to students in the School of Engineering, and such students are required to take the basic Artillery course for six quarters and then take the specialized Ordnance work as advanced students. This unit thus places the technically trained students in the branch for which they are well fitted and also makes it possible for many of them to obtain a commission that they could not get otherwise, as many of these engineering students cannot spare the time for the Field Artillery practical drill each week and would otherwise have to drop the work at the end of the basic course.

In the spring of 1927, during Major Geary's regime, the R. O. T. C. was made one of the departments of the School of Engineering. This has proven a very wise move and has materially strengthened the position of the Military Department in the university organization. The Dean of the School of Engineering is Lieutenant Colonel Theodore Hoover, Ordnance Reserves, who is a very warm and most valuable supporter of the Stanford R. O. T. C.

The university gives the student every incentive to enroll in the R. O. T. C., as is shown by the fact that just as much credit is given for work in the military courses as in any other department. In order to graduate at Stanford—B. A. degree—a student must earn one hundred and eighty units in academic courses and six in physical education during his twelve quarters in the university. If he satisfactorily carries out the full schedule of military requirements in both practical and theoretical courses, he is credited with thirty-five units of academic and all of the units required in physical education work. In addition, if a student desires to major in military science and undertakes additional military courses, he is given such additional credit, within limits, of course, as the Military Department may recommend.

The Field Artillery unit at Stanford is divided into five batteries, and each battery has one day set aside for all of its practical work.

The following outline gives, it is believed, a very good idea of just what is required of the student in the Field Artillery unit during his university career.

During three of the six quarters of the basic course the student takes one two-hour per week classroom or theoretical course in Gunnery, Topography and Communications, and Care of Animals. During each of the six quarters of the advanced course the student takes one three-hour per week theoretical course in Advanced Gunnery I, Advanced Gunnery II, Tactical Employment of Artillery Details, Tactical Employment of Field Artillery, Military History, and Military Law and Administration. For such courses he receives one unit per hour credit toward the 180 units required for graduation. He has thus taken 24 units of theoretical work with the Military Department.

During each quarter of his four undergraduate years he devotes one three-hour afternoon period to outdoor practical drill, the first six being credited toward the six units of either physical or military training required of all students, the remainder toward his degree. An understanding of the work offered can perhaps best be obtained by following the schedule for the autumn quarter. At 1.30 p. m., the battery drilling on that particular day is fallen in, the roll called, and the students are then subdivided for the period from 1.30 to 3.00 p. m., the advanced course students receive instruction in training remounts, the sophomores in topography, and the freshmen in basic equitation. From 3.00 p. m. to 4.30 p. m., the advanced course and the freshmen drill together in dismounted drill, the posts of cannoneers, carriages limbered and unlimbered, unlimbering and limbering by hand, preparation for action, and drill of the firing battery, while the sophomores receive instruction in equitation.

During the winter quarter from 1.30 to 3.30 p. m., the freshmen receive gunner's instruction and equitation (one hour each); the sophomores harnessing, driving and mounted drill; and the advanced course mounted reconnaissance and detail work. From 3.30 to 4.30 p. m., all classes drill together in the various formations of the battery dismounted.

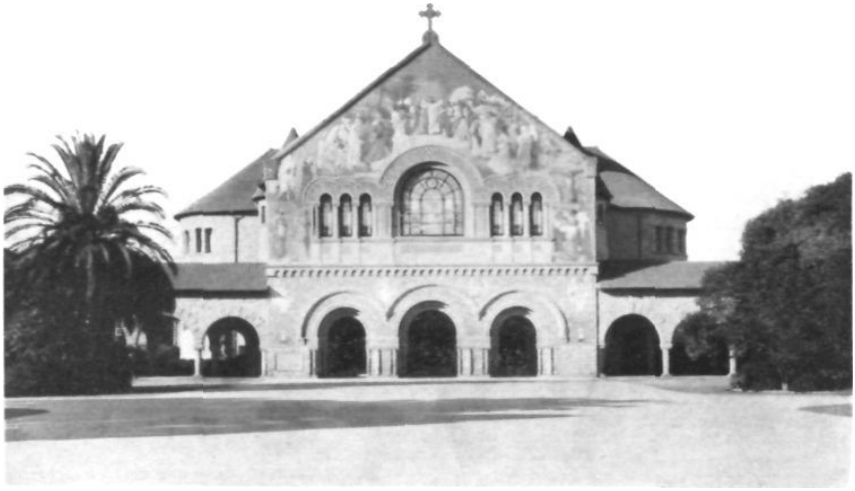
During the first five weeks of the spring quarter, from 1.30 to 3.00 p. m., the freshmen receive instruction in instruments, elementary computation of firing data, and are refreshed on the drill

of the firing battery. The sophomores continue with driving and draft, and are drilled in the maneuver of the battery mounted by the advanced course students. From 3.00 to 4.30 p. m., the freshmen are instructed in equitation, the sophomores refreshed on instruments and gun drill, while the advanced course students conduct fire on the smoke puff range. During the last five weeks of the spring quarter the entire battery spends the full three-hour period in mounted drill, occupation of position and simulated firing problems. Advanced course men going to camp are relieved at 3.00 p. m., and come in for smoke puff conduct of fire.

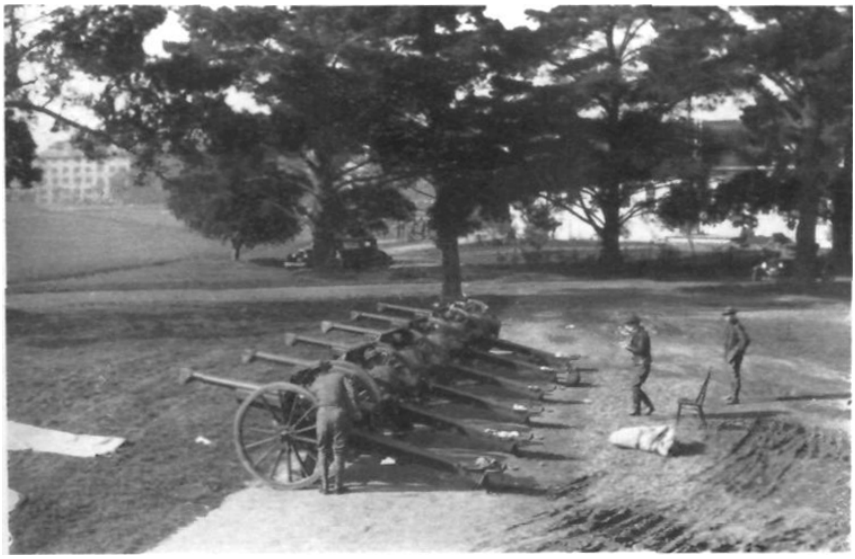
This program has been worked out over a number of years. It has as its aim the preparation of our graduates in all departments of the normal duties of a battery officer and the preparation of our juniors for summer camp, and is so arranged as to give every man some mounted work each week. It has worked out well, is varied and interesting to the students, and makes the maximum use of the facilities at our disposal. It is, however, true that the schedule is best adapted to a mounted unit of about 400 students. Inasmuch as the freshmen registration at Stanford is limited to 350 per year, an initial enrollment of from 125 to 150 freshmen per year serves to keep this unit at approximately this strength.

The R. O. T. C. draws its members from the very best type of university students, and the high caliber of personnel is shown by the splendid spirit that characterizes the Stanford batteries and Ordnance unit both during the college year and at the annual summer camps.

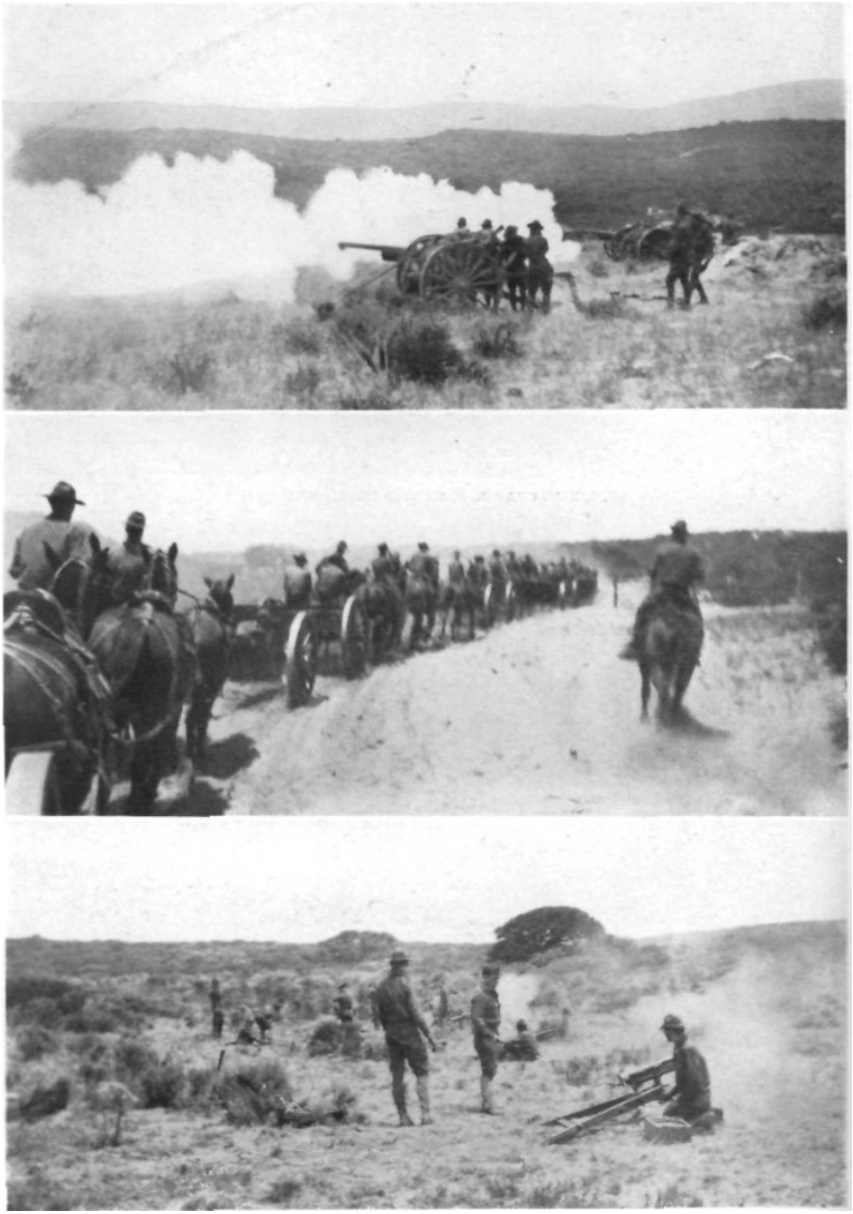
Military training here is, and always has been, strictly voluntary, and Stanford, therefore, points with satisfaction to the fact that out of a total enrollment of approximately four hundred, one hundred and twenty are advanced students. However, without the splendid cooperation and support of the President of the University, Doctor Ray Lyman Wilbur, who takes a very sane attitude toward military training, the continued success of the Stanford R. O. T. C. would have been impossible.



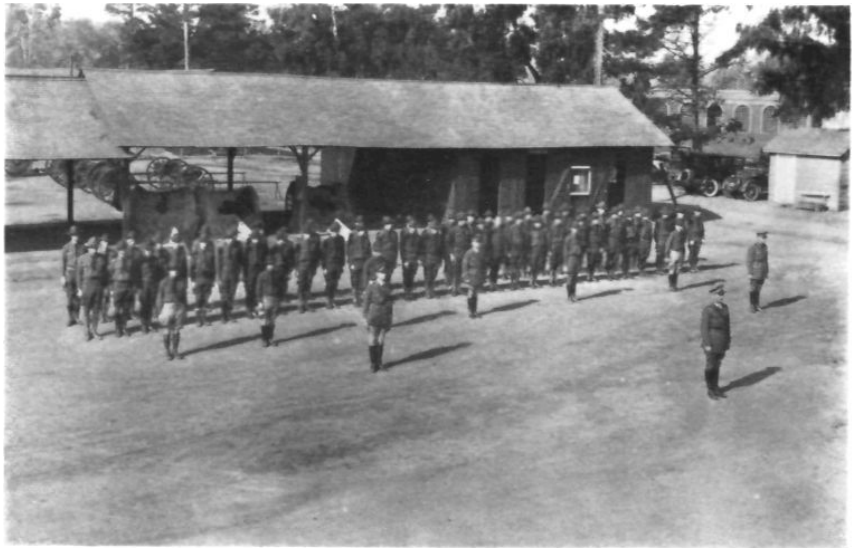
MEMORIAL CHAPEL, STANFORD UNIVERSITY



GUNNERS' INSTRUCTION



AT GIGLING—THE RANGE NEAR MONTEREY, CALIFORNIA

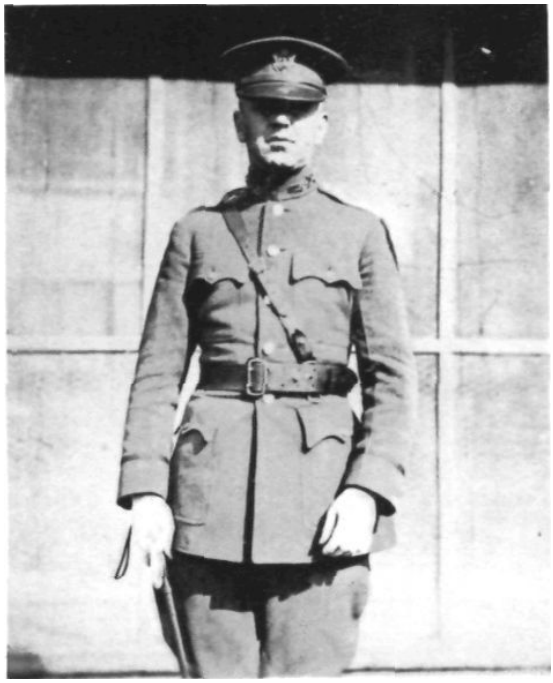


THE MONDAY BATTERY

GENERAL SUMMERALL AT STANFORD

WILLIAM H. RUCKER D.S.M.

Major of Field Artillery, U. S. Army. Born January 23, 1883,
Died November 9, 1928



The passing of this colorful character leaves a void in the ranks of gentlemen and soldiers. And when those under whom he served, or his contemporaries, or those who served under him are gathered together in reminiscence of past army days, it is inevitable that incidents and anecdotes will be recalled and recounted, keeping green his joyous and respected memory, attestations of his gentleness, character and rugged force. Reared in the army, the son of a distinguished officer, his own army service saw him earn his way through the enlisted grades from Private to First Sergeant, through the commissioned grades from Second Lieutenant to Colonel, and to the command, with distinction, of two different regiments of Field Artillery in combat.

Soldier, sportsman, and gentleman, his ideal was the "thoroughbred" in man, beast, or attribute. This ideal indelibly marked his life and contacts as only it could do.

Ever enjoying the confidence of his superiors, loved and esteemed alike by all with or under him, such was his life, and so happily combined in him were the sterling qualities of sympathy, force and integrity, that it may be well said of him

"WHEN HE WAS MADE THE DIE WAS BROKEN."

POLO

AT STANFORD UNIVERSITY

PLAYERS, LEFT TO RIGHT: WEYMOUTH, THOMPSON, POST, McDOUGALL, CONNOLLY

STANFORD has held a most enviable position in Western collegiate polo since the original establishment of the mounted unit, and games are played practically every year with the University of Arizona, Oregon Agricultural College, New Mexico Military Institute, the Presidio of San Francisco, Oakland. Burlingame and other prominent Coast teams. The number of polo players is limited only by the number that can be mounted. On last year's team were Chauncey Thompson (Captain), E. H, Post (this year's Captain), and J. A. MacDougall, who are generally considered three of the very best young polo players in the West. Thompson was developed at Stanford, and Post and MacDougall are products of New Mexico Military Institute, which has sent Stanford many promising young players. It is the ambition of the Stanford polo enthusiasts to send a team East to play the leading Eastern college teams. Next year, perhaps, this dream may materialize.

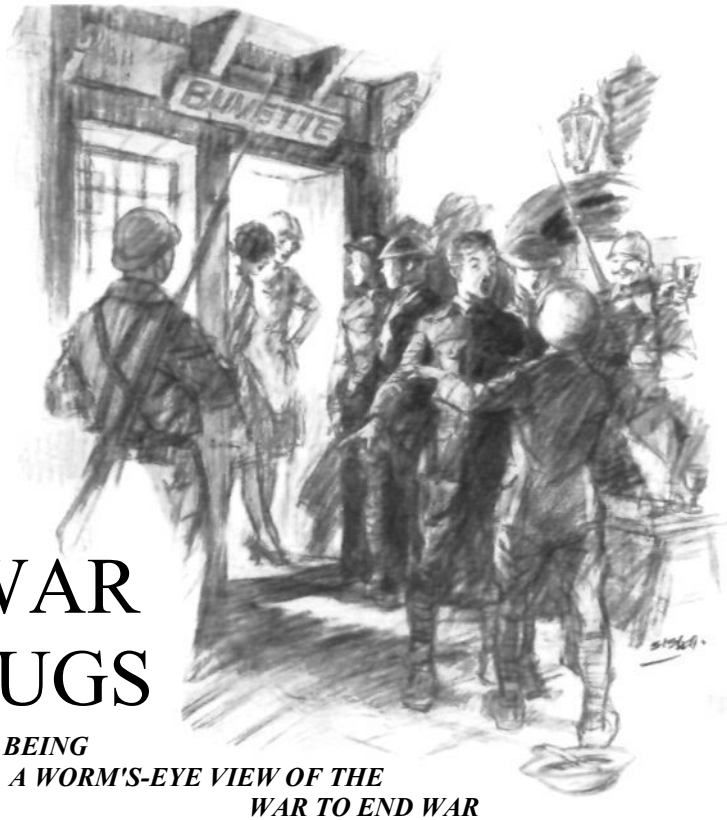
THE POLO FIELD AT STANFORD

BRITISH ARMY POLO TEAM INVITED TO VISIT UNITED STATES IN 1929

In an endeavor to continue the custom of playing periodically a British-American Military Polo Tournament, the Secretary of War, Honorable Dwight F. Davis, has directed that the following cablegram be sent to the Military Attaché, American Embassy, London, England:

> "Please convey to the proper British military authorities the sincere hope of the War Department that a British Army team will be permitted to visit the United States in 1929 for a series of matches with an American Army polo team in accordance with the forthcoming invitation of the United States Polo Association to the Chairman, the Hurlingham Club Polo Committee. The Secretary of War feels that the resumption of these matches will again bring the two military Services together on a basis of good sportsmanship and mutual understanding beneficial to both. The British Army team will be most welcome."

The British-American International Military Polo Tournaments were inaugurated in 1923 by General John J. Pershing, then Chief of Staff. In that year the British Army team came to the United States for a series of games which was won by the United States Army team. In 1925 the American Army team visited England and again won the military championship. No games have been played since 1925.



WAR BUGS

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

BY

CHARLES MACARTHUR

Formerly Private, Second Class
Battery F, 149th Field Artillery
42nd (Rainbow Division), AEF

BY COURTESY OF
LIBERTY MAGAZINE
PICTURES BY
RAYMOND SISLEY
Formerly of Battery C, 149th F.A., AEF

IN MY OWN defense, I would like to explain that a long while ago I wrote a book called A Bug's-Eye View of the War.

I didn't write it on purpose. We were on the Rhine. The captain was nabbing me for extra detail every time I turned around. I got sick of it, and when the fellow saviors of my country elected me as historian of their heroic deeds. I jumped at the chance. After all, life is short and one gets fed up grooming eight mules a day.

I forgot that the book might fall into the hands of our wives and sweeties and went the whole hog, at first. Nothing was soft-pedaled; nothing left out. At last the proof sheets were ready. In a spirit of good, clean fun. I sent them to the colonel for his approval.

He let out a yell that could be heard as far as the Lithuanian cemetery, and began jumping up and down on my stomach. It was too bolshevik, he thought; too disrespectful, too disorderly, too everything.

I have a weakness for the colonel—he was a swell soldier—so I lopped ten good pages out of the manuscript.

The captain came next—He seemed to feel that I had pounded a little on the subject of wine and women. I toned *that* down. And after corresponding interviews with the major, the Y. M. C. A., the Red Cross, and several ministers of the gospel, the record got to be something like The Rover Boys in the White Mountains.

It was privately published and achieved a circulation of nearly 400 copies, all subscribed for. The men were sore as goats. They felt the revised version made them look like little ladies and gentlemen, whereas in the history of the entire world there was never such a husky horde of heroes. Although most of them were college men, it wasn't their fault, and they met the disadvantage by growing whiskers, spitting through their teeth, and remaining in the ranks until the end of the war.

They played dirty in and out of action, and ate up the war.

With half a chance, the Rainbow Division could have busted through Berlin in 1917 and eaten Armistice Day dinner in China—the eastern part of China. That's why the Allies put up all those barbed-wire entanglements—to keep them back. Ask the Germans. Ask anybody. Ask *us*.

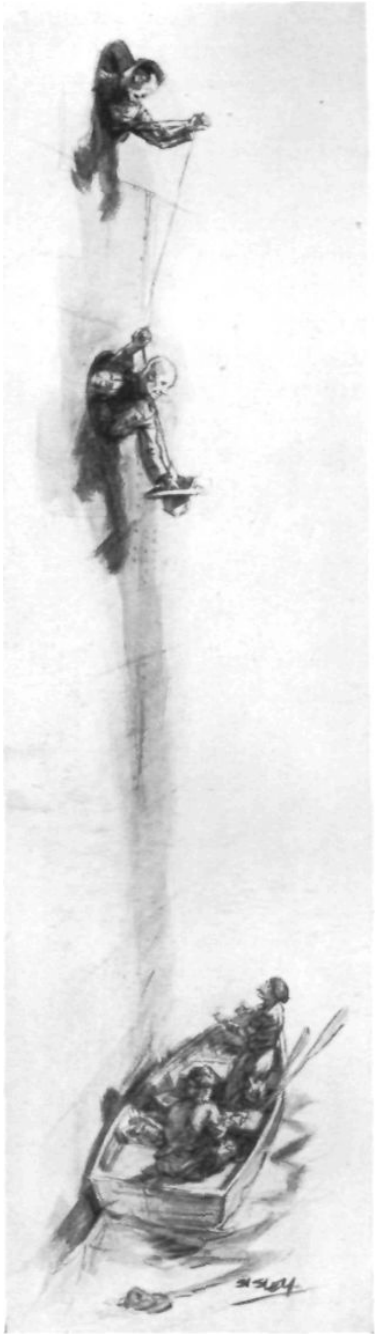
Those Germans had pet names for us beside which Devil Dog sounds like Sissy. The most conservative was Cholera. Incidentally, the Marines made up the name Devil Dogs themselves.

If a simple record of what we did will demonstrate Who Won the War, here it is. Here goes. One side or a leg off—

PART ONE

We reached France just like ordinary soldiers, packed in the coal bunkers of the President Lincoln so tight that you couldn't talk without biting off somebody's ear, and a man had to be a contortionist to make a pass at craps. We slept in four layers, like a birthday cake. Every time the ship rolled, the entire battery did a trapeze act.

We had been recruited during the summer from Chicago and



the University of Illinois, christened the 149th Field Artillery, and added to the Rainbow Division. The entire division sailed in one convoy in October, 1917. Somewhere in midocean the President Grant, bearing the Alabama regiment of infantry, turned home again. The wigwag rumors were to the effect that the boys had chucked a couple of officers overboard. The disappointing explanation later on was Engine Trouble.

The trip occupied thirteen days—rather uneventful days, although Captain Bruce Benedict did his best to make them exciting. Every day and night he predicted a submarine attack for the following ten minutes; and as we were in the direct center of the ship, below the water line, he assumed we were it for tag. With real concern he directed our course. The Strong were to rescue the Weak. We were to wear our woolen mittens as a means of coping with the cold, wet ocean. We were to draw our pistols as we went over the side and shoot the submarine crew. We were to be brave.

Following this excellent advice, Captain Johnson of Supply Company addressed his men, who lived in the same coal bunker. Captain Johnson announced that everything Captain Benedict had said applied to Supply Company

except: that he wanted no sissies in his outfit, and if there were any weak guys who couldn't save themselves, good-by and good luck.

Furthermore, if he caught any of his men coming out on deck with mittens, he would drown them himself. As for shooting the submarine crew, Supply Company could use its judgment. Fists, in Captain Johnson's opinion, were better. Captain Johnson's brave words usually came to an end at this point, due to the frequent dislodgment of his false teeth, which were often found a good thirty-five feet from his position on the companionway. Of course, they were seldom returned, as without them Captain Johnson was powerless to issue orders or deliver reprimands. By freezing on to them, Supply Company often got a day's vacation.

All of us were very fond of Captain Johnson. He was so damned fierce and soldierly.

We reached St. Nazaire October 31, with only two men under

arrest. They had been caught fishing through the ventilating funnels in the cook's galley with a rope and a bent nail. With this primitive instrument a large sausage vat could be completely emptied before the cooks called out the guard.

Five days after the ship had docked, we were still under quarantine on board, lowering dollar bills in campaign hats in exchange for apples and bars of chocolate, watching the accompanying destroyers slide into the locks of the Loire, and wigwagging to the sailors on shore for definite information as to whether champagne was really ninety-five cents a quart. Interest was continually excited by the countless women in black, the long gray green caterpillars of German prisoners on their way to work, and the red legged French territorials who escorted them.

After the first day in port, dock details gave ambitious members of the battery a chance to say they had touched foot to French soil first—as if there was a chance that the boat would turn back to the States without allowing them to land.

At last debarkation orders came down. The regiment marched off the boat. We cheered the sailors. The sailors cheered us. Commander Sterling of the Lincoln made a speech. Little Sylvester, the band leader, blew out his chest and started up *Sambre et Meuse*. The band had been practicing it every day since we mobilized, in anticipation of this great moment.

Unaccustomed to hiking after a *bon voyage* on the ocean wave, our first thoughts were of beds and beans.

We got the beans, but Battery D found the straw pile first, and that led to a tired cat-and-dog fight. We won, and retired in a variety of straw chowder at 6 p. m. For the first and last time in the history of the organization, passes to town were turned down. This despite early soap-bubble stories of cognac, wild women, and pretty scenery.

Early the next morning some bright baby with stars on his shoulders and mush in his head—a wife-beater in his heart—ordered us to march on a reservoir five miles from camp with picks, shovels, water wings, and boots. There the axiom that "you'll never get rich, you so-and-so," was richly rubbed in.

Heroes? In a pig's eye! We dug like dagos at that grand cañon among reservoirs for three days, with a lot of Regular Army officers yapping at us to dig faster. The reservoir had been started

by the first contingent of Marines—gold-bricks who later swelled around in Paris, pinching honest privates; and our completion of the task led to the supposition that again the National Guard was being called upon to finish something the Marines began.

Spare time at this garden spot was filled with hard-tack, corned willie, drills, details, and lectures on the Perils of Pleasure by Eminent Y. M. C. A. Workers. It wasn't until November 11 that we got a break and were ordered to the training camp.

This was Coetquidan in Brittany—the most godawful blight in all geography. Getting there was pleasant enough. The magic lantern railroad trains with their *"Hommes 40, Chevaux 8,"* were new then, and strange. Every silly toot and squeal of the engine was imitated vocally down the line of cars. As long as daylight held out, we poked our heads through each other's shins, and every farmer and crossing guard got a yell and a *"Veev la France!"*

Such girls as we rattled past (provided they were from six to sixty) were treated to endearments that varied with individual enthusiasts. Cush Pryor, our most effective Romeo, was hoarse in an hour and had to revert to sign language. Windmills, canals, and chateaux were loudly pointed out as windmills, canals, and chat-oos by the better informed.

The next day we hit Coetquidan, a pile of tar-paper sheds floating in a mud puddle. We were given a set of shacks lately inhabited by German prisoners, and put to work cleaning them out. They were lousy, wet and cold. For three days we struggled, digging up the dirt floors and spraying them with disinfectant, whitewashing and spraying the walls, paper windows, and paper ceilings, and fumigating the results.

Since vermin habitually dropped from the ceiling, we had our heads shaved; which inspired some of the boys to leave scalp locks and fancy designs. Until they were seized and forcibly barbered, Buck Somers and Red Lawrence wrought emotional havoc among the native women by palming themselves off as Red Indians. Every woman in Brittany seemed consumed with a movie fostered passion for Heap Big Chiefs at the moment, and Buck and Red maintained an unbeatable edge for a week.

A few days later we had our first mail. Concerning this event all the hooplas of stage and screen and story are true. We went wild. Our feelings weren't at all affected by the assurances of our

friends and relatives—all of them right on the Inside—to the effect that the Rainbow Division would spend the winter right on Long Island, that the war was virtually over, and that we would never see France, etc. These bright hunches had been addressed to Camp Mills and forwarded on.

In November, 1917, Rennes—forty kilometers from camp—was a swell place to visit, with or without leave. The people were hospitable; the town was picturesque; the hotels were good. Moreover, the women were not any too good.

By doing a fast 220-yard dash from the railroad station to the town, the privates usually beat the officers to the most desirable places, which contributed a great deal to the pleasure of the trip. Baths were there, too—*bains,* if you would rather—with great tubs, lined with muslin and brimming with hot water. If curiosity moved you to press the bell that dangled in front of your nose, a girl popped in and began rubbing your back, a phenomenon that caused an abominable stage fright among the men. They complained that it was indecent and just like the Frogs.

For no reason, a passion for omelets developed among visitors to Rennes. Literally, one man thought nothing of a twelve egg

omelet, and where two or three were gathered together, fifty and sixty egg omelets were often demanded, to the amazement of the French. On top of this, a small dinner party could easily handle a dozen fried squab and live to make overtures toward the waitress. This was done as a matter of course, and had nothing to do with the intentions, good or bad, of the dinner party. It was part of the evening—like cognac and cigars.

No record of the war is complete without at least one variant of the following episode:

Throughout one of these little celebrations Bud Boyles entertained four or five of the boys with various speculations on an extremely charming waitress. It was decided that she was the modern counterpart of *Camille*, and, under pretense of complaining about the service, Bud got pretty hot and bothersome in his talk.

Army life simplifies amusement, and the boys were suffocating until Bud tried to light a cigarette with a trick French briquet. Pausing in his appraisal of the young lady, he observed that the French ought to lose the war for that one invention, the briquet. Whereat the waitress said, in exquisite English:

"Perhaps it is because you have no essence."

Five soldiers, who really were gentlemen under their tan, died on the spot. Mademoiselle explained that she was born in Canada and educated at St. Agnes'.

At this distance of months and battles, we regard Rennes as the scene of our salad days. Getting there was such a picnic. The only means of transportation was a narrow gauge railroad, eighteen inches between the rails, and sporting a conductor who wore more gold lace than Foch. The hoodlums soon discovered how to kick over the air brake on the back platform at a point in the journey where the train did a regular roller coaster dip. With no air, the toy engine would rush down the grade until it reached the upward incline, then roll back and forth on both slopes like a rocking-chair until the engineer jumped out and put a rock on the track.

For fifteen minutes thereafter he was sure to wave his arms and scream at the gold plated conductor, who waved his arms and screamed back. Expert translators informed us that both engineer and conductor regarded the entrance of America into the war as the worst lot of boloney they ever heard of, that Lafayette was a chump, Wilson a maniac, Pershing a pest, and so on, until the air

brake was repaired. This perforce went on every night at the same steep valley—although the joke was always reserved for the ride home: none of us wanted to be late for Rennes.

There wasn't much fun at the camp. At the bottom of the hill on which we sweated and drilled and dug was a ring of the usual put-up-in-a-hurry shacks for the sale of licker at prescribed hours. These were operated by thrifty coin shepherds of a doubtful class, who wreathed their establishments patriotically with French and American flags and proceeded to gyp the pants off of us. There were the Franco-American Bar, the Lafayette Bar, the Star Spangled Banner Saloon, and others still more vociferously pro-Ally. Before we had been in camp a week a real enterprising gentleman moved in and opened up the Stars and Stripes Saloon—a hard boiled egg free with every drink.

The opening was a pretentious affair, and when it was discovered that this Foxy Grandpa among saloonkeepers had installed a wooden rail in front of the bar and mirrors in back of it, he couldn't handle the business.

Of course there were some nondrinkers in the outfit. They were big idealists, mostly; men like Addie Moore and Carroll French. who could tell you what the war was about from a standpoint of anthropology, philosophy, and evolution. And Art Williams, a Y. M. C. A. worker by choice, who chided the boys gently for singing Jesus Wants Me for a Sunbeam and making light of Things Eternal. Somehow, Art managed to spread morality and remain popular—a rare stunt for a corporal. Also Kenneth MacFarland, who increased the battery's rating On High by intensive study of the Bible and the classics. Kenneth could recite all of Paradise Lost—and *would* if we weren't careful. And the officers confided that the most rowdy were given to the most Christian letters home.

The great event of those early days was the arrival of the guns—four sweet little 75s, painted green and buff and black, Wicked little babies, the counterparts of our clumsy 18-pounders. Before the war was over we'd learned to fire them at the rate of thirty-two shells a minute. Now there was great excitement and bitter competition for places on the gun crews. A tentative firing battery was selected, and we spent endless days "firing" with wooden shells. Tiresome, and endurable only because of nightly drinking and the possibilities suggested by the Field Artillery Drill Regulations.

This invaluable little book virtually prescribes when and how and in what order a canoneer must die. Number One man, according to the book, falls first. He is succeeded by Number Two, then Three, then Four, who is ordered finally to draw his pistol, blow up the gun by a device with which we were acquainted, and then "to sell his life as dearly as possible." It is all very grim and real and, under its spell, tentative Number One men took on a look of too good for this world that got them many a sock on the nose before they had fired a shot.

The seriousness of dummy drill was fantastic and furiously fanatic. It was lightened only by small and slightly social events within the battery. Captain Benedict was ordered to the staff officers' school and First Lieutenant Howard R. Stone took charge.

Thanksgiving came and went, and everybody got a pound of real turkey—present from the War Department. We prowled the reputed Forest of Merlin nearby for holly and mistletoe. Harry Papolis, operator of a one arm lunch in Illinois, who had been brought to France under the impression that Greeks were good cooks, managed to make the turkey edible; and enough beer and light wine were on hand to complete the celebration.

Drills, drills, drills, drills, and finally December 5, when we did our first firing. Early in the afternoon we set out for the range. Two circumstances are noteworthy. One was that the canoneers rode out on top of the carriages. Had a canoneer climbed on a gun carriage in the last days of the war, when our horses were dying faster than we could cut them out of the harness, he would have been shot, then court-martialed at the first stop. Second was the pep of our horses, which couldn't be held. Just before the Armistice the last horse died and went to heaven, and we hauled our guns around by hand—miles sometimes.

We fired from a hillside three kilometers from camp. Lines were strung, trail circles dug, and the canoneers looked as important as possible. So did the general and Pappy Le Prohon, the genial cannibal who was our first lieutenant, firing executive, father, and friend. The order came down. Pappy repeated it as if the world would be destroyed by the subsequent salvo. The guns went off. So did the gunners, who thought the little iron saddles on the trail were things to sit on. It is no fun getting thrown off a 75, but Pappy didn't take that into consideration. He yelled terrible things

in his funny French Canuck accent (most of them threats to kill).

"My Gawd!" he bawled, as the canoneers displayed a little more reserve in their art. "Git back on them guns! Ride 'em! Tame 'em! You so-and-so-and-so!"

And, smiling, the boys fell dead—or wished they had. There wasn't enough liniment in France to heal the hinter anatomies of those unhappy pioneers; nor did they feel any better when a committee of French soldiers, who had been watching the firing, asked them—in their quaint broken English—why in hell they sat on the guns. It seemed that the French never did.

Slow times until Christmas. More drills. Double stable duty with mean horses. The only compensation we had for their bites and sneaking kicks was that horse meat mysteriously began to appear as an item of the daily menu. Apparently, the Service of Supply had failed, and when in France one does what the horse eaters do.

The camp was visited by two Australians who were playing hookey from their outfit. Bitterly they sought to enlighten us as to the real causes and conduct of the war; and in a fit of patriotism Chick Buell called out the guard and ran them ragged.

Quartermaster Sergeant Jones discovered that his shack wouldn't accommodate all the battery supplies, and the men were ordered to move them to a new quartermaster's office four blocks away. Having accomplished this one Sunday, it was decided to move the anvils, kegs of nails, saddles, and so on, back again—because of a fancied lack of ventilation. The third Sunday was used up moving the tons of property to still another office adjoining that of the regimental quartermaster sergeant (supposedly because he was an old friend with whom Jones loved to talk while pairing up Size 44 shirts with Number 18 drawers).

Christmas. Dissipation started after morning stables and lasted until sometime the following morning. In each barracks there were piles of wrapping paper, excelsior, and red ribbon at least ten feet high. Gifts from home consisted of everything for which we had no possible use—joke books, hymn books, necktie racks, stomach warmers, electric toasters, cuff links, and Paris garters.

Herb Mooney received a Sam Browne belt from a highly optimistic admirer. He traded it to Lieutenant Stone for a safety razor and a pass to Rennes. George Daugherty's box from home contained

several cans of corned beef—our deadly daily diet for more than a month. He had to be strapped down.

Dinner was a terrible affair. Ross Brown, a baker in civil life, worked all night long making doughnuts and pie, and Scotty Langlands brought out the jam he had been hiding for six weeks—thereby acquitting himself of certain dark suspicions. (It was the custom of mess sergeants and Greek cooks to make great headway with the local ladies by presents of army dainties.)

The German prisoners, who played the garbage cans daily for titbits not included in the French *table d'hote*, went crazy. They stood about us, knee-deep in mud, as we tore into the turkey, and there wasn't a man in the battery who didn't split a wishbone with a Kraut.

Well, one man, George Daugherty, embittered by his present of monkey meat, and having the issues of the war deep in his heart, presented a mess kit filled with spare parts of turkey to two prisoners, and, just as they reached for it, hurled it into the garbage can with a rousing. *"Deutschlander Schwein!"*

George's bitterness was shared by the French commandant, who paused in his rounds, screamed that we were pro-German, and scattered the Hungry Heinies with violent kicks in the pants. Otherwise,

it was a Day of Love. Even the little Greek was affected by the Christmas spirit, and offered a second helping without once reaching for the cleaver.

Three days after Christmas 100 men from the battery were ordered to St. Nazaire to rustle 470 wild horses for the regiment. Captain Irving Odell was in charge. The trip was made by rail, the detail arriving in St. Nazaire late at night. Here we were met by Pappy Le Prohon, who had been assigned to remount work; and, lest we had forgotten his admirable discipline, he began yelling his heart out on all subjects. In sixty breathless seconds Pappy employed 100 beautiful although unnecessary expressions, impossible to repeat or remember, and laid everybody cold on the matter of missing buttons, dirty shoes, and sloppy salutes. Then his affection for us got the upper hand, and he was Old Pie again.

We visited the remount station and got four horses apiece. The next job was to saddle without getting kicked out of the corral. There were never such horses. They kicked, bit, reared, tied themselves into lovers' knots, and unwound miraculously into four heel kicks if you so much as looked at them. Some of the men had never seen a horse before; but then, some of the horses had never seen an artilleryman before—so it was an even break.

Under the eye of Pappy, though, anything was possible, and before long we had them saddled and roped, and were charging through the business section of St. Nazaire. Here the horses went completely pro-German, running up and down the sidewalks, kicking in the plate glass windows, knocking over vegetable stands, and winding the string horses around every telephone pole in town. The natives—those who didn't run to their cellars—joined with the gendarmes in re-forming the parade, and the march resumed.

Once out of the city limits—God knows how we got there—the horses became attracted by the green fields and began jumping fences and ditches with an agility that was wonderful to behold. When one horse got into a field of expensive vegetables, he whistled for his pals and the round-up began all over again. Jake Anshel found himself sitting up on a saddle in the middle of the road with no horse under the saddle. It was a regular game of tag. Ray Quisno was unwrapped from every telegraph pole on the road.

Herb Mooney was sometimes on his horse and sometimes on various bushes and barbed wire fences. Every time he pulled

himself together he complained bitterly of the war and J. P. Morgan, who supposedly had ordered our participation in it. The eighth time he sailed over the head of his nag he said he didn't know that transfer to the flying corps could be made without the consent of the soldier.

Brick Bristol had the worst time. Every time he began chasing his steed, the horse turned around and chased him.

The trip took three days and nights and did a lot to explode the old theory that if a man doesn't like a horse there is something the matter with him.

Further fun was the organization of medieval troubadour parties by Cush Pryor. Slightly boiled, we visited people's houses, rapped on the windows, and sang good old American ditties like the Raggedy Cadets and Never Trust a Soldier. Charmed, the natives asked us in and poured extensively. We explained that the ballads were mammy songs and finished with The Canoneers Have Hair in Their Ears to the tempo and expression of My Old Kentucky Home. Our hosts were much moved.

Since our first range fire, early in December, the battery had been firing on an average of three times a week, drills and details filling up holes in the program. When we fired, it was at 3 in the morning, so that we might simulate sneaking up on the enemy when he wasn't looking. Nine times out of ten it rained. But we were getting good and were itching for war. More doldrums. An E Battery man died and Sylvester got a chance to play Chopin's Funeral March, which he had been dismally practicing for weeks. Of course *Sambre et Meuse* was spilled again on the way back, although there wasn't a Frenchman in miles.

Marking time. A bath book was established whereby the Spartan souls who doused themselves in one of the water buckets at headquarters could immortalize themselves by signing their names. We whiled away the boredom with interbarracks pillow fights after taps, loading the pillows with mess kits, rocks, and horseshoes.

Not a night passed without several warriors getting knocked cold. One barracks invaded another, which called for sly plans and nifty strategy. Such pillows as were captured were kept as trophies until the next night.

These battles, which became quite vicious as barracks spirit developed, were ended by rumors that at last we were going to the front. New activities confirmed it. We were worked twenty-six

hours a day, with inspections under full pack in our spare time. There were gas mask drills and we were led through gas filled dugouts to get used to the sensation. We simulated loading gun carriages on flat cars by staking out rectangular patches of grass and pretending they represented the Paris-Orleans limited. Barracks bags were packed with extra clothes, boots, and cartons of cigarettes for use in the trenches. Naturally, we never saw them again.

On February 10 we began moving battery equipment to the town of Guer to be loaded on flat cars. The work went on until 4 o'clock the next morning. The same day we had a stiff hike with full equipment. The men were so bushed on their return that they flopped on their cots without removing their haversacks. It began to look like war.

All kinds of quarantines were established. All kinds of rumors went the rounds. Finally February 18 rolled around, as it has a habit of doing every year, and we got under way. There was an impromptu farewell party at the officers' mess—conveniently deserted for the occasion. Porch Climber MacMillan, once a piano player in Chicago, banged out some swell ragtime. Clarence Soderlund and Carroll French, both aesthetes, played a Chopin duet. Everybody yelled and made all the noise possible. Speeches were made and applauded wildly.

The top blew his whistle in the battery street. We formed and started down the long hill, singing That's Where My Money Goes. At last we were getting somewhere.

(*To be continued*)

HUMMING ALONG, PILING UP 408 HOURS AND PLOUGHING UP 1,261 ACRES WITHOUT STOPPING

MISS DEL MONTE CHRISTENS THE CATERPILLAR WITH A BOTTLE OF DEL MONTE CATSUP JUST BEFORE THE START OF THE NON-STOP RECORD RUN

(The above photographs were taken during the University of California tractor test when a Caterpillar Thirty Tractor ran seventeen days and nights without stopping. This test was described in the last issue of the F. A. Journal.)