WAR DEPARTMENT . . OFFICE OF THE CHIEF OF STAFF.
SECOND (MILITARY INFORMATION) DIVISION,
GENERAL STAFF.
No. 8.

REPORTS

OF

MILITARY OBSERVERS

ATTACHED TO

THE ARMIES IN MANCHURIA

DURING THE

RUSSO-JAPANESE WAR.

(DECEMBER 1, 1906.)

PART III.

Report of
Major JOSEPH E. KUHN, Corps of Engineers.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1906.

WAR DEPARTMENT,

Document No. 273,

Office of the Chief of Staff.

NOTE.

General maps of the region in which the war occurred are found in Part I of these reports.

REPORT ON RUSSO-JAPANESE WAR.

CONDENSED ITINERARY.

I left Manila March 2, 1904, and reached Yokohama March 19. After delaying here four days to procure a necessary outfit of warm clothing, I proceeded to Tokyo on March 23 and reported to the United States minister on the following day.

Permission to go to the front was withheld by the Japanese war office until July 20, 1904, on which date I left Tokyo by rail for Shimonoseki, and thence for Liushutun, Dalny Bay, where I landed July 27. Marching overland, I reached the headquarters of the Second Japanese Army, General Oku, at Haicheng, on August 8, 1904. I remained with this army during the battles of Liaoyang and the Shaho until October 30, when, in obedience to cabled instructions from the United States minister at Tokyo directing my recall, I set out to return to Japan, spending four days, November 1 to 4, with the Third Japanese Army before Port Arthur and reaching Tokyo November 13. On November 19 my orders were countermanded by cable, and I was reassigned to duty as a military observer.

After a tedious delay, due to diplomatic negotiations, I left Tokyo by rail December 18 for Osaka, whence I embarked on transport for Dalny, where I arrived December 24. On the following day I reached the headquarters of the Third Japanese Army, General Nogi, to which I was now assigned, and witnessed the closing incidents in the siege of Port Arthur. Under special permission I remained at Port Arthur until March 3, 1905, for the purpose of studying the Russian defenses. On March 3 I departed by train for Liaoyang to join General Nogi, and reached his headquarters on the night of March 8 during the battle of Mukden. I remained with the Third Army during its movements after Mukden and until the conclusion of hostilities. On September 17 I started to return from the front, reaching Tokyo September 29 and Washington, D. C., November 11, 1905.

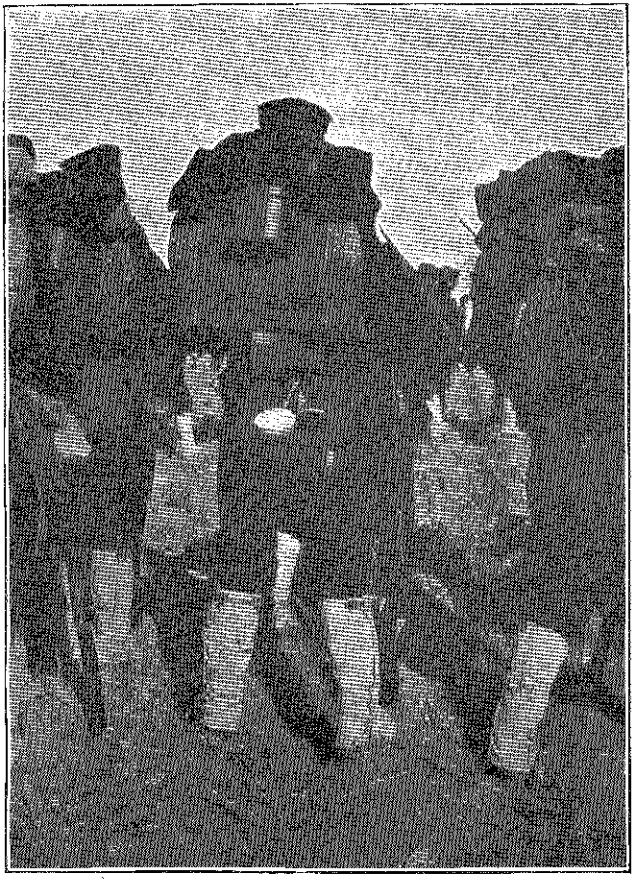
THE JAPANESE INFANTRY.

Being a poor nation, Japan's principal reliance in time of war is on the infantry, which has, accordingly, received more attention relatively than the artillery or cavalry arm. The Japanese infantry has been frequently referred to as incomparable, and, judging by its achievements in the Russo-Japanese war, it is not too much to say that it can undoubtedly hold its own against the infantry of any other nation. Highly intelligent, brave to the degree of recklessness, quiet and orderly in his habits, the Japanese infantryman possesses all the qualities sought for in a soldier under modern conditions of warfare. Japan has indeed reason to be proud of her superb infantry, whose achievements attracted the attention of the civilized world.

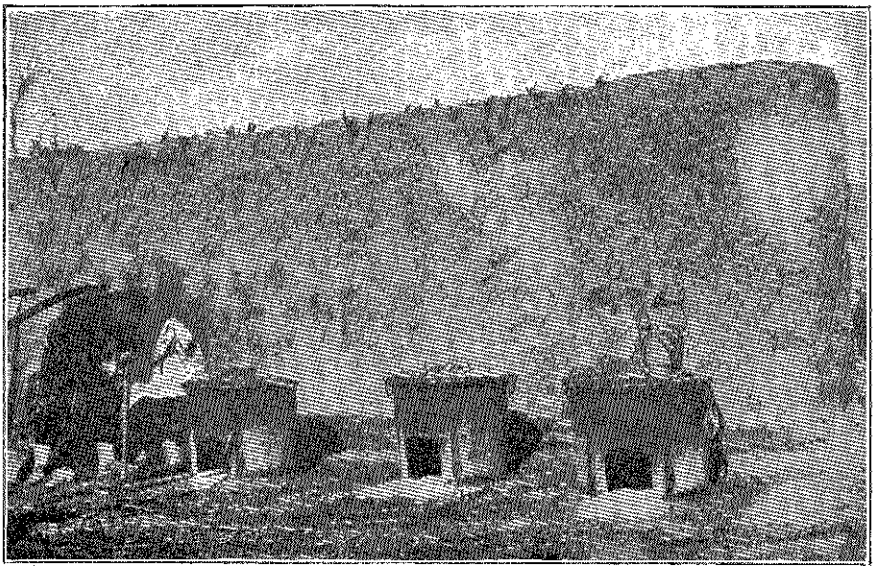
At the outbreak of the war the minimum height prescribed for the infantry recruit was 5 feet 3 inches. As the number presenting themselves annually under the conscription laws far exceeds the requirements of service with the colors, only the strongest and most robust are selected. A finer set of soldiers physically than the first-line troops of Japan would be hard to find. Although small of stature, they were unusually sturdy and stocky and capable of great endurance. These splendid troops, however, gradually disappeared as the war progressed, owing to the heavy casualties, and the general appearance of the men after Mukden was markedly inferior from a physical standpoint to those seen during the first summer of the war. An edict by the war minister in the spring of 1905 reduced the limiting height for infantry recruits 1 shun (about one-tenth of a foot), indicating that the previous standard was too high to secure the necessary number of conscripts called out to make good the losses in battle and for the organization of the new divisions. The period for service in the second reserve (Kobi) was also extended five years, with the result that many soldiers approximating 40 years of age appeared in the ranks.

Generally speaking, the physique of the officers was below that of the men, there either being no limiting standards of physique in their case or these standards being considerably lower.

The infantry is organized into regiments of 3 battalions,



1. JAPANESE INFANTRY SOLDIER.



2. JAPANESE COMPANY KITCHEN.

each battalion having 4 companies of 3 zugs, or platoons, which latter are subdivided into 5 subsections, or squads, each under a noncommissioned officer. The strength of a company is 5 officers, 30 noncommissioned officers, and 200 privates. The privates are graded as second class, first class, and superior soldiers, the grades being indicated by one, two, or three narrow yellow bands on the bottom of the sleeve.

The total combatant strength of a regiment is 2,854, and of a brigade of two regiments 5,716. Each regiment is equipped with 12 bicycles, but owing to the wretched roads little use was found for them except for messenger service in the larger towns.

Each company of infantry carries 94 portable tools, viz., 5 hatchets, 67 spades, 17 picks, and 5 folding saws.

In constructing intrenchments the soldiers are divided into two reliefs, each working thirty minutes. At a whistle signal the relief at work drops its tools and steps out of the trench, being immediately succeeded by the second, which has been drawn up in line in rear.

The soldier's kit weighs 42½ pounds without rifle, which weighs 9 pounds 8½ ounces with the bayonet—a heavy load, considering the Japanese soldier's stature and weight. This does not include the special articles of winter clothing issued for the winter in Manchuria.

The kit includes a rawhide knapsack with the hair side out, a red blanket,[a] dark-blue overcoat, canvas haversack, aluminum mess can, water bottle and cup, shelter-tent half and 2 poles, belt with 3 cartridge pouches, and elongated cotton bag.

The knapsack contains 1 pair spare shoes, strapped on outside, 1 pair socks, 1 shirt, 1 pair drawers, 2 days' emergency rations (tinned meat and biscuit or desiccated rice), 2 cardboard packets containing 30 rounds of ammunition, and a housewife containing comb, scissors, thread, needles, etc.

Certain spare parts of the rifle are also carried in the knapsack, such as striker, bolt head spring, cocking piece, etc.

The shelter-tent half is a piece of brown waterproof can-

[a] Toward the end of the war blankets of a grayish-brown color were issued, a decided improvement over the brilliant red pattern.

vas, 4 feet 10½ inches by 5 feet 2 inches, with a wide hem, having eyelet holes along two adjacent edges and cord loops along the other two edges. The shelter-tent poles are 17½ inches long, one having a socket at one end and point at the other and the other pole being pointed at both ends. By an ingenious arrangement the pointed end can be securely locked in the socket end, giving a strong and rigid pole. If desired, three or more poles may be coupled together. Generally the shelter halves are assembled along their edges to make a large fly to cover a number of men instead of forming "dog" tents for two men as practiced by us.

The soldier carries on his person 150 rounds of ammunition, of which 120 are contained in the 3 belt pouches, the two front ones having 30 each and the one behind 60 rounds. The remaining 30 rounds are carried in the knapsack. When going into action the soldiers usually discarded their knapsacks, which were piled up at some convenient point in rear and left in charge of a guard. The elongated cotton bag would then be filled with such necessaries as reserve rations, ammunition, etc., and worn like a blanket roll in battle.

Company officers also carried knapsacks, but of a different pattern from those of soldiers.

In summer the uniform was of khaki with a khaki cap cover. In winter the blue uniform was worn, the color being concealed by the voluminous brown overcoat especially issued for this war.

The special articles of winter clothing consisted of the overcoat above mentioned, an armless khaki vest lined with sheepskin, heavy knit cotton and woolen underwear and socks, knit finger gloves, Balaklava caps, felt boots, and straw bootees. The overcoat is loose and baggy, with a high goatskin collar and long sleeves falling below the hands. It is in addition to the regulation blue coat and was worn over the latter. With the overcoat comes a detachable hood and pair of mittens made from the same cloth. If need be, the soldier could clothe himself in heavy underwear, blue cloth blouse, armless sheepskin vest, regulation dark blue coat, and, finally, over all, the special brown winter coat. Having worn the Japanese winter clothing, I can say that it met the requirements of the climate excellently, and it is no wonder that the

Japanese soldier withstood the cold so well. During the battle of the Shaho, before it was cold enough for overcoats, the troops wore their summer khaki over their blue, ripping the seams so that the garments would go on and then stitching them together loosely. This was solely for concealment.

The felt boot was intended for mounted men and designed to be drawn over the leather boot. I could find none large enough to go over my shoes, so wore the felt boot without shoes and found it most comfortable. The straw bootee was issued to men on outpost duty, and to others whose duties required them to be out during severe weather. Canvas leggings are normally worn by the infantry, but quite a number of units also wore puttee leggings made from the same brown cloth as the overcoat.

Great attention was paid to the subject of concealment, and pains taken to cover the soldier entirely with brown or khaki. Just before the battle of Liaoyang orders were issued to cover all sword scabbards, so as to avoid flashing in the sunlight. This was most effectively done by a wrapping of cord.

During the summer of 1905 a change was made in the officer's summer uniform, and the first new ones appeared in the month of August. Instead of the plain khaki formerly worn, the collar was faced and the breeches piped with the color of the arm. The rank of the wearer was indicated by a shoulder strap, with gilt stripes and stars on a field colored according to the arm of the service. The new cap has a loose top and a band colored according to the arm. The new uniform is prettier than the old, the touch of color greatly relieving the plainness of the khaki, but it is not nearly so serviceable.

The soldier's daily ration consists of 1.06 pounds of rice or 1½ pounds of biscuit, one-half pound fresh meat (including bone) or one-third pound preserved meat, and an allowance of Japanese sauces and pickles. Beef, either canned or fresh, appears to have been issued irregularly, rice and fish forming the staple ration. Every ten days there is an issue of one-fourth pound sweetmeats, a package (20) of cigarettes, and about 1 pint of saké to four men. The sweetmeats and cigarettes are the personal presents of the Emperor. Men trade off these special articles according to their personal likes.

When starting out on a forward movement the soldier will

have eight days' rations accompanying him on the march, as follows:

The day's ration (that is, after breakfast he fills his mess tin with the remainder of that day's ration), 1; heavy baggage of battalion, 1; provision columns, 4; emergency rations (carried on person), 2.

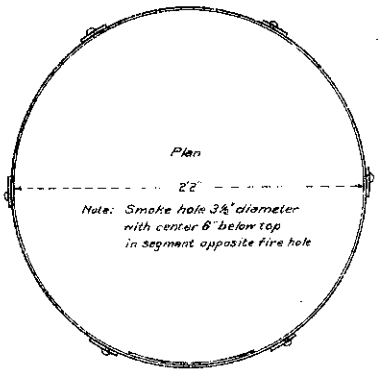
Being a rice-eating nation and depending upon boiled food almost exclusively, the messing arrangements for the Japanese army are exceedingly simple. The cooking stove is a cylinder of sheet iron, without top or bottom, in six segments. Each segment has all its edges stiffened by reenforcing strips of iron, one-eighth inch thick and three-fourths inch wide, fastened on by rivets. One vertical edge of each segment has two studs with boltheads, while the other edge has two slotted clips. The dimensions and method of assembling are clearly shown on Plate I and the accompanying photograph.

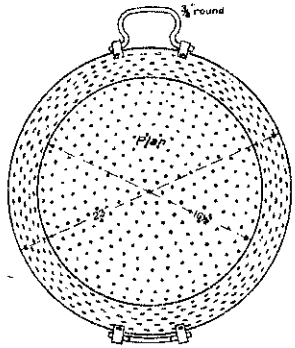
The cast-iron kettle is made thin to secure lightness. It has two handles and fits into the top of the stove. The rice boiler or colander fits into the kettle, resting by its handle lugs on the depressed rim of the kettle. The stove is fired with wood or kaoliang, being well suited to the latter. The rice is placed in the colander, and after the water in the kettle has reached a boil the colander is lowered into the kettle and covered with the wooden cover which belongs to the outfit. As the Japanese like their rice with a firm grain it requires only twelve to fifteen minutes to cook after being placed in the boiling water. When the cooking is finished the colander is lifted from the kettle and allowed to drain, leaving the rice grains dry and firm.

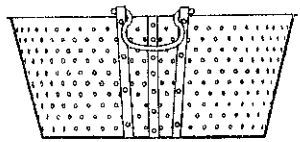
Each outfit will cook rice for 40 men at one operation, so that the process of cooking must be repeated with some of the stoves constituting the company allowance to provide enough for a company of 235 men.

The rice is first washed in galvanized-iron cans of 2 feet diameter and 30 inches height, the grain being churned by two sticks tied together about 2 feet from the lower ends, the water being changed several times. These galvanized cans also serve to hold the rice after being cooked and to transport it considerable distances from the kitchen if necessary. The rice is served into the men's mess tins with wooden ladles or boxes, each holding a ration.

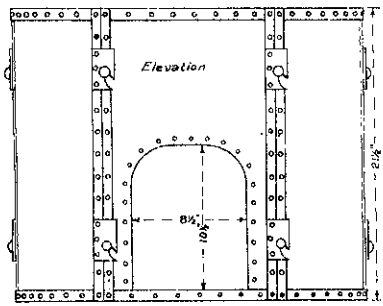
Japanese Cooking Outfit



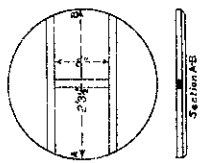




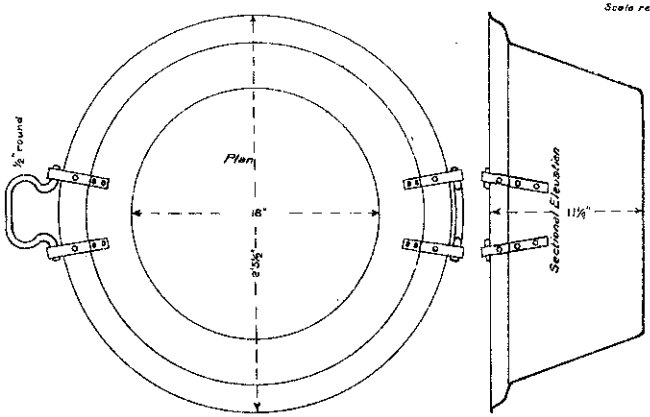
Tinned Sheet Iron Colander



Sheet Iron Stove



Wooden Lid for Kettle
Scale reduced



Cast Iron Kettle

PLATE 1

The same cooking outfit also serves for boiling water for drinking and for boiling vegetables and meats. The mess tins, which are of aluminum, contain several compartments for pickles, vegetables, and sauces. These mess tins also serve to cook rice, and it was a common sight to see men detached from their kitchens boiling their rice over a fire with four or five tins strung by their handles on a pole.

Knives, forks, and spoons are not required, as each soldier carries his chopsticks or readily improvises a pair from twigs or a bit of packing box.

The cooking outfits are transported on pack animals, the stoves being knocked down, and, with kettles, cans, and other small utensils, carried in a netting bag, which is slung from the pack saddle.

The regulation allowance of cooking outfits for a company of 235 men is four.

Beef on the hoof is sparingly issued when convenient and possible. After the battle of Mukden, the left wing of the Japanese army received considerable fresh beef, the cattle coming over the Mongolian border, and many herds of fine animals were seen in the vicinity of Fakumen during the summer of 1905, en route to the various army units. Fresh pork is also occasionally issued, Manchuria being well supplied with pigs. In the Second Army during the summer and autumn of 1904 there was some pillaging of pigs and poultry, but on the whole the Japanese troops refrained from depredations and their treatment of the natives, while strict, was eminently fair and just.

The entire problem of feeding the army is much simplified by the peculiar food of the Japanese. With rice, canned or dried fish, the various national sauces and pickles, and the dried or canned vegetables of his native land, the Japanese soldier is well satisfied. His food is not perishable and is easily prepared and transported.

The tinned beef issued as part of the emergency ration appeared of excellent quality, but was flavored with soy, which sauce appears to be an essential component of all Japanese foods. To the foreigner the flavor soon becomes distasteful, and the beef became palatable to me only when made into a stew with plenty of salt and pepper.

The daily life of the Japanese soldier, as noted in the

Third Army, during the summer of 1905, was about as follows:

He rises at 5 a. m. and breakfasts at 6 a. m. without any music, calls, or formations. From 7 a. m. to 10 a. m. he parades for three hours' drill, instruction, or exercise. At 12 he eats his dinner. In the afternoon he again parades for two hours between 3 and 6 for further drill and instruction. Thoroughly drilled and proficient soldiers are excused from afternoon parade. The evening meal is at 6 or 6.30, and at 9.30 the soldier retires for the night.

The absence of music[a] in the Japanese army is noteworthy and impresses the foreigner strangely. Men make their way to the place of parade individually and without bugle calls. Hours not devoted to drill or instruction are spent as the men like, usually in their quarters, sleeping, washing clothes, reading, or writing letters, of which latter they seem very fond. The men are very quiet in their habits, and are not given to roaming about in search of excitement, as is the case with the American soldier when off duty.

Outpost organizations, as a rule, are changed every ten days. Men on outpost duty are liberally fed and their comforts attended to as much as possible.

Men generally bathe daily, going to considerable trouble to fit up appliances for heating water. At all étape stations and at the larger headquarters the Japanese wooden bathtub, or a special canvas camp tub, with charcoal heater, was to be seen. The soldiers commonly bathe in the large jars used by the Chinese for storing a supply of water or in empty saké casks.

When on duty discipline appears to be very strict and quite like what obtains in other well-regulated armies. When not on duty, and particularly on occasions of amusement or entertainment, a spirit of camaraderie and good feeling, amounting almost to familiarity, obtains in all ranks from the highest officers to the privates.

Drunkenness is almost unknown, and violations of law and regulations very rare. Although men were occasionally seen under the influence of drink, I never saw a single case of a real helpless drunk. This was not because saké was not ob-

[a] The First, Second, and Third Armies had each one band attached to army headquarters.

tainable, for it was not only an article of issue, but was sold by the canteens, which followed the troops closely at all times.

The Japanese theory that every man can become a good soldier if he will only put his heart into his work seems to pervade all ranks and permits a degree of control over the men which would be out of the question with any European or American army. In other words, the individual soldier can be pretty well depended upon to carry out instructions given him regarding his duties, health, deportment, etc., without constant supervision or inspection on the part of his officers. It is simply a matter of temperament, in which the Japanese possess a decided advantage over other nations.

No description of the Japanese soldiers' life in the field would be complete without some reference to the various measures adopted to provide entertainment and recreation when the armies were at rest. Wrestling and theatricals are the two national pastimes, and were freely indulged in by the troops. Nearly every village in which troops were billeted possessed its wrestling ring, where the soldiers engaged in friendly contests daily, usually in the evenings. Theaters, requiring more elaborate preparations, were limited to the larger étape stations and headquarters. Every national holiday, fête day, or anniversary was eagerly seized upon as a pretext for entertainment, more or less elaborate, in which all officers and men of the organization concerned took an active part.

Some of these affairs were of imposing magnitude, such as that of the First Army to celebrate the anniversary of the battle of the Yalu and that of the Ninth Division to commemorate the anniversary of the capture of Port Arthur. The latter entertainment was given at a Chinese farmstead called Nanling, about 1 mile south of Chinchiatun, within sound of the outpost firing. The fête extended over two days, so as to permit the entire division to attend. Weeks were spent in preparations and an enormous amount of labor and material expended in making the affair a success, which it was from every point of view. A grove of tall cottonwoods some 250 yards square was converted into a Japanese fair, with numerous booths for the dispensation of food and drink, and with the inevitable accompaniment of a huge theater and wrestling ring.

Artificial cherry blossoms, flags, lanterns, etc., strung from the trees made the grove look decidedly bright and gay. Soldiers dressed as geishas attended to the wants of the guests, while numerous groups of dancers, musicians, peddlers, etc., contributed to the entertainment. The ingenuity and artistic taste displayed by the soldiers in the construction of the numerous booths and decorations from the scanty material available was quite remarkable.

Athletics also form a prominent feature of the soldiers' training and were freely practiced on occasions of entertainments. The prizes offered in wrestling and other athletic contests were usually inexpensive packages of cigarettes, stationery, towels, handkerchiefs, soap, etc.

The many entertainments gotten up for the benefit of the troops were not only intended to afford pleasure for the moment, but to keep up the spirits of the soldiers and to counteract homesickness.

The training and instruction of the infantry is most thorough. In drilling, movements are executed with smartness and precision, and, in the domain of minor tactics, the infantry soldier displayed a high degree of skill and efficiency. Although much attention is paid to instruction in target practice, the shooting did not impress me as being very good, considering the intense volume of fire delivered by the firing line. Volley firing was but rarely used by the Japanese, who generally refrained from opening fire until mid-ranges were reached, when they invariably resorted to file firing, each man firing rapidly, too rapidly, in fact, for good results. While this method produced an enormous hail of bullets, filling the air with lead, accuracy of shooting suffered in consequence, and the expenditure of ammunition impressed me as being out of all proportion to the casualties inflicted on the Russians.

In their tactical formations for combat the Japanese employed the same general methods as prescribed in the regulations of all modern armies. There was a firing line, line of supports, and line of reserves, all supplied by the same regiment. The strengths of the various lines and their distances apart varied according to circumstances, and in the several combats of which the tactical formations were known there were no two cases exactly alike. Generally speaking, the

firing line was rather dense, the skirmishers being posted at intervals of about 1 pace, so as to secure a heavy volume of fire. Ground is gained by rushes of the firing line from one flank of each deployed unit. For instance, if entire companies are deployed on the firing line, the right zug or platoon would rush forward, being covered by the fire of the two remaining zugs; then the second zug would rush to the line of the first zug, being covered by the fire of the first and third zugs. Finally the third zug would rush to the line already established. The lengths of rushes varied according to the topography and the severity of fire. When close range is reached and the losses by rushes of entire platoons or sections would become too heavy, ground is gained by individuals from a flank moving successively until line is again formed. Movements are controlled by zug commanders by whistle, there being special calls for advancing, firing, and halting. If the firing line finds the enemy's fire too severe to continue the advance, it intrenches itself, as may also the supports and reserves, and awaits further developments

The strength of the firing line appears to be generally one battalion of a regiment, but frequently, when more front must be covered, it may be much more. Thus, at the attack on Manjuyama Hill by the Thirtieth Regiment of the Second Division during the battle of Liaoyang, 10 companies deployed, each two zugs in first line and one in support, leaving but two companies in reserve. During the attack on the Russian inner line at Liaoyang in front of the Fourth Japanese Army, the Fortieth Regiment of the Tenth Division deployed 11 companies in the first line, leaving but one in reserve.

Perhaps the best commentary on Japanese battle tactics is that of General Kuropatkin, as disclosed in a Russian document, entitled "A Study of Japanese Tactics," captured at Mukden, and of which the following is from a Japanese translation, all dates being old style:

A. HILL FIGHTING AND ATTACKS.

The Japanese attack in a continuous succession of waves and never relax their efforts by day or night. If the enemy's front is narrow, they seek to outflank it; if extended, to pierce it. Their movements are usually carried out under cover of night and are followed by an assault on the particular portion of the positions selected for attack.

When attacking in flank they invariably make a simultaneous attack against the front of the position. It is very necessary, therefore, to make bold reconnoissances in order to be able to distinguish between the real and the feigned attack.

A characteristic of Japanese tactics in the mountains is that they advance along the sides of the hills on a very narrow front and carefully avoid valleys. They generally attack our positions from a flank. These would seem to be the best tactics to pursue in the mountains of Manchuria. If the Japanese find it absolutely necessary to march along a valley, they wait until night to do so.

The Japanese mountain artillery moves in considerable numbers and with great rapidity in the mountains. Their mountain guns always keep pace with their infantry and are often boldly pushed forward to positions on our flanks or even within our lines of defense. Compared with the Russian field guns, the Japanese mountain guns are directly inferior both in rapidity of fire and in mobility over flat country. They have, however, achieved considerable successes at times over our batteries by rapidly changing their positions and taking up new and better ones. The Japanese show considerable skill in these movements, and they appear to have some special equipment that enables them to move rapidly.

Moreover, their guns very soon come into action on positions captured from us, and they afford invaluable support to their infantry, enabling them to retain what they have won.

B. TACTICS IN FLAT COUNTRY.

The Japanese are in the habit of making separate and independent attacks on each of the various portions of our positions. The operations are carried on chiefly by night. For example, on the night of September 27–28, 1904, they attacked the heights near Kushutzu village.[a]

On the night of September 29–30 they attacked and occupied the heights of Durugovbaya and a temple to the east.

At daybreak on the 1st of October, 1904, they captured Houchai Hill, and on the 3d of October they seized some heights and a road in the vicinity of the above hill.

On each of these occasions, directly the positions had been captured, the Japanese opened a heavy artillery fire on the Russian trenches in the neighborhood, thus clearing the ground for further action.

In making attacks the Japanese usually deliver the assault just before dawn, so as to be in possession of the place by sunrise. During the day they strengthen the position as much as possible.

In order to deceive the enemy as much as possible, the Japanese make one or more false attacks before delivering the real one. These feints are supported by heavy artillery fire. Sometimes the real assault is delivered under cover of a general attack along the whole line. The main object of these false attacks appears to be to entice the enemy's reserves away from the real point to be assailed. For example, on the

[a] All dates are old style

11th and 18th of August, 1904, they made false attacks on the Third Siberian Army Corps, and on the same day delivered a vigorous attack in force on the Tenth Corps at Sanping. On the 27th and 28th of September, 1904, they made a demonstration against the Tenth Army Corps, and on the following day they attacked the Seventeenth Army Corps. Again, on the 30th of September they threatened the First and Seventeenth Army Corps, and at daybreak on the following day they delivered a severe attack on the Tenth Army Corps.

In the attack the Japanese advance by successive fractions of an extended line; their supports follow, similarly extended, 100 to 150 yards in rear. When in close-order formations under artillery fire the Japanese deploy at once.

For example, during the fighting near Shanlantzu on the 3d of October, 1904, some of our shells burst over a column composed of two or three battalions. To our surprise, they extended so smoothly and rapidly that in one minute the whole column had deployed. An hour afterwards a number of scattered groups of infantry appeared from some trees close by. They doubled forward to some bundles of millet (kaoliang) stalks piled along their front and there lay down. Very soon they stood up and ran forward again, each man carrying a bundle of the millet, and lay down again some distance farther on. In this manner, by successive rushes, they succeeded in reaching the banks of the Shaho. They were opened out to 50 or 60 paces interval between men and hid behind natural cover or behind the bundles of millet stalks that they brought with them. They appeared at first to be lying still, but after careful observation we perceived that they were engaged in making trenches, and very soon they were all connected up and a long line of trench was formed, which they defended obstinately.

By this skillful method of advance the Japanese succeeded in bringing up their main body to within 800 yards of Putilov Hill without attracting our attention. Fortunately, we then discovered them from the position of the Thirty-third Elettski Infantry Regiment and brought an effective fire to bear.

On the 4th of October, 1904, we observed that about half a Japanese battalion had assembled in a trench that we had previously abandoned and which was directly in front of the Thirty-third Elettski Regiment. Here they hid themselves for about half an hour. Parties of them extended right and left of the trench, creeping along the ground, and began to dig; by evening their trenches extended from Shaho village to Shynsalensko Hill.

We once had an opportunity of closely watching an advance made by the Japanese against the front of the position held by the Thirty-eighth Alrofski Infantry Regiment.

They attacked in widely extended skirmishing order. The firing line advanced at the double for a short distance, lay down, and commenced to dig. Notwithstanding our extremely heavy fire, they again doubled forward, giving up their half-constructed trenches, and began to dig new ones. The supports then doubled forward

and occupied the first trenches and completed them. When the firing line advanced from the second line of trenches, these were occupied by the supports, and the reserves then moved up into the first line of trench. The advance continued by successive rushes in this manner.

The Japanese make a very careful reconnoissance of ground over which it is intended to attack. On the 30th of September we could very clearly discern their various reconnoitering parties from Shanlantzu village. At 10 a. m. a patrol of about 30 infantry appeared near Houchai village, and shortly afterwards an individual soldier crept down quite close to our firing line, keeping well under cover and making careful observations. Some men of the patrol in rear then intentionally showed themselves, fired a few volleys at our lines, and hid themselves again, evidently in order to divert our attention and to allow the scout to reconnoiter without being disturbed. This went on all that day until 5 p. m.

The Japanese artillery almost invariably opens fire after that of the enemy.

They utilize their infantry to draw the enemy's fire and to locate the positions of his batteries; they then fix the positions of their own guns accordingly, usually by night.

They are very particular in providing cover for their guns, even if they are concealed from view behind a village or wood.

The Japanese artillery concentrates its fire firstly on the enemy's batteries, secondly on the troops, ammunition wagons, etc., in reserve, and finally upon the ground in rear of the enemy's position in order to prevent reenforcements being sent up.

They occasionally cease firing for a short time and then reopen with renewed energy. These pauses in the fire are apparently to make us believe that we have got the true range and have caused them damage; during the cessation of fire the gun crews all take cover under shelters or in a trench.

It is evident, from the accuracy with which they hit villages, hills, etc., at almost the first shot, that the Japanese batteries are provided with excellent maps.

The Japanese infantry fire is as a rule wild, but it is superior in rapidity to ours. The Japanese infantry does not hesitate to make night attacks, and in these cases they make great use of hand grenades. It is impossible not to admire the bravery and activity of the Japanese soldiers; the latter is doubtless due chiefly to their light equipment and to their natural fondness for the offensive.

In this connection the following notes on Japanese tactics and Russian cavalry tactics from a document by Major-General Kartzov, commanding mixed Caucasian Cossack division, captured June 16, 1905, at Liaoyangwopeng, may be of interest:

1. The principal characteristics of the Japanese troops are as follows:

Careful and strict performance of outpost duties; a quiet and noiseless advance when assuming offensive; precautions when in action to guard against surprises; quick decision at critical moments.

The points to which we should pay particular attention are as follows:

1. RECONNOITERING.

It should be borne in mind that other things should be reconnoitered besides merely the enemy's position. The general features of the country should, in particular, be carefully observed.

Reconnoissances should be pushed as far as possible against the front and around the flanks of the enemy's line, care being taken to avoid being cut off.

When the enemy's patrols are encountered, it is unnecessary to pursue them. More importance should be attached to fulfilling the particular mission on which they have been sent. It is preferable to try to decoy the enemy into an ambush, and every opportunity should be embraced of getting to close quarters with cold steel, as hand-to-hand fighting is the weak point of the Japanese cavalry.

The outpost line must always be ready to fight at a moment's notice, as laid down in the field service regulations, and under no circumstances is retreat permissible. All outpost duties must be strictly performed, especially at night.

Reports should not be sent by a single orderly; not only is there a chance of his being intercepted by the enemy, but he may also be set upon by the Chinese who are hostilely disposed to us. The line of pickets should be thrown out as far from the main body as possible.

2. The following points should be remembered with regard to tactics:

(*a*) *Against the enemy's cavalry.*—The Japanese cavalry has hitherto tried to avoid shock tactics against our Cossack cavalry; the only occasions on which it has charged having been when dealing with a very small detachment. In future, therefore, when encountering the enemy's cavalry it will be advisable to conceal your strength and to entice them to approach to close quarters, when shock tactics can be employed.

An advance in deep columns against Japanese cavalry is not recommended; it will be better in most cases to keep the main body under cover until the enemy advances sufficiently near to render a charge possible. As many prisoners as possible should be taken.

(*b*) *Against the enemy's infantry.*—If the enemy's infantry is taken by surprise, a sudden cavalry charge will undoubtedly be successful. In order to effect a surprise, the following points should be borne in mind:

(1) The real strength of the force should be concealed from the enemy as long as possible.

(2) Care should be taken to keep out of the effective range of the enemy's infantry.

(3) Endeavors should be made to entice the enemy's infantry away from the point which it is intended to attack.

(4) Foggy weather or darkness should be taken advantage of.

(5) Retirements in front of the enemy's infantry should be carried out in extended order, so as to minimize losses.

3. DISMOUNTED SERVICE.

During the war our cavalry has frequently fought dismounted; this has often been rendered necessary because the ground was not sufficiently open for mounted action. Dismounted service should be employed rationally as circumstances demand. Should the enemy's cavalry adopt dismounted action or should his infantry be encountered, our cavalry must not hesitate to fight on foot also.

According to the experience gained by our troops, there is nothing much to fear from Japanese infantry fire as regards quality; having plenty of ammunition they are able to fire a great deal.

On the defensive, therefore, it is advisable to allow the enemy to advance within 600 yards, and then to overwhelm him with a hail of bullets. The moral effect of this will be very great. When firing at long ranges, the target must be a large one, such as an encampment, barracks, or reserves in close order. Even against such an objective it is useless to fire unless the range is accurately known. Otherwise the only result is a waste of ammunition and the exposure of our position to the enemy, which will call down a heavy hostile fire, more particularly from the enemy's artillery.

During the war the terrific and powerful effect of artillery fire has been most marked. Consequently troops should not be exposed unless an opportunity presents itself.

The comments made by General Kuropatkin are convincing testimony to the skillful tactical methods of the Japanese, and are fully substantiated by all the information which could be gathered on the Japanese side. In reconnoitering positions and in night maneuvers and attacks the Japanese infantry displayed a remarkable efficiency which contributed largely to its success.

If I were asked to name the chief characteristic of the Japanese infantry, I should say that it was its tenacity. Ground once gained was rarely, if ever, yielded, even when enormous sacrifices of life were involved. Time and again during the war, when the advance was checked, the leading troops would hold on under terrific and deadly fire for hours, sometimes even for days, without yielding an inch. Likewise, failures in assaults did not appear to dishearten the

soldiers, who returned to attack at the word of command with the same apparent determination.

I have heard it charged that the Japanese soldier possessed the spirit of a fanatic. While some of his exploits may appear to savor of fanaticism in their daring and determination, his nerve, or, perhaps better, his lack of nerves, as evinced in his ability to hang on and stick it out for long periods under heavy fire, reveals a spirit quite the opposite of the fanatic, to whom constant motion is essential.

Skillful in preparation, brave in execution, resourceful in emergencies, the Japanese soldier compares favorably with the soldier of any nation, if, indeed, he does not actually surpass him.

THE JAPANESE CAVALRY.

During the summer of 1905 I was fortunate enough to meet a number of leading cavalry officers of the Japanese army and to learn a few matters concerning the Japanese cavalry, of which the following notes are the result. At this time all the available Japanese cavalry was operating on the left front of General Nogi's army, its movements extending to a distance of 80 miles west into Mongolia.

The Japanese cavalry is organized normally into 13 regiments of divisional cavalry, each of 3 squadrons, and 2 independent brigades, each of 2 regiments of 5 squadrons, of which 4 only take the field, the fifth squadron being retained as a depot for training remounts and recruits. The divisional cavalry regiments bear the same numbers as their divisions. The First Brigade is composed of the Thirteenth and Fourteenth Regiments and the Second Brigade of the Fifteenth and Sixteenth Regiments. The two brigades perform the functions of corps cavalry, and are assigned to different armies, as circumstances require. In the operations before Liaoyang and the Shaho one brigade was attached to each of the flank armies. During and subsequently to the battle of Mukden both brigades operated on the left flank.

During the war a new cavalry regiment, the Seventeenth, was organized, but it is not known just where it was posted or when it arrived at the front. There were also organized 2 "independent reconnoitering detachments" of 2 squadrons each, whose organization and functions are not clearly understood.

The weakness of the Japanese in cavalry is forcibly shown by the fact that it constituted only about one-seventieth of the entire field force in Manchuria, and this, too, in a country eminently adapted to cavalry movements. In face of the Russian superiority in cavalry it was about all the Japanese cavalry could do to perform the needful duties of scouting, reconnoitering, and contact without attempting to engage in cavalry actions The Japanese squadrons were entirely too few and precious to be frittered away in charges, and their tactics were necessarily influenced and regulated by the conditions of the war. In order to strengthen the cavalry brigades some of the squadrons of the nearer divisional regiments were generally added. While engaged in the siege of Port Arthur practically all the cavalry of the besieging army was employed with the field armies in the north.

Owing to the exceptional conditions affecting the Japanese cavalry in the war, its normal conduct has been defensive and its main reliance the firearm. The cavalry took the field with but 36 rounds of ammunition for carbine, which was soon increased to 150 rounds, and instead of replenishing from the nearest infantry ammunition columns, the brigades organized their own. By the adoption of defensive tactics, fighting on foot, and keeping more or less near an infantry support, the Japanese cavalry was able to hold its own and to perform the duties of scouting and reconnoitering with a fair degree of satisfaction. The numerous villages which dot the plains of Manchuria afforded excellent defensive points to cavalry acting on the defensive, for, once the cover of a village was gained, it put an end effectually to mounted action by the enemy and gave the Japanese time in which to receive reenforcements or to make a dash for the next village in the event of the Russians dismounting to fight on foot.

A favorite scheme of the Japanese cavalry was to steer the Russian troopers against an infantry ambush, and the trick was frequently worked in connection with outpost and reconnoissance duties.

For some strange reason the Russian cavalry seemed unable to force issues at close quarters and, although outnumbering the Japanese cavalry 7 or 8 to 1, accomplished very little in the way of useful results for their side during the war. In discussing this question the Japanese cavalry offi-

cers are disposed to blame the Russian method of training cavalry which makes it more a mounted infantry than a true cavalry force and destroys the true cavalry spirit. Although compelled to adopt defensive action and to fight dismounted the Japanese cavalry officers believe in training cavalry primarily as such and not as mounted infantry. Such at least is the opinion of General Akiyama, the father of Japanese cavalry, who, in spite of the experience of the war, was an adherent of the arme blanche and shock tactics. Perhaps his opinion is influenced by the Japanese traditional fondness for the sword, which is called the "soul of the Samurai." But whatever the opinion as to cavalry training, shock tactics and mounted action were simply out of the question for the Japanese in the Russo-Japanese war, and the Japanese cavalry officers very wisely adapted themselves to the peculiar conditions and thereby rendered the best possible service.

There can be no doubt that Japan was heavily handicapped in the war by her weakness in cavalry and that many golden opportunities were lost thereby. Both at Liaoyang and Mukden Japan failed to reap the full benefit of her victories owing to the want of cavalry. At Mukden especially a well-trained corps of 10,000 sabers with some horse artillery would have been simply invaluable. One almost feels disposed to criticise the lack of forethought and prevision, usually such a conspicuous feature with the Japanese, in sending over half a million men to Manchuria with but 6,500 sabers all told, did one not know that there are extenuating, almost insuperable, circumstances. Japan is by nature a horseless country. Its dense population and intense cultivation leaves no room for such bulky live stock as horses or cattle and the pressing need of economy forbids dependence on mounts purchased abroad. The war practically exhausted the entire domestic supply of horse flesh, and one of Japan's chief difficulties lay in procuring remounts for cavalry and artillery. During the early spring of 1905 some Australian horses were purchased, probably because they were cheap, and some 500 were being trained at the depots in June, 1905. As these animals were unbroken and had on their winter coats when they reached Japan, it is doubtful whether the experiment would have been successful.

The brigades are accompanied by about 5 per cent spare horses with pack transport containing one day's rations and grain with cooking outfit. There is no supply column. A train detachment follows the brigade as closely as possible and has charge of horse hospital, reserve material, and workshops. When on the move the brigades live mainly by requisition on the country and when at rest depend on the nearest divisional depot.

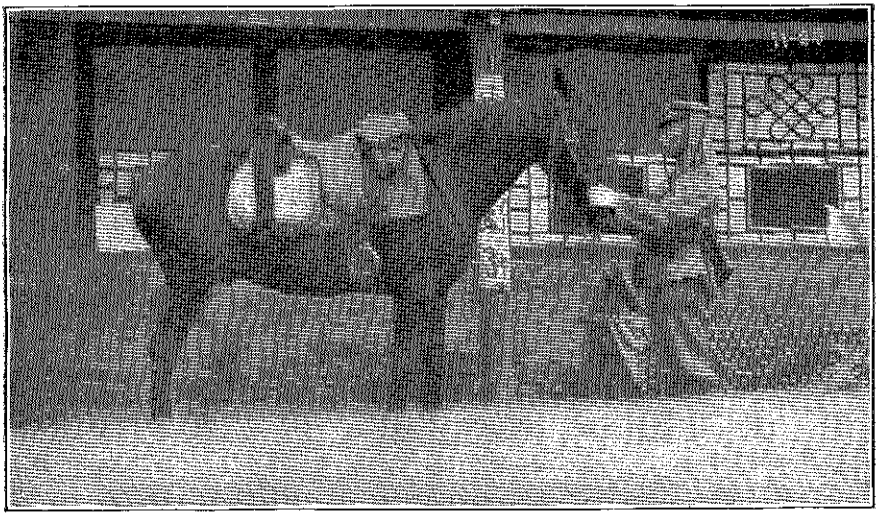
The squadrons are complete units for purposes of training and instruction and their captains are held responsible. The First Brigade was commanded by Major-General Akiyama who, in most respects, is the leading spirit in the Japanese cavalry. He is 55 years old and has spent four years in France, speaking French quite fluently. He is an energetic, vigorous, and tactful man and a fine type of the thoroughly trained and professionally educated soldier with which the Japanese army abounds. He is, moreover, endowed with an agreeable personality, being genial, cordial, and affable, quite a contrast in fact to the average Japanese officer whose bearing was marked by reserve and taciturnity and an evident desire to avoid conversation lest he reveal a military secret.

The two colonels of the First Brigade, Koike and Tayabi, are young men 41 and 43, both in the prime of life and exceedingly active and vigorous. Colonel Koike also spent some years in France, and is a fine horseman. He is a good type of the "beau sabreur" cavalryman, while Colonel Tayabi is rather more of the "brainy" type.

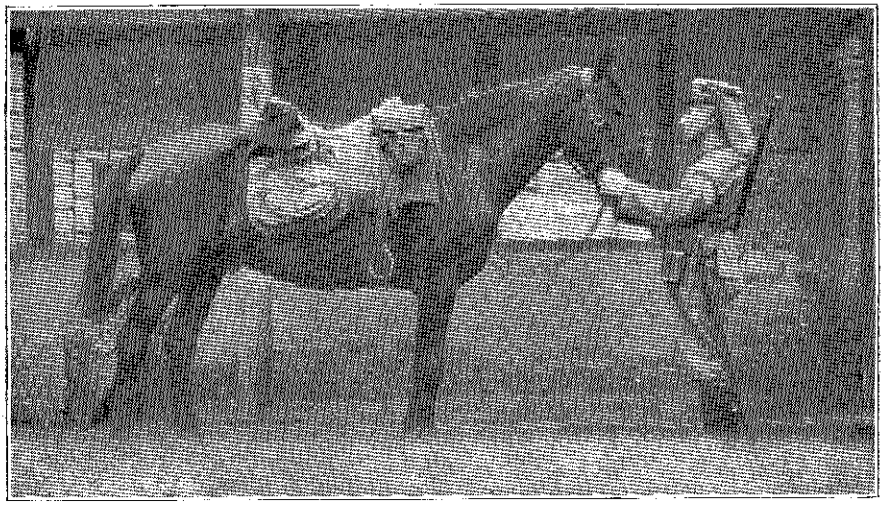
The Second Brigade is commanded by Major-General Tomura, a pleasant and agreeable officer above 50 years of age and of very small stature, even for a Japanese.

The cavalry is regarded as a sort of corps d'élite and the officers are from the best families, but brains are a primary requisite. In the training of officers long-distance rides and other competitions form a feature. The cavalry recruits are selected for their intelligence as well as for their conformation as future horsemen. No extra pay attaches to the cavalry service, but an allowance is made for shoeing and saddlery, and a horse is furnished. Most of the officers, however, own private mounts.

The soldiers are well instructed and all privates can read maps and are quite capable of taking care of themselves indi-



3. JAPANESE CAVALRY SOLDIER AND HORSE.



4. JAPANESE CAVALRY SOLDIER AND HORSE.

vidually. The high intelligence of the Japanese cavalry soldier was noticeable.

The Japanese cavalry horse would hardly meet our standards. They are uneven, but for the most part light in the barrel and leggy, but notwithstanding capable of remarkable endurance. Japan is fully conscious of her weakness in suitable cavalry mounts and has for some years been engaged in improving the quality by establishing stud and brood farms and encouraging the peasantry. The results of these measures are already becoming apparent in some of the mounts, mostly officers, seen in the field.

The remounts required in a year's campaigning amounted to about 50 per cent, drawn from the horse depots of the army to which the brigades were attached and from local purchases and capture. Great efforts were made to capture Russian horses, both because they were better than the average Japanese animal and because of Japan's limited resources in horse flesh. The hardest work for the brigades occurred during and subsequent to the battle of Mukden, when the horses averaged 15 miles per day for forty days, being given plenty of food.

The cavalry is armed with saber and carbine, the latter slung on the back by its sling and the former hung from a waist belt. The carbine sling must be tight to hold the weapon firm, and this produces an objectionable pressure on the chest. The carbine breech (also the infantry rifle) is generally kept wrapped with cloth to keep out the dust, which is very frequent and troublesome in Manchuria. Japanese cavalry officers differ in their opinion as to the lance. Some believe in it for its moral effect. Some officers even favor a bayonet for firearms for night work.

The men's saddle is rather heavy for its size, but made of excellent material and wearing well. It has detachable pommel stuffed with wool, no burrs in front, and with short fantails. The kit is carried in detachable wallets and saddlebags. Two blankets are carried, and the overcoat is rolled and strapped. The entire kit is simple and serviceable. The saddle stirrups are of metal, which make them cold to the feet in winter and hot in summer. They are frequently wrapped in cloth.

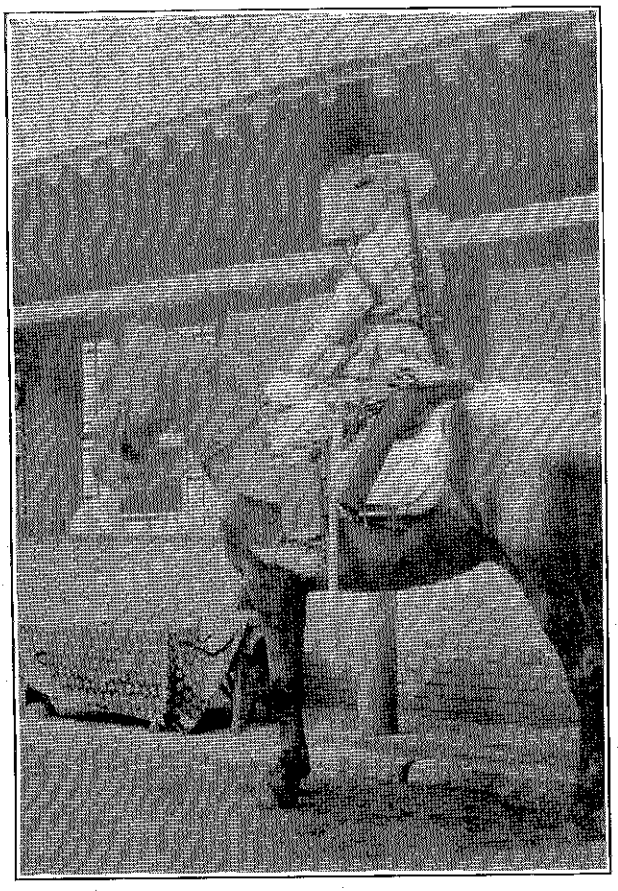
An inspection of six squadrons in June, 1905, showed

three sore backs only and very few old sores, from which it may be safely concluded that the men's saddle is a satisfactory article of equipment. The officers' pattern of saddle is smaller and lighter than that for the men, and, from my own experience, conducive to sore backs, probably from lack of stiffness in the arch, which permits of pressure on the withers. Fully 50 per cent of the horses with Japanese officers' saddle accompanying the second group of attachés on its ride from Liushutun to Haicheng, 150 miles, came in with sore backs. The march was an extremely easy one, taking thirteen days, of which four were days of rest. The two horses with American saddles on this march came in sound and whole, although one of them had exceptionally high and thin withers. Many cases of sore backs from the officers' pattern saddle developed during the campaign among the horses ridden by the attachés. But if defective in construction, the officers' saddle was quite comfortable, as I can testify after nine months' continuous experience.

The stable management is bad, the horses being fed and watered twice a day on an iron-clad system regardless of the conditions of work. The Japanese justify this procedure on the theory that the horse must accustom himself to hardships of service and that too much "nursing" is bad. It must be admitted, however, that the condition of the Japanese horses was good at all times, notwithstanding. They are tough and hardy naturally and accustomed to "hard picking" all their life, and accordingly do not require as much care as finer-bred animals.

Stabling is provided in summer time by improvised huts of light spars lashed with rope and inclosed with the universal kaoliang matting. In winter sunken huts are provided. Owing to their pawing and generally restless nature the standings in the improvised stables become bad very quickly.

The main grain ration is barley, fed unhulled and uncrushed. This seems to be difficult of digestion as shown by the grains in the horse manure. Long forage is fed only sparingly, and the horse's craving for such food was illustrated by his greed for any and all substitutes. Hard and unappetizing as they must be, the dry kaoliang stalks, preserved by the Chinese for fuel, were greedily eaten, as were



5. JAPANESE CAVALRY SOLDIER AND HORSE.

6. JAPANESE WINTER STABLES, SHAHO.

also the rice straw matting in which grain and other supplies are packed. I have seen horses tied to building walls tear these to pieces to get at the kaoliang stalks upon which the mud is plastered. Trees within reach of the animals were invariably barked.

During the latter part of the war Australian compressed fodder—a mixture of hay, whole oat stalks, and a little bran—and California baled hay were also issued in small quantities. Some millet straw was also purchased locally and fed with kaoliang grain and beans or bean cakes, the straw being chopped up in Chinese fashion. In the matter of feeding the Japanese learned much from the Chinamen whose live stock, in spite of extra hard work, was always in prime condition. No infectious or contagious diseases appeared among the Japanese horses during the war, showing that they are hardy and tough.

The shoeing of the cavalry horses is looked after carefully. Cold shoeing is employed on the march and hot when in camp. Veterinarians accompany the brigades, one with each regiment and one with the horse hospital with the train detachment.

The cavalry horses can hardly be said to be well broken or the men to ride well, although they do ride fearlessly. Officers as a rule show a good seat and have nice mounts. Normally there is no artillery with the brigades, but for the war an improvised horse artillery battery was organized for each brigade from captured Russian guns.

Machine guns were also added to the cavalry after the outbreak of the war, there being six to each brigade, divided into sections of two guns under one officer. Sections may be attached to squadrons as required. The guns are used primarily for defense and their fire reserved for short and mid ranges.

A general impression seems to prevail that the Japanese cavalry was a very negligible quantity in the war and that its quality does not merit serious consideration. Both impressions are not only incorrect, but unjust to a very zealous, earnest, and efficient branch of service in the Japanese army. Considering its numbers, the achievements of the Japanese cavalry are nothing less than wonderful, and the fact that it was not utterly wiped out of existence by the immensely

superior force of Russian horsemen should be convincing evidence of its ability.

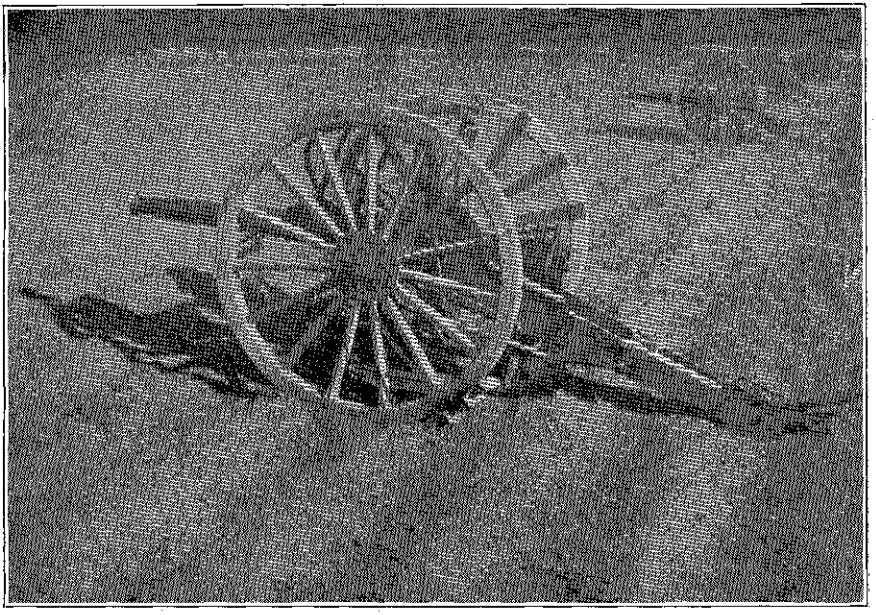
To one who has been privileged to form a closer acquaintance with the personnel of the Japanese cavalry it is not so difficult to understand how the latter maintained itself against the enemy. The high character and intelligence of officers and men, who were actuated by a keen spirit and earnest zeal, went a great way toward compensating for deficiency in numbers.

During January and February preceding the battle of Mukden the Japanese cavalry dispatched a number of patrols to the rear of the Russian lines to reconnoiter and to damage the railway line. So effective were the results of these patrols that the Russians became considerably perturbed over the safety of the railway and made new dispositions of their cavalry. It is claimed, and with some show of reason, that the withdrawal of his cavalry by General Kuropatkin to protect the railway line just before the battle of Mukden greatly facilitated General Nogi's turning movement.

THE JAPANESE ARTILLERY.

In what follows it is not proposed to enter into any details of the construction of the Japanese field and mountain guns, which are already known to the War Department, but to confine myself to some notes on the organization and tactics of the artillery as observed in the war.

In the regular organization 1 regiment (6 batteries) of artillery, field, or mountain guns, belongs to each division. This proved true except for the Seventh Division, which had but 4 batteries (2 field and 2 mountain) upon its arrival at Port Arthur in November, 1904. The following shows the kind of artillery accompanying the different divisions in the field: Guards Division, 6 field batteries; First Division, 6 field batteries; Second Division, 6 field batteries; Third Division, 6 field batteries; Fourth Division, 6 field batteries; Fifth Division, 6 mountain batteries; Sixth Division, 6 field batteries; Seventh Division, 2 mountain batteries, 2 field batteries; Eighth Division, 6 mountain batteries; Ninth Division, 6 mountain batteries; Tenth Division, 6 field bat-



7. JAPANESE FIELD GUN.

8. JAPANESE BATTERY WAGON.

teries; Eleventh Division, 6 mountain batteries; Twelfth Division, 6 mountain batteries; Fourteenth Division, 6 field batteries.

Besides the divisional artillery there were 2 artillery brigades, each of 72 field guns. One of these brigades was attached to the Third Japanese Army and the other to the Second and Fourth Armies, being shifted from one to the other as circumstances required.

Until after the battle of Mukden the Japanese had in Manchuria only their 13 line divisions and a certain unknown number of Kobi brigades. The organization of the Kobi brigades calls for 1 battery of artillery and 1 squadron of cavalry, but I never saw either artillery or cavalry with the Kobi brigades in the Second or Third Armies. The Kobi brigades were held as general reserves for the armies, and all information concerning their numbers was carefully guarded; but from the best information available it does not seem that there could have been more than 1 or 2 such brigades in each army, with perhaps several additional held in reserve by Marshal Oyama.

Leaving out of consideration the Kobi brigades, whose artillery complement, if any, would be small, the Japanese had 600 pieces of field artillery all told, of which 192 were mountain guns.

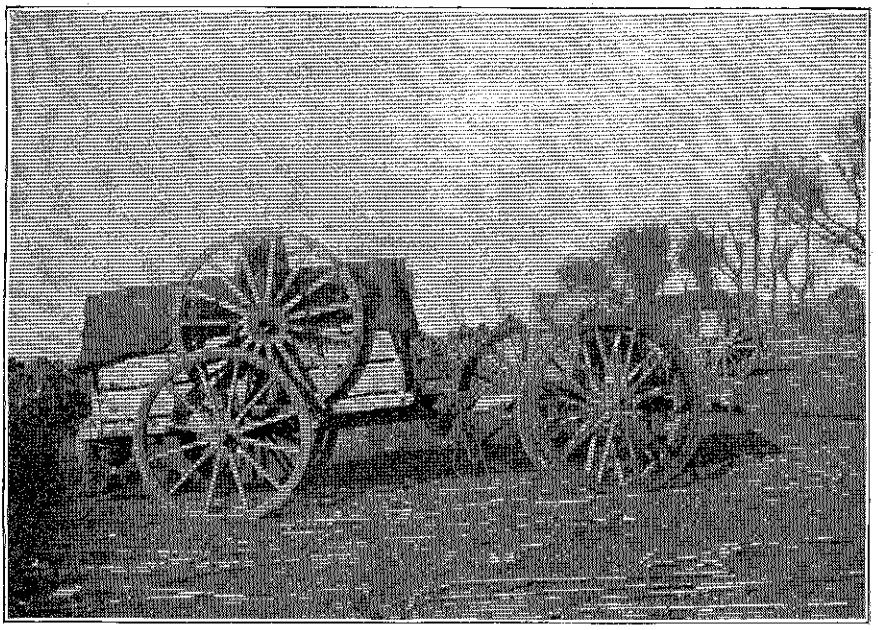
Besides their field artillery they also possessed a complement of 15-cm. and 12-cm. howitzers, horsed, and a complement of 9-cm. field mortars, transported on handcarts. These howitzers and mortars were organized in batteries of 4 pieces. The distribution and number of these pieces could not be ascertained beyond the fact that the Port Arthur army has 16 15-cm. howitzers, 28 12-cm. howitzers (4 knocked out), and 24 9-cm. mortars in its siege armament. Part of the howitzers had been used at the crossing of the Yalu by the First Army and then sent to the Third Army. All the field howitzers used at Port Arthur were sent north, and were presumably used in the battle of Mukden on some part of the front. Field howitzers and mortars also accompanied the Second Army during the battles of Liaoyang and the Shaho, and it is known that 32 such howitzers and mortars, mostly the latter, were posted and used at Liaoyang. The Japanese

called these howitzers and mortars their heavy artillery. At Port Arthur this ordnance was in charge of fortress artillery organizations, and the same may be assumed to have been the case in the field armies. On the advance to Liaoyang the 9-cm. mortar section was seen a number of times on the march. The mortar is of steel, on a wooden platform, and very much like our 3½-inch field mortar, the caliber being a trifle larger.

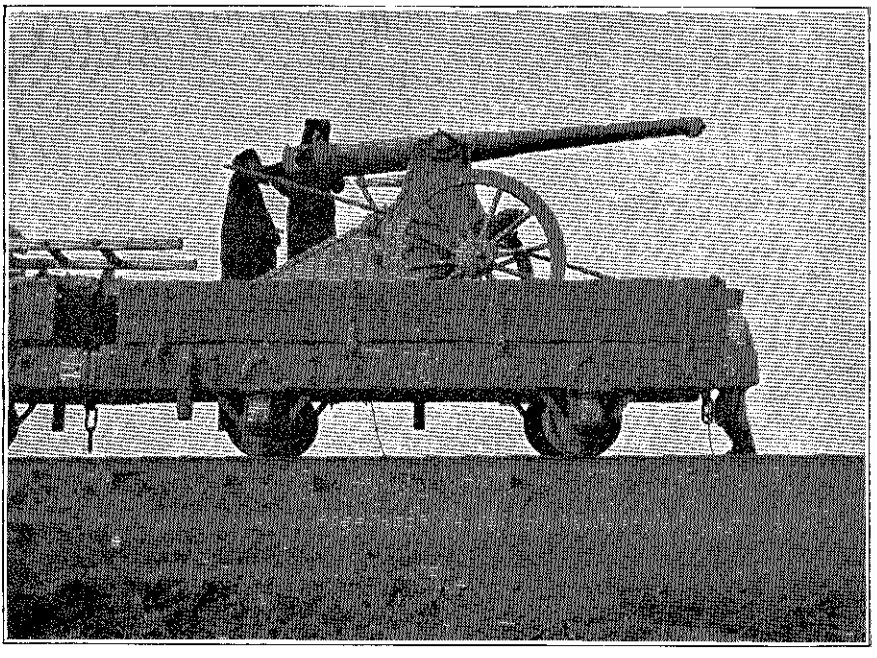
Besides their field and heavy artillery the Japanese also organized a number of captured Russian guns into batteries of 6 pieces. Thus, during the battle of the Shaho, at least one such battery was used by the Sixth Division, and it was understood that others were also organized later from guns taken in that battle. The Ninth Division had a battalion of 3 batteries of Russian guns organized from the trophies at Port Arthur. Probably there were other batteries organized in the other armies of which I have no knowledge. Up to and including the battle of the Shaho the Japanese had captured about 150 Russian quick-firing field guns and a fair amount of ammunition. Many of these guns, however, were minus some essential part of the breech mechanism, which had been removed by the Russians before abandoning the pieces. One difficulty complained of by the Japanese officers in utilizing the captured guns was their weight and the inability to procure horses of sufficient size and strength to horse them satisfactorily. Two Russian batteries were also used during the battle of Mukden by the cavalry division operating on the left flank of the Japanese army, being employed as horse batteries.

Four 10.5-cm. siege guns, captured at Nanshan, were used by the Japanese during the battles of Liaoyang and Shaho. They were transported on push cars along the railroad and always emplaced close to the railway track, as it was impracticable to transport them across the fields. These guns were presumably also employed during the battle of Mukden.

Allowing 14,000 combatants to a Japanese division and estimating each of the four field armies up to the battle of Mukden as having 2 Kobi brigades aggregating 12,000 combatants, the total number of combatants would be about 230,000. Considering only the Japanese field artillery, the proportion of guns works out to about 3 per 1,000 combatants.



9. JAPANESE BATTERY WAGON.



10. RUSSIAN 10.5 CM. GUN TAKEN AT NANSHAN AND USED BY JAPANESE AT LIAOYANG AND SHAHO.

The mountain guns, which form about one-third of the Japanese artillery complement, are sighted to 4,300 meters only and have an effective shrapnel range of 3,700 meters. The field gun is ranged to about 5,500 meters with an effective shrapnel range of about 4,500 meters. Contrasting this with the Russian field gun, which is ranged to 6,400 meters and fires a 15-pound shell as against a 11-pound Japanese shell, it will be evident that in the matter of material the Russian artillery had a decided advantage over that of the Japanese. As regards the number of pieces possessed by both sides, it was generally understood that the Russians also had an advantage. In one particular only did the Japanese artillery possess an advantage, and that was in the matter of a high-explosive shell, of which the Russians had none, or, if they did, never fired any to my knowledge. This advantage turned out to have been a most important one and went far toward maintaining a balance in the artillery equipment of the belligerents. The Russians being nearly always on the defensive and occupying fixed lines with artificial or natural cover, the high-explosive shells of the Japanese artillery rendered service to their cause to a degree that is little appreciated. The material and moral results of high-explosive shells found frequent illustration, both at Port Arthur and in the field battles. Village walls and houses ceased to afford safe cover, and the trenches in the rocky soil of hilltops, while not so vulnerable as villages, must have been very trying to the defenders' nerves under the accurate high-explosive-shell fire of the Japanese. Against material cover of even the slightest kind shrapnel fire is practically powerless, and when fired with uncut fuse the shell can do no more than perforate a small hole in a wall.

The Japanese high explosive shell is charged with picric acid, which gives off a huge volume of dense, black smoke on explosion. Occasionally shells failed to explode, but would break up on stony soil, scattering the explosive about and staining the ground an intense yellow. The importance attached by the Japanese to high explosive shells may be judged from the fact that they formed from one-fourth to one-third of the ammunition carried.

The Japanese gun was in no sense a quick firer. The ammunition is separately loaded, the powder charge being

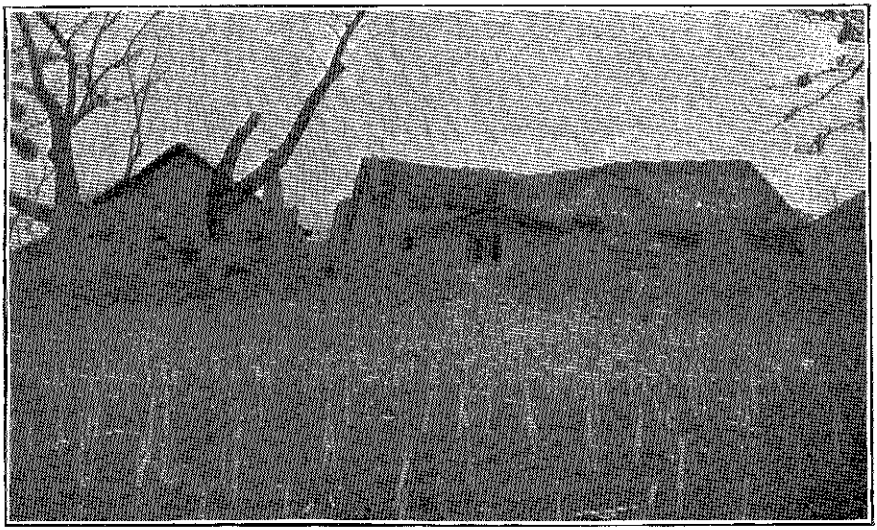
contained in a brass case. The gun limber recoils on its wheels after each shot, being automatically returned part way into battery by the tension of a spring operating through a wire rope carried from the spring around the axle to a brake shoe under the wheels. Some assistance must be given by the gunners in order to secure full return into battery. This is effected by two men, one on each side, who seize the wheels as the limber begins to move forward under the action of the spring and by their efforts complete the return into battery. On account of the heavier work required in the service of the artillery the soldiers for this branch of the service are selected from the taller and stronger recruits.

The Japanese mountain gun is carried on pack ponies, of which five are required per gun. One pony carries the gun alone, one carries the upper part of the trail, which is in two pieces coupled by a socket joint, one carries the lower part of the trail, one carries two wheels and two boxes with powder charges, and the fifth pony carries two shell boxes each with 7 rounds. The smaller parts, such as shafts, handspikes, etc., are distributed among the four ponies not carrying the gun. The pack saddle used throughout the army is employed with the addition of a light iron cradle to carry the gun and trail pieces. With the saddle the horse wears a harness by means of which the gun when assembled may be drawn about. The gun can be knocked down and loaded, or unloaded and set up, in less than three minutes.

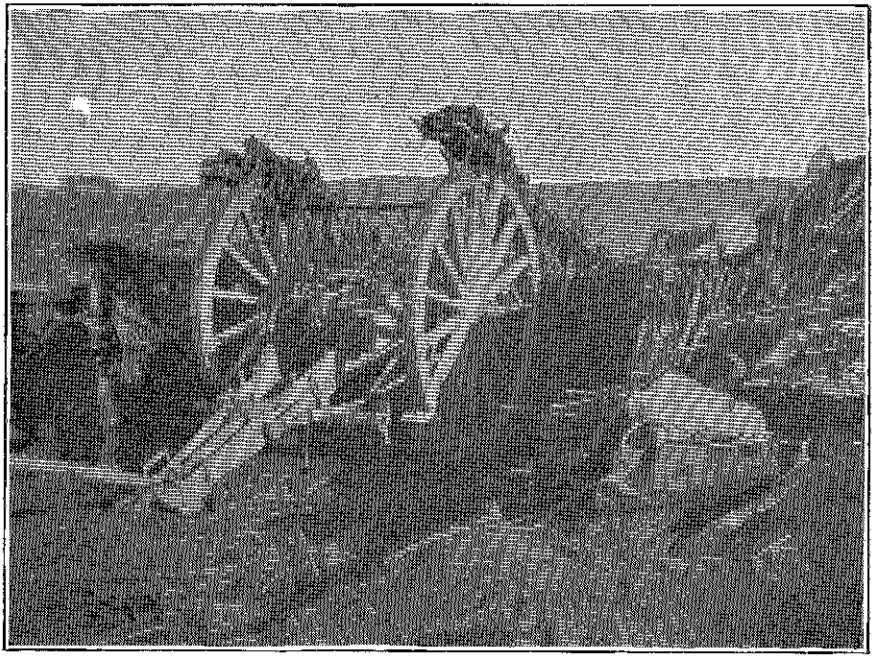
Each artillery regiment has 2 ammunition columns, each of 136 Japanese carts, providing 150 rounds per gun. The shells are transported in wooden packing boxes holding 9 each, 4 boxes to 1 cart.

Each battery carries with it 130 rounds, 40 rounds in the gun limber and 45 rounds in each of the caisson limbers. The regimental reserve, 70 rounds per gun, is carried in 27 caissons. The total number of rounds per gun, carried with battery, regimental reserve, and ammunition column, is 350.

Tactically the Japanese handled their artillery with great skill and daring. Guns were massed and fire concentrated upon the objective of attack. Thus, at Liaoyang, the fire of 180 field guns and 32 howitzers and mortars was brought to bear on the Shoushanpu position during August 30 and



11. WALL AND HOUSES BREACHED BY JAPANESE HIGH-EXPLOSIVE SHELL.



12. JAPANESE FIELD-GUN EMPLACEMENT, SHAHO.

31, 1904. In the attack on Chaohuatun, March 7, 1905, by the Ninth Division, 108 guns were brought to bear on the Russian position. In the attacks on the outlying Russian positions at Port Arthur similar tactics were brought into play. In the attack on Shihliho, October 12, 1904, 72 guns bore on this village. In every case of this kind the Japanese artillery was overwhelmingly superior to that of the Russians, who, notwithstanding their superiority in artillery as a whole, never seemed able to bring but a small part into action at threatened points. The Japanese, having the initiative, could bring their artillery to bear where they pleased, whereas the Russians, being on the defensive, were under the necessity of dispersing their guns along the entire defensive line.

Being outranged by the Russian guns, the Japanese were under the necessity of getting in pretty close to the Russian lines in order to make the fire of their artillery effective. But aside from this necessity the Japanese artillery leaders showed great daring in the way in which they pushed up their guns and supported the infantry. At Port Arthur the field artillery was generally pushed up to within 1,500 yards of the Russian works, while at Chaohuatun on March 7, 1905, the artillery was gradually pushed forward, as the attack developed, to 1,800 yards from the village. At Tungehangshang, March 10, 1905, two batteries were pushed into Kuoshantun, from whence they shelled the Russians at a distance of only 400 yards. The infantry attack was always supported up to the last moment by the artillery, which did not hesitate to fire over the infantry for this purpose.

The shooting of the artillery was very good, and it seemed to have no difficulty in ranging its guns. The accuracy of the Japanese artillery was commented upon by both Generals Kuropatkin and Stoessel, the former in his paper on Japanese tactics, which appears under the subject of the Japanese infantry, and the latter in conversation with General Nogi while discussing terms of capitulation at Port Arthur.

In selecting gun positions great attention was shown in the matter of concealment. Much of the firing was indirect, being controlled from an observatory on a near-by eminence or from a tree top. At Liaoyang, during the attack on the

Shoushanpu position, the Japanese artillery took up its position in the fields of kaoliang, which had at this time reached its maximum growth, the fire being directed by observers located in tree tops, house tops, or on stepladders carried by the batteries and of sufficient height to enable the observers to look over the top of the kaoliang. During the attack on the inner lines at Liaoyang the fire of the main artillery position was controlled by observers on the summit of Shoushanpu, about 1 mile to the left rear of the position. Observers are provided with large telescopes or hyposcopes and have telephonic conection with the batteries. Where no natural concealment exists artificial concealment is provided if possible. During the battle of the Shaho much of the kaoliang had been cut and shocked, and the Japanese utilized these shocks for concealment.

During the battle of Mukden, when the fields were utterly bare, the guns of the artillery brigade of the Third Army were provided with improvised shields of light plate wired to the gunner's seat. These shields were shrapnel proof and, although small, afforded fair cover to the gunners, who had to maintain a crouching position owing to the lowness of the gun. As digging of gun pits was impossible in the frozen soil, the batteries also carried a supply of sand bags with which to construct epaulments, filling them with frozen dust scraped from the surface of the ground. Village walls also afforded good gun positions, the guns firing through ports, while the houses afforded cover for the teams and ammunition wagons.

The Japanese artillery, besides showing skill in concealing their gun positions, regulated its fire with a view to deceiving the Russians. If the Russian shrapnel commenced to get the range and to burst near the front or rear of a Japanese battery, the latter would cease fire, as if it had been found, and the Russians would hold their range and pound away uselessly on a line several hundred yards short or over. When the Russian batteries ceased the Japanese would resume. If by any chance the Russians got the correct range the Japanese would continue firing regardless of losses until the Russians altered the range. These tactics were personally noted during the preliminary artillery attack on Shihliho, October 12, 1904.

All the foreign observers were of one accord in their estimate of the Japanese artillery, which rendered a most excellent account of itself during the war. Although outclassed in its material, and probably in quantity also, it not only held its own, but showed a marked superiority over the Russian artillery. This result was due entirely to the skillful and daring manner in which the artillery was handled. That it accomplished great material results is testified by the statistics of the Russian casualties, which show about 20 per cent due to artillery. At Port Arthur the Japanese also suffered heavily from the artillery, which was responsible for about 20 per cent of the casualties, but in the field battles their losses from artillery appear to have been less. The only authentic statistics which I was able to secure are those of the Second Army at Liaoyang, where the casualties due to artillery amounted to 6.99 per cent.

TECHNICAL TROOPS.

THE JAPANESE ENGINEERS.

The following notes on the organization and equipment of the engineers are largely the result of an inspection of the Sixth Battalion made on September 28, 1904, by authority of the headquarters of the Second Army. The battalion was at this time quartered in a village on the right bank of the Taitzu River, about 4 miles northwest from Liaoyang.

In time of war the engineer battalions are organized into three field companies, a field telegraph section, and a bridge column. Each field company consists of 5 officers and 220 men, with a pack train, without cart or wagon transportation. The horses of the pack train are in charge of train soldiers, who are not included in the numerical strength of the company. According to the statement of a staff officer, there are 25 pack animals in the company train, but a company officer of engineers stated that there were 30. Of these, 13 carry engineer tools and material, while the remainder carry the heavy baggage. Each engineer battalion has its regulation quota of medical officers and hospital corps men.

The field companies all perform the same class of work; that is, they are all competent to perform demolitions, bridging, roadmaking, surveying and mapping, etc. No railway or balloon organizations were met with in the field, but when any special technical work arises, such as operating searchlights, such work is put in charge of the engineers. Thus at Port Arthur the military balloon and the searchlight outfits were in charge of the engineer soldiers attached to the engineer park.

Normally the engineer battalions are under the direct command of their respective division commanders, although they may, on occasion, be directed from army headquarters.

The equipment and uniform of the engineer troops is the same as that of the infantry, excepting only the tools carried on the person and the number of rounds of ammunition. The pickaxes and shovels are long handled, and, as a compensation for the increased weight, the men carry but 90 rounds of ammunition in the belt, instead of 120, one of the front cartridge boxes being omitted. The distinguishing color of the engineers is a reddish brown.

The engineer recruits are obtained from the annual drafts by selection, the minimum height being 5 feet 4.42 inches; in other words, about 1½ inches more than for the infantry. The men must be "handy" men, able to read and write well, and good at arithmetic. Of those selected, one-twentieth must be suitable for smiths, one-sixth for carpenters, one-fifth for boatmen, and the remainder for telegraph or railway work.

The annual instruction of the battalion for the first year includes:

1. Individual instruction.
2. Gymnastics.
3. Musketry, preliminary drill.
4. Estimating distances.
5. Firing with reduced charges.
6. Digging, revetting, fascine and gabion making.
7. Drill in small squads.
8. Rifle practice.
9. Company drill.
10. Bayonet exercises.
11. Packing and loading tools and stores.
12. Construction of field works.
13. Field exercises.
14. Swimming and rowing.
15. Pontoon and other bridge construction.
16. Battalion drill.
17. Military roads.
18. Construction of redoubts.
19. Maneuvers.

13. PIONEER PACK TRAIN, SHAHO.

14. PIONEER PACK TRAIN, SHAHO.

During the second and third years the work of the first year is repeated and sapping and surveying practiced.

For the higher education of engineer officers there is a school for artillery and engineers at Tokyo, to which junior officers are detailed for a normal one year's course.

The distribution of the tools among the personnel of a field company, as witnessed during the inspection of the Sixth Battalion, is about as follows:

By whom carried.	What carried.	Number per company.
Noncommissioned officers.	1 clasp knife, 1 notebook, 1 10-meter tape	.....
Privates	1 jointed cross-cut saw	6
Do	1 hatchet, 1 chisel	5
Do	1 billhook, 1 hand-saw with detachable blade	6
Do	1 ax with detachable handle	30
Do	1 pickax with detachable handle	60
Do	1 shovel with detachable handle	90
Do	1 hatchet, 1 ship's auger	10
Do	1 bull's-eye candle lantern, folding, brass	.....
Noncommissioned officer.	50 meters tracing cord, chalk line	.....

The small tools, also the ax blades, are carried in leather cases and strapped to the soldier's pack.

Besides the tools carried on the person, the company pack train carries additional tools of the same kind, as well as all the special tools and materials.

Of five pack ponies exhibited, three carried tool boxes and two, long-handled tools and sundries.

The tool boxes are all identical—2 feet 4 inches long by 1 foot 3 inches wide by 7 inches deep over all. They are made of wood about five-eighths inch thick, covered inside and outside with thin sheet metal and painted dark gray. The box has a hinged cover with two hasps, and two short chains riveted to the bottom for slinging to the pack saddle.

The contents of the six tool boxes shown were as follows:

No. 1: Carpenters' tools, such as hand hammers, chisels, planes, ship augers, pincers, chalk lines, saws, adze, squares, whetstone, wire nails, etc.

Nos. 2 and 3: Blasting material, mainly explosives and Bickford fuze. The explosive was of two kinds—dynamite sticks, 1 inch diameter and 5 inches long, and cubes or blocks of Japanese "yellow powder," undoubtedly a picrate. Each piece of explosive was wrapped in oiled paper. Each box

contained about 50 pieces of explosive, mostly "yellow powder," weighing, it is judged, 30 to 40 pounds in the aggregate.

No. 4: Blasting apparatus, consisting of two reels of insulated wire, Breguet exploders and electric fuzes.

No. 5: Wire (light galvanized, about 0 gauge), iron dogs, folding siege lanterns, sickles, side-cutting pliers, adjustable level, jointed saw, rope, monkey wrench, billhooks, etc.

No. 6: Surveying outfit, consisting of folding tripod, plane table, compass, collimeter, hectograph, etc.

Each box is marked on the outside to show the nature of its contents, while inside each, on the cover, is a drawing showing contents and method of packing the box. The boxes are simply hooked to the pack saddles by their chains without lashings of any kind. When so hooked up, the lids are out and hinges down, so that a box may be opened without taking it off the pack saddle.

The two pack horses loaded with long-handled tools carried loads as follows:

No. 1: Eight shovels (4 each side), 8 pickaxes (3 one side and 5 on the other), 1 maul, and 2 canvas packages containing (*a*) billhooks, chalk lines, wire cutters, and (*b*) coil of galvanized wire and iron dogs.

No. 2: Twenty shovels, 8 pickaxes, 4 axes, and 4 long, powerful, two-handed wire cutters.

The average load per pony is 165 pounds. The axes have their blades incased in a netting with straw edge for the cutting edge of the blade.

No information was given concerning the total number of tool boxes carried for each company, but on one occasion, during the battle of the Shaho, an engineer company pack train contained 9 ponies, each with 2 tool boxes, and 4 ponies and 1 steer with long-handled tools, from which it would appear that 18 tool boxes constitutes a company outfit.

The long-handled tools carried by pack animals are supported by a simple iron loop 3 feet long and 5 inches wide, made of five-eighth inch round iron, with 2 short loose chains. The tools are inserted into the loop, handles down, equally divided between the ends of the loop. The handles of the two bunches of tools are crossed and held by a diagonal lashing which is fastened to the ends of the crossbar of the

saddle, so that the weight of the tools tends to spread the two bunches apart, thus jamming them against the ends of the loop. The loop with tools is simply hooked to the saddle by the chains without other fastenings.

The pack saddle is identical with that in general use throughout the Japanese army, described under the "Japanese transport and supply system."

Generally speaking, the engineer equipment in the Japanese army is characterized by its simplicity and its adaptability. Tools and supplies are reduced to the lowest limits possible, both as regards variety and quantity. The mistake of attempting to provide for every possible contingency that might arise and loading down transportation with a lot of useless plunder has been studiously avoided.

So far as could be learned no special outfit of blacksmith tools was carried into the field by the engineers, and in one instance at least where blacksmithing work was required in the construction of a bridge the work was done by native smiths. Field forges accompany the train battalion of the division, and these afforded all necessary facilities for doing such blacksmith work as became necessary.

Iron dogs were used exclusively as fastenings for heavy timbers in bridge work and, in my judgment, are far superior to bolts for work in the field, saving both time and tools. Their more general adoption in our engineer service merits earnest consideration.

The principal duties of the engineer troops with the field armies during the war were limited to bridge building, road construction, building redoubts, and demolitions, and these kept them reasonably busy. The flat plain of the Liao is intersected by numerous streams of varying sizes, having steep banks and sandy bottoms.

The Taitzu River below Liaoyang and the Liao are unfordable. The remaining streams can generally be forded except when in flood, care being taken to avoid the quicksands with which these streams abound. Excepting the railroad bridges there are no others in Manchuria, the native carter depending upon the fords or ferries, of which latter a few are maintained on important roads. Under such conditions many military bridges were required, and the Japanese engineers generally showed great skill in this class of work.

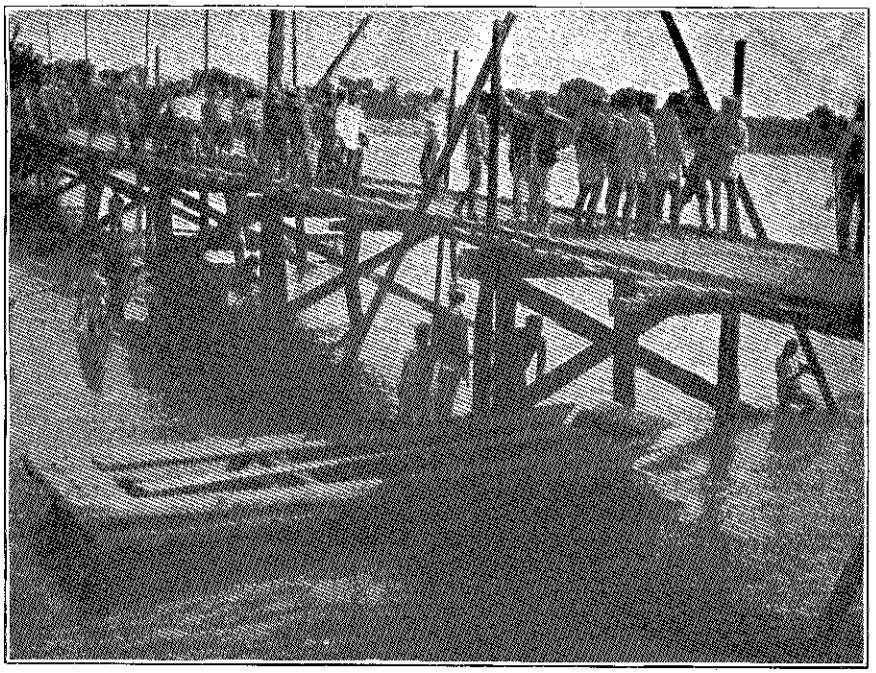
Where available, the Chinese junk, which was eminently adapted to the purpose, was employed to construct pontoon bridges. On the smaller streams, where junks could not navigate, pile bridges were constructed, using the only available timber, viz., the cottonwoods and willows, of which a few grew in villages and about the ancestral tombs.

At least six bridges were thrown across the Taitzu River after the battle of Liaoyang, five across the Hun, and eight across the Liao, besides many others across the smaller streams to the rear. The bridges mentioned by no means cover all that were built, but merely those of which there is personal knowledge. Of the numerous bridges constructed by the Japanese engineers of the Second and Third Armies several typical forms are shown on Plate II and by the photographs herewith.

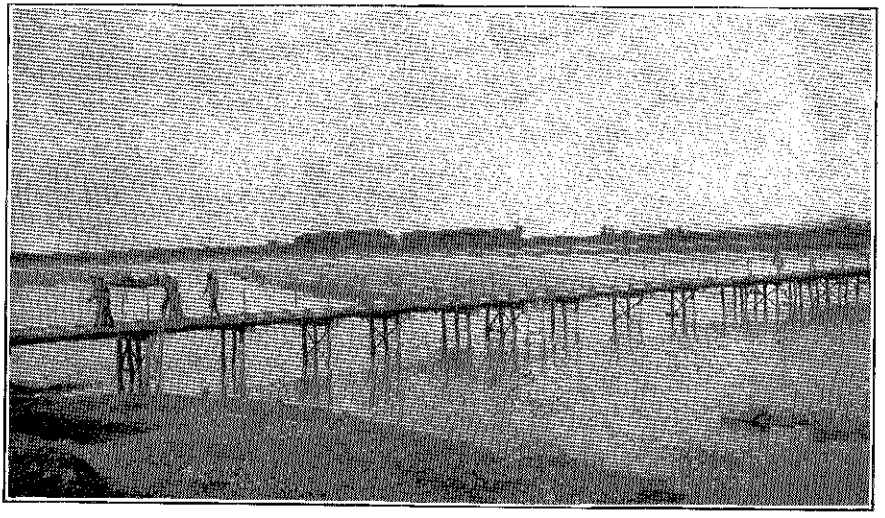
The bridge at Kaiping, shown on Plate II, was intended for foot passengers and horsemen only, and was of light construction. The trestle bents were about 20 feet apart and braced transversely by inclined piles. A detached and braced fender pile was placed upstream to ward off floating débris. Four steel rails served as stringers, supporting the planking, which was held in place by side rails and rack lashing. There was no longitudinal bracing other than that afforded by the stringers which were wired to the trestle caps.

The Taitzu River bridge (A, Pl. II) was likewise intended for light traffic only, including Japanese pony cart. Every fifth bent was braced in the manner shown in the cross section. Intermediate bents were either entirely unbraced or provided with the simple 2 by 4 inch diagonals. The hand rail was of simple wooden posts, spiked to the cap, with two running cords of light wire rope.

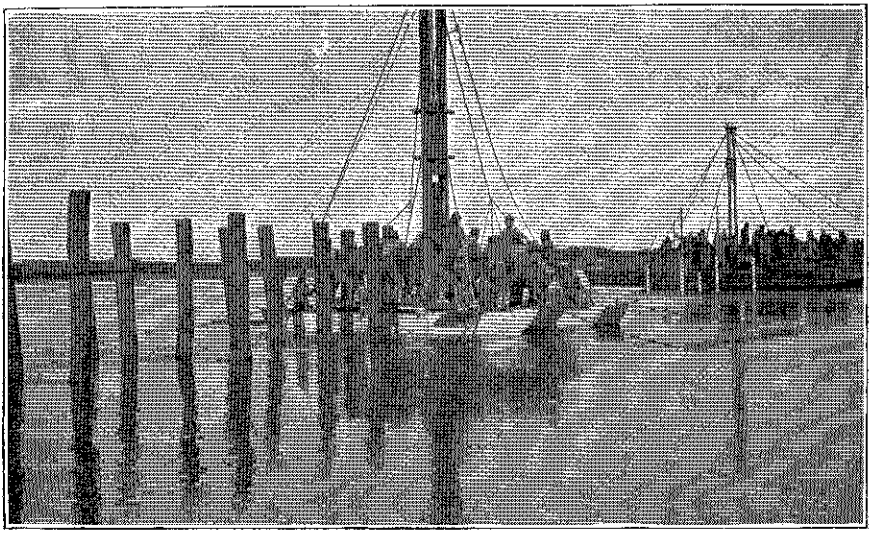
The Haicheng River bridge presented a unique example of the adaptation of steel rails and wire in bridge building. The trestle bents were spaced about 25 feet apart and braced by diagonals. A steel rail was then driven vertically alongside the outside piles of the bent and spiked to those piles by ordinary railway spikes. Inclined rails were driven in the plane of the trestle bent and wired to the vertical rails. The six steel rails used as stringers were trussed by two 2 by 10 inch plank supported under the middle of the stringers by wire cords running to the tops of the vertical steel rails.



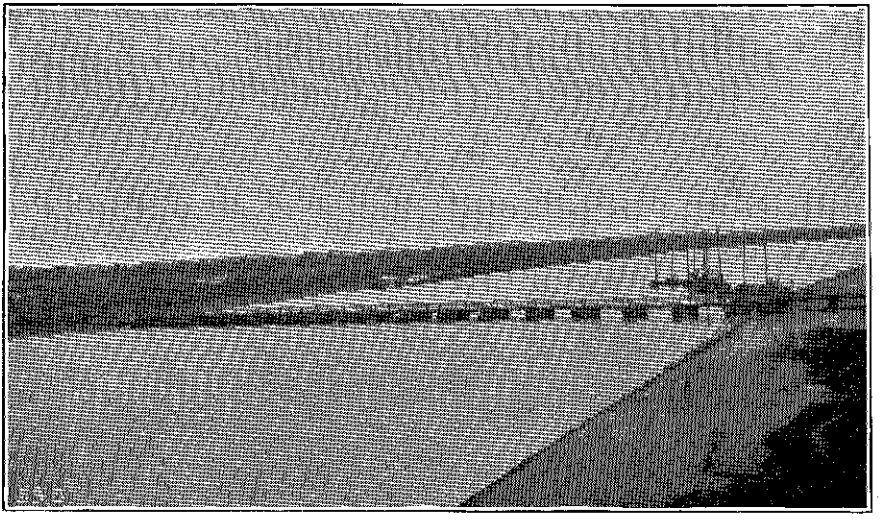
15. BUILDING BRIDGE ACROSS HAICHENG RIVER.



16. BRIDGE OF FIRST ARMY ACROSS TAITZU.



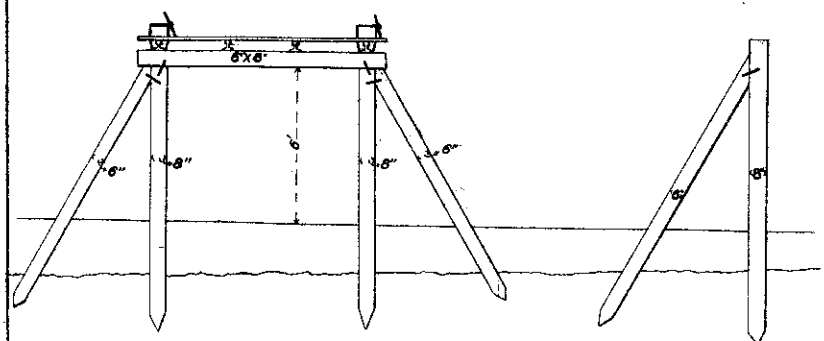
17. JAPANESE ENGINEERS BUILDING TRESTLE BRIDGE ACROSS THE TAITZU.



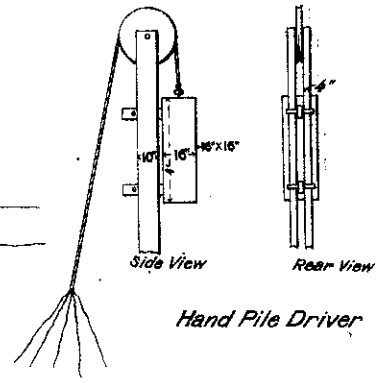
18. JAPANESE PONTOON BRIDGE ACROSS LIAO AT HSIAOTATZU.

Japanese Military Bridges

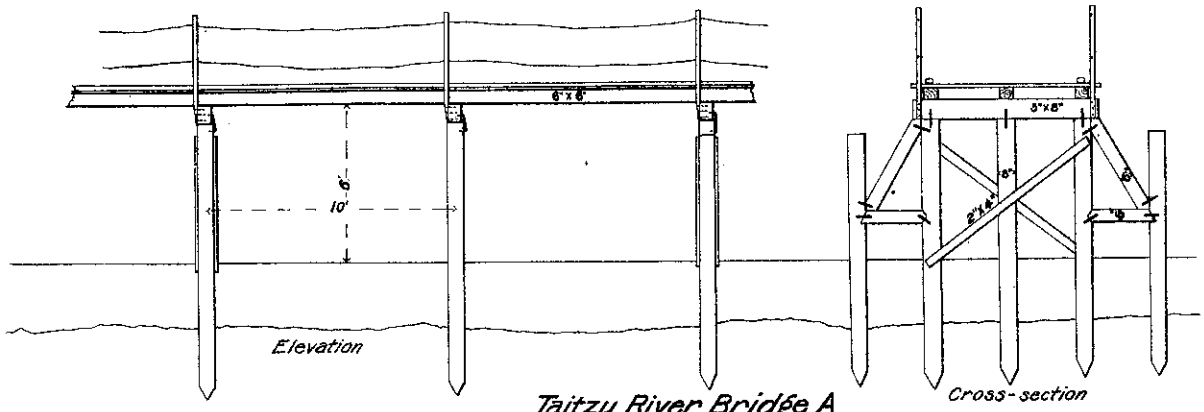
0' 5 10 15 FEET



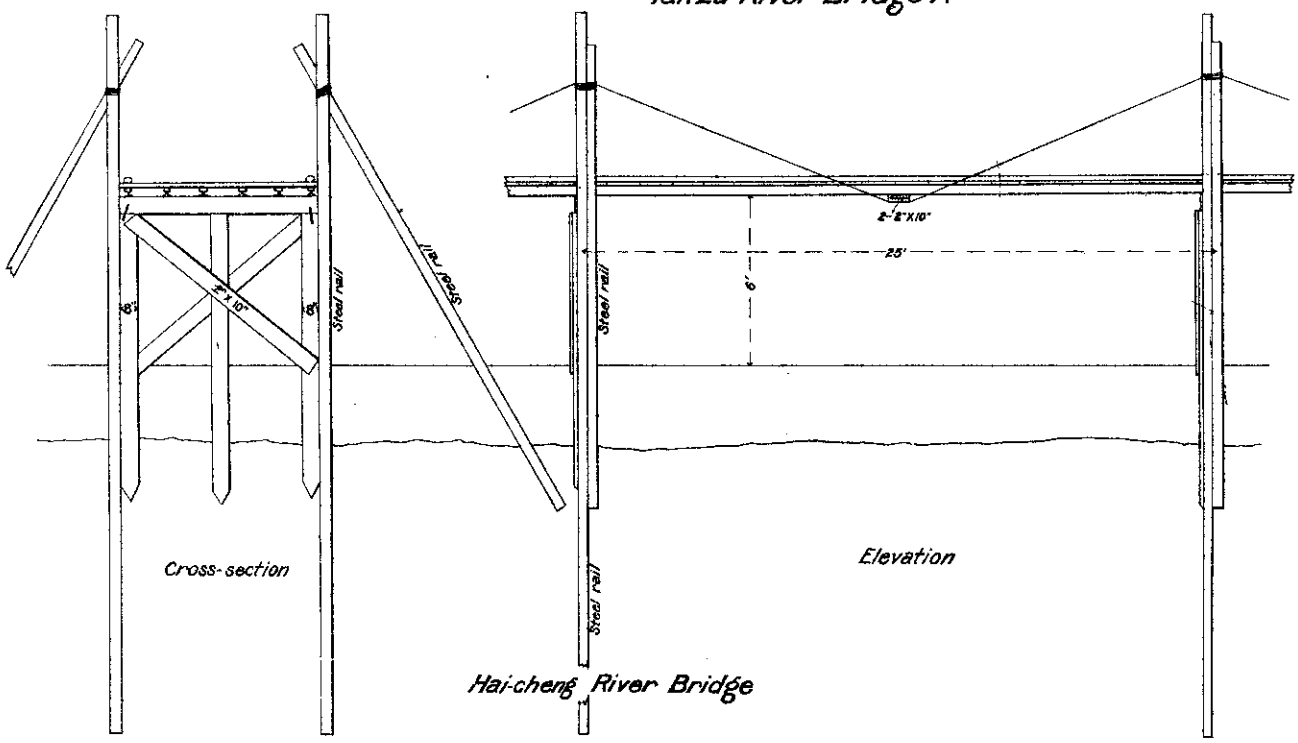
Bridge at Kaiping



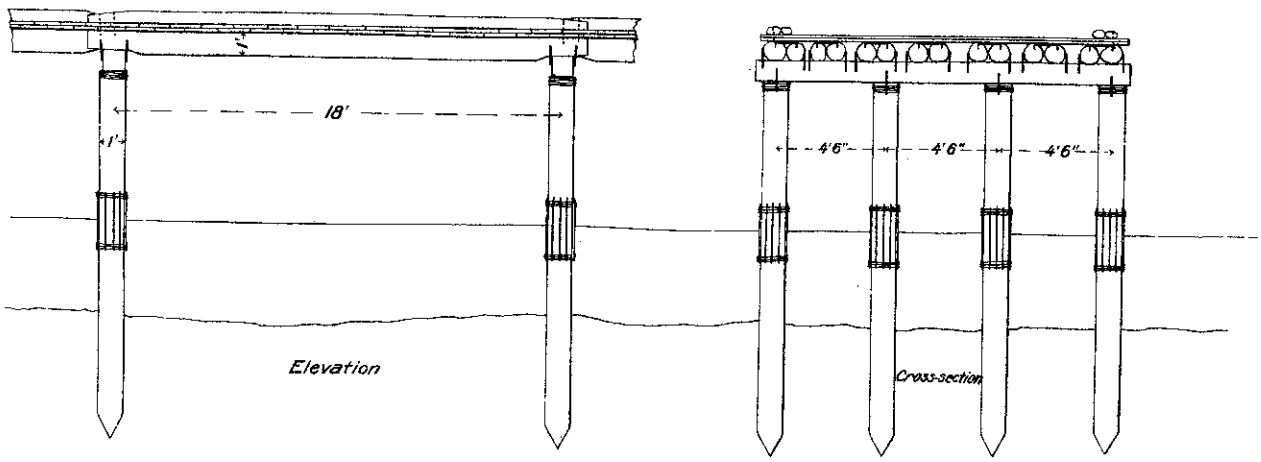
Hand Pile Driver



Taitzu River Bridge A



Hai-cheng River Bridge



Taitzu River Bridge B

Joseph E. Kuhn,
Major of Engineers

PLATE II

The bridge is 145 meters long, and it took one company of engineers five days to complete the structure.

The Taitzu River bridge (B, Pl. II) was a strongly built trestle bridge, designed to carry the heaviest wheeled loads. The piles are protected at water line by a ring of iron bars laid longitudinally and held in place by wire. This bridge was built during September, and the protection of the pile against floating ice and débris required consideration. The piles were wrapped with wire at the top to protect them while being driven. The seven stringers were of round logs dressed flat to secure a bearing on the caps. Stringers, caps, and piles were all strongly fastened together by iron dogs, as shown in the drawing. The planking was doubled, each layer being about 1½ inches thick. It will be noted that the bridge is without transverse or longitudinal bracing of any kind, reliance being placed altogether upon the rigidity and strength of the iron-dog fasteners to keep the bridge from yielding. This bridge was built about 50 yards downstream from the railroad bridge and almost on the same line as the Russian trestle bridge, which had been destroyed by fire on the retreat from Liaoyang. The length of the bridge is about 150 yards, and it took one company of engineers a full week to build the structure, after materials had been delivered on the ground. Pile driving was done by ringing engines, mounted on rafts, or Chinese junks or Japanese pontoon boats, there having been a total of seven engines, each operated by from 22 to 24 men. Just a year later, while returning from the front, this bridge was observed to have been carried away, probably by the breaking up of the ice in the spring. The photograph herewith shows the bridge in progress of construction.

As an example of a pontoon bridge, those crossing the Liao at Hsiaotatzu and Shihfossu have been selected. They are sufficiently shown in the photographs and need no further description. The one at Hsiaotatzu was built leisurely by the First Battalion of Engineers during the summer of 1905 to replace an earlier bridge at the same place. Like all the bridges across the Liao, it has a draw span, in this case 11 meters wide. The Chinese junks were so well adapted for use as pontoons that they were nearly always employed in preference to trestles. These junks are very stanchly

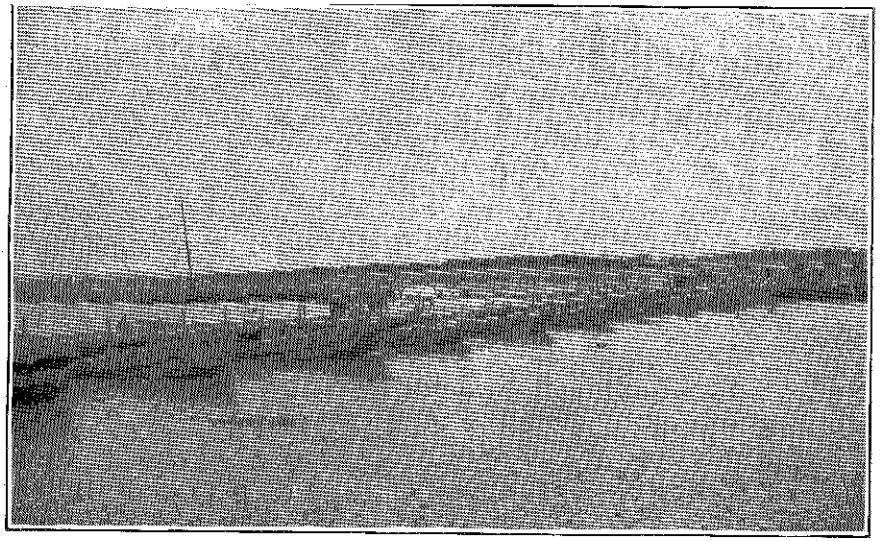
built and of sufficient buoyancy to afford a stiff bridge under the heaviest loads. As the current in the Liao is very swift, every junk was anchored upstream, downstream anchors being employed every second or third boat.

Until the battle of Mukden the Russians made no attempt to permanently damage the railroad, simply contenting themselves with burning the wood floors of the bridges as they fell back. At Anshantien and at Liaoyang the floors of the large bridges were thus destroyed, and it devolved upon the engineers to relay the same.

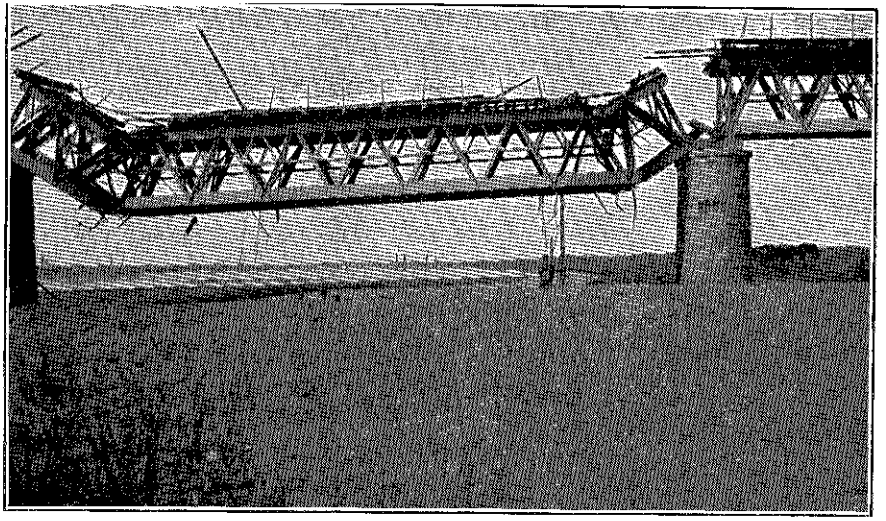
As bridge builders the Japanese engineers displayed skill and adaptability in utilizing the scanty resources afforded by a country like Manchuria. Their work was neat and, though light, sufficient for the ends in view. Their work, however, like all the operations of the Japanese, was characterized by deliberation and slowness. As an illustration, the case of the Hun River railroad bridge may be cited. This bridge consists of 23 riveted spans, each 120 feet long. On the 10th of March, 1905, the Russians effectually destroyed three spans, rendering the bridge useless for railway purposes. Instead of attempting to repair the railroad bridge, the Japanese built an entirely new low-level bridge alongside, using plate girders supported by trestle bents, and grading up at each end to the existing railway embankment. This work required six weeks' time and was done by the railway employees. The repair of the existing railway bridge could have been effected very simply by cribbing built up from the shallow river bed (one damaged span was over dry land), and I am confident that with American troops the railway would have been in working order across the bridge in less than one week. The appearance of the damaged bridge two weeks after the battle of Mukden is shown by the photographs herewith.

Upon my return from Manchuria the damaged railway bridge had been repaired by heavy timber trestlework and the temporary bridge abandoned. A similar procedure was adopted in the case of the wrecked bridge at Kaiyuan.

Notwithstanding the great amount of trestle bridge building accomplished, steam pile drivers were never employed, all work being done by hand. In fact, all the military operations of the Japanese suffered in respect to rapidity by their



19. PONTOON BRIDGE AT SHIHFOSSU.



20. HUN RIVER RAILROAD BRIDGE, BLOWN UP BY RUSSIANS MARCH 10, 1905.

failure to appreciate the benefit of doing things on a larger scale and using labor-saving machinery. In making the criticism due allowance must be made for national character and financial limitations.

Ferries were also occasionally employed to cross the Liao. These consisted either of a raft, made by lashing together two junks, or of the specially built Chinese ferryboat. Both types were operated by sculling.

During the summer of 1904, while attached to the Second Japanese Army, there was little road building done. In a few cases especially bad spots were ditched or cut out by a new road through the fields. During the summer of 1905, while attached to the Third Army, much road building and improvement were accomplished in the sphere of operations of that army in the country about Fakumen. The topography is rolling and hilly and the ground much cut up by nullahs or ravines, which latter generally contain the roads, the soil here being sandy and gravelly, and consequently firmer. In wet weather, however, the alluvial character of the soil and the numerous nullahs and ravines intersecting the roads render them all but impassable.

To remedy these conditions the Japanese improved the existing roads from Sanmiencheng, on the Liao, to Hsiaotatzu, via Fakumen, and the one from Tungchuangkou to Fakumen. The improvements consisted generally in ditching and draining the existing roads and in providing bridges over the worst crossings. Several low and marshy spots were corduroyed, but the scarcity of timber prevented any general application of this system of improvement. Beyond Hsiaotatzu the road crosses marshy ground for a distance of nearly 3 miles to Sanchiatzu. Here the engineers built a road in embankment from 3 to 4 feet above the marsh and put on a top dressing of several inches of broken stone obtained from the bluffs on the right bank of the river at the bridge. The sides of the embankment were stepped and revetted with hurdles, the whole making a substantial piece of work. This road was not completed until August, 1905, and was the only piece of good road seen in Manchuria.

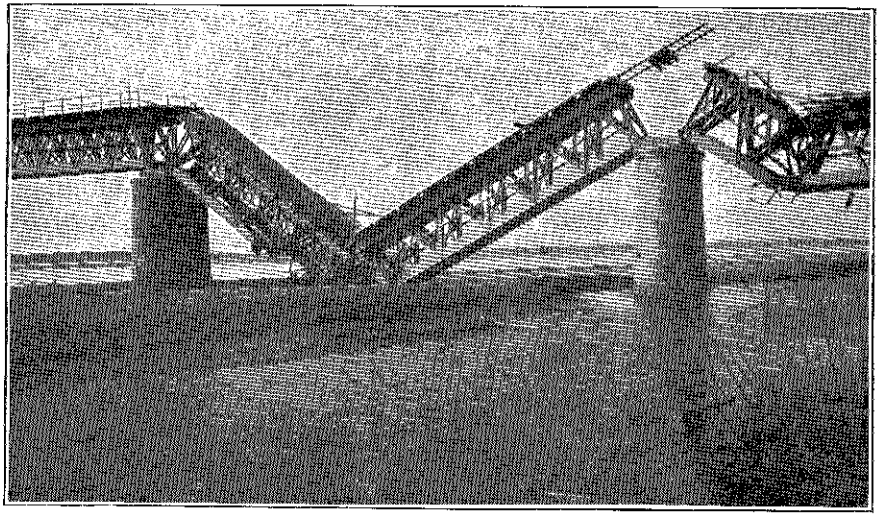
No one who has not actually seen and traveled over the so-called Manchurian roads during the height of the rainy season can form any adequate idea of their wretched condi-

tion. The numerous boggy spots and quagmires lend an element of danger and call for the exercise of considerable watchfulness on the part of the traveler. Even in dry weather the thin crust of apparently firm soil overlying the quagmire frequently gives way and precipitates horse and rider. Under such conditions it can be readily understood that such feeble measures as ditching and draining produce no adequate remedies. During the height of the rainy season all wheeled transport ceased, and the troops were dependent upon pack transportation for securing their supplies.

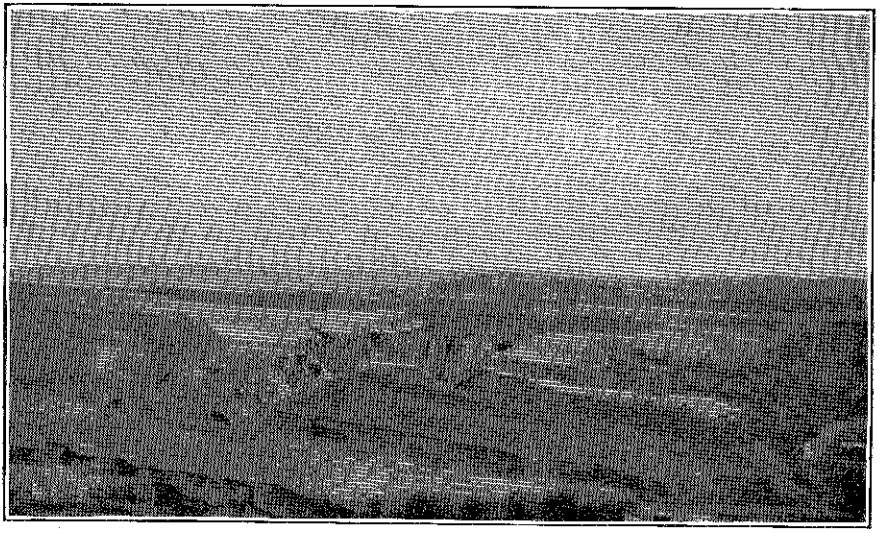
During battle the engineers were employed strictly as combatant troops for the removal of obstacles and demolitions. Thus at the attack of the Shoushanpu position a detachment of 60 engineers from the Third Battalion opened their narrow gaps at the eastern end of the ridge, losing 7 men killed and 31 wounded. At the western edge of the ridge, where the Russian lines extended to the railway at a section house, a detachment of 80 engineers from the Sixth Battalion, under command of a captain, cut the wire entanglements and engaged the Russians hand to hand. Only 10 men of the detachment came out unhit. During the battle of Mukden the Ninth Battalion of Engineers demolished the outer inclosing walls of Santaitzu (just north of the Northern Tombs) and built emplacements for machine guns at Kuoshantun for the attack on Tungchangshang.

In the construction of their fortified lines of resistance at Haicheng, Liaoyang, and after Mukden, the engineers were called upon to do much work, building the redoubts, bombproofs, heavy gun emplacements, and constructing obstacles.

Owing to their limited equipment the engineer battalions were unable to meet all the requirements in surveying and map making, and a considerable corps of civilian employees accompanied the headquarters for this purpose, being under the direction of the chief engineer of the armies. These civilian employees were uniformed like all other civilian employees at headquarters and were assimilated in pay to officers, usually sublieutenants and lieutenants. Generally the engineer battalions surveyed and mapped positions and fortifications and the civilian employees the general topography of the country. In the China-Japan war of 1894–95 the Japanese forces had occupied the country as far north as



21. HUN RIVER BRIDGE.



22. COUNTRY NEAR FAKUMEN, SHOWING NULLAHS CUT IN SLOPES BY RAIN.

Haicheng and appeared to have good maps, scale 1:50,000, of the territory occupied on that occasion. Beyond Haicheng the Japanese were dependent largely on the excellent Russian maps, 1:84,000. Much of the country west and northwest of Mukden had never been accurately mapped, and the Japanese surveyors were employed on this work, covering the country behind the outpost lines. The reproduction of maps for issue is made at army headquarters under direction of the chief engineer, sometimes by hectograph but more often by lithographic reproduction.

THE BRIDGE COLUMN.

Each division is accompanied by a bridge column which forms a section of the train and does not necessarily follow or accompany the engineer battalion, which is in no way responsible for its transport.

The column consists of 171 carts and wagons in charge of a train lieutenant and is accompanied by a detachment of engineer soldiers under a sublieutenant, which is responsible for the condition of the material. The train carries 32 complete boats and 8 trestles, sufficient for 144 meters of bridge. The train can be divided into four sections, each containing the material for 36 meters of bridge. The pontoon wagon is four wheeled, the front wheels being but 2 feet in diameter, so that they can cut under the wagon body in turning. Excepting the pontoons all material is carried on the standard Japanese cart.

Sixty-four pontoon wagons are required to carry the pontoon halves, while 48 carts carry chess and balk, each the material for one bay. Eight carts carry 2 trestles each, and 16 carts carry each 16 floor boards for flooring the bottoms of the pontoons. About 8 carts are loaded with cable, abutment sills, anchors, paddles, tools, etc., while the remaining carts of the train carry luggage, rations, forage, etc.

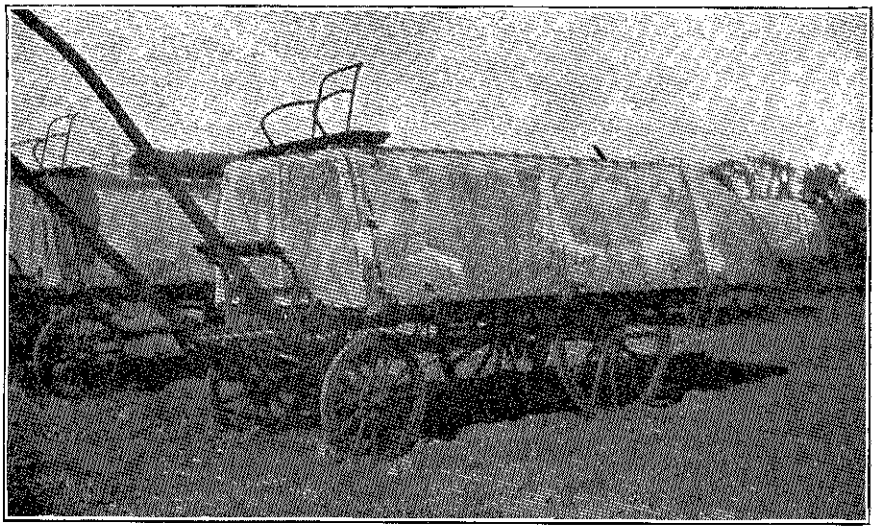
The weight of a pontoon half is a little under 500 pounds, and that of the pontoon wagon (four wheeled) is also about 500 pounds, making the total weight over 900 pounds, being the heaviest load behind a single pony in the Japanese army.

Each pontoon half is 12 feet long and consists of four pieces, the bow section, a mid section, an end section, and a bulkhead section. These are all separable by a system of

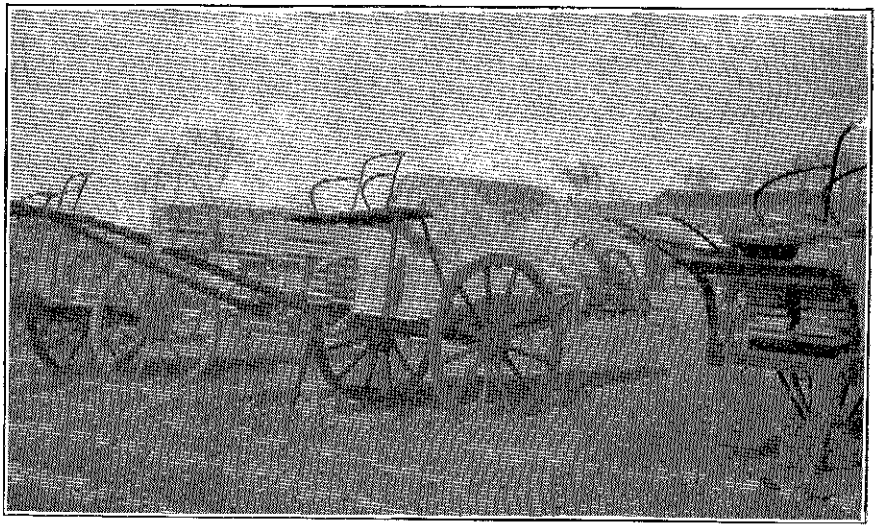
packed joints forced together by cam levers. The width of the pontoon boat is 4 feet 1¼ inches at top, 3 feet 2¼ inches at bottom, and 2 feet 3¾ inches deep. When the bridge is built the pontoon has a free board of about 21 inches without load. The pontoon is made of thin sheet metal, only 1 mm. thick, easily dented or punctured. Its lightness, however, permits of ready repair in the field, for which the necessary tools are carried. That the pontoons are frequently injured was made apparent by the patches, of which many were noticed. To prevent the pontoon collapsing, each half is provided with three wooden thwarts or struts spread between the gunwales. In transportation the pontoon half rests upside down on these thwarts, the driver's seat being fastened to the wooden cleats screwed to the bottom of the pontoon, as shown in the photograph herewith. Each pontoon half is stiffened longitudinally by two ½-inch round-iron stanchions and two ½-inch round inclined braces attached to the wooden thwarts and angle-iron ribs. The joint packing is an ordinary strip of canvas and rubber. In making a boat two half pontoons are joined, bulkhead to bulkhead, by means of bolts and clevises, two on each side. Each pontoon half is provided with one hinged rowlock, two lashing rings, and two lashing hooks, the latter being fastened to the middle T bar at the bottom.

In constructing the bridge the saddle sill is laid across the thwarts, the recesses on the underside fitting over the nuts on the ends of the vertical stanchions, and lashed to the outer thwarts. On its upper side the saddle sill carries seven pairs of iron dowels which engage holes in the ends of the balk. There are nine balks to each bay, six for the floor, two for the side rails, and one for lashing transversely under the floor balks. The ends of the saddle sill have holes into which are dropped the iron stanchions, which support a light rope, the whole forming a hand rail. All the pontoon material is painted a light blue.

Like everything else in the Japanese equipment, the pontoon boat is excessively light—much too light, in fact, for the train and artillery of occidental countries. The idea contained in the design is, however, worthy of study, and it is believed that a metal boat can be designed sufficiently strong for our trains and equipment and considerably lighter than the present standard wooden pontoon boat.



23. JAPANESE PONTOON WAGON.



24. JAPANESE PONTOON TRAIN.

The ability to employ sectional boats of metal will enable the load of the pontoon wagon to be kept within such limits as to permit the bridge train to easily follow an army anywhere. The objection that metal boats can not be repaired in the field so easily as wooden boats should have but little weight with thin sheet metal which can be readily repaired by simple tools.

The Japanese boat possesses sufficient buoyancy to carry their artillery and trains, but not the Chinese cart. The division into small sections enables the boat to be carried by pack animals, and it is understood that the boat was so transported in the advance of the First Army through Korea. No examples of bridges with the Japanese pontoons occurred during the war in the operations of the Second or Third Armies, but the First Army on two occasions, at least, used their bridge equipment, once at the Yalu and once at Liaoyang, across the Taitzu.

SANITATION AND HYGIENE.

During the summer of 1904 practically every recognized principle of sanitation and hygiene was violated by the Japanese army saving two only, viz, the general use of boiled water and the wearing of abdominal bandages. This statement is made advisedly and with full knowledge that so-called experts have decreed otherwise in books and public lectures. The troops were regularly billeted in the dirty and vermin-infested houses of the villages, whose streets and compounds were nothing but reeking cesspools. No sinks were dug, the men defecating where they pleased in the fields adjacent to their quarters. The water supply was invariably derived from the village wells located on the edge of cesspools and not infrequently close to the village manure pile. In the hot, sultry summer the pest of house flies was something beyond description. In fact, all the elements for the development and spread of camp diseases were at hand, and yet the general health of the troops was excellent, and, saving beriberi only, the immunity from camp diseases was nothing less than astonishing. Some typhoid and dysentery were always present, but the percentage was remarkably small.

With the conditions so favorable for the development of enteric fevers it may well be questioned why the Japanese army enjoyed such immunity. Although a layman, I am impelled to offer the following thoughts or suggestions on the subject:

(*a*) Manchuria has an undoubtedly healthy climate. The population is light and scattered, and, although the Chinaman himself is about as dirty and insanitary as it is possible for a human being to be, both personally and in his surroundings, the pastoral life offsets what would otherwise be a serious menace to health.

(*b*) The long and severe winter helps to prevent the outbreak of epidemic diseases. For eight months in the year there is frost, and the warm weather is of short duration.

(*c*) High winds, which prevail throughout the year, are also a factor in producing a healthy climate and in counteracting the miasmatic conditions that might otherwise become dangerous in the low, flat valley of the Liao.

(*d*) Asiatics are undoubtedly less liable to enteric fevers than are occidental nations, whatever the reason may be. But aside from all climatic and physiological considerations there must be some weightier reason for the immunity of the Japanese troops from typhoid and dysentery under the conditions which prevailed in Manchuria. As in all other disciplined armies, the Japanese soldier receives instructions as to the preservation of his health and his handbook contains the sanitary rules and regulations, which are pretty much the same the world over. But it is one thing to prescribe a rule and another to enforce it, and right here, in my opinion, lies the key to the Japanese immunity from camp disease. The Japanese soldier can be fairly well depended upon to obey to the letter all rules and orders prescribed by his superiors. To this obedient spirit, coupled with the inherent virtues of cleanliness, sobriety, and simple diet, must be attributed the remarkable success of the Japanese in escaping camp diseases during the war. To credit these results to the superior excellence of the Japanese military medical organization is the sheerest nonsense, and yet this is exactly what certain enthusiastic and ill-informed writers would have the public believe.

The functions of the Japanese medical department are not

different from those in other armies. They do not exercise command except over their own medical personnel, and act in a purely advisory capacity to the commanding officers. A good understanding, however, exists between the medical and combatant officers, and the advice of the former in regard to the health of the troops is generally heeded. In fact, it may be stated that the health of the troops is a matter of deep concern, not only to the medical department, but to every combatant officer and individual soldier, each of whom has had the importance of good health thoroughly impressed upon him.

In selecting camps the general line of the army is fixed by army headquarters and areas told off to divisions, brigades, regiments, and battalions. In selecting lines and camps the first object is always tactical, and no sacrifice of tactical efficiency is permitted for hygienic considerations.

While the dreadfully insanitary conditions surrounding camp life in 1904 were generally disregarded, a decided improvement in this respect took place in 1905. Inhabitants of villages were required to police their compounds and to drain their grounds and the roads under the supervision of the military police. Sinks were dug, both for soldiers and inhabitants, and maintained in a reasonably satisfactory condition. The general policing and cleaning up of the villages produced a marked effect upon the flies, whose numbers were perceptibly less during the second summer of the war, and improved the sanitary conditions beyond just criticism. In Fakumen many cesspools in streets and compounds were filled in with gravel and sand obtained from the dry river bed in the town, and public sinks built at street corners. By the close of the war this town, at least, had assumed a very creditable appearance.

All wells are examined as soon as practicable and marked as to potability. Aside from this, however, all water must be boiled (length not known) under standing orders. While this is generally done, instances of violation while on the march came under personal observation on several occasions, but such cases were exceptional, and the claim that the soldiers complied faithfully with orders on this subject seems well substantiated.

Boiling was at first effected in the camp kettles or in the mess tins of men detached from their company kitchens. Later a number of portable boilers and tanks rigged up on Japanese carts were issued. The boilers have a double wall around the fire box, to get the largest returns possible from the fuel. When boiled, the water is drawn off into square tanks of wood holding 20 to 25 gallons each, there being two tanks mounted on one cart. The idea of the boiler is undoubtedly borrowed from the Russian traveling kitchen, many of which were captured at Mukden and used by the Japanese as water boilers.

Boiled water was always kept on hand at étape stations for the use of men passing over the lines of communication. On main roads between army and division headquarters rest stations were also encountered during the summer of 1905. These stations were provided with boiled water, sinks and shade for the comfort and convenience of travelers.

The medical officer with advance guards examines and posts wells after rough examination. If wells are likely to be used for some time, samples of their water are analyzed at division headquarters. The surroundings of wells in or near the more permanent camps were often drained and improved and covers put over the well hole. Sentries were also frequently posted at wells to insure their being kept clean, or, it may be, to warn off soldiers from particularly dangerous water.

Boiling was the principal reliance for purifying water. As no Japanese will drink water when he can get tea, it is not so difficult a matter to insure water being boiled before drinking as would be the case with American soldiers. Several types of field filters were seen at different times and places. These filters appear to have been more for test than for use.

The fact that suitable and seasonable clothing was issued to the soldiers also had beneficial effect on their health. This included abdominal bandage, mosquito head nets, and dust glasses. Cigarette smoking is general, and presumably is rather healthful than otherwise while campaigning.

During the second summer of the war barley was mixed with the rice as a preventive of beriberi, the object being to

obtain a more nitrogenous food. Just what results were accomplished by this can not be told until more detailed medical statistics become available. That there was less beriberi the second summer than the first is certain, but whether this was wholly due to the barley diet or partly to the inactivity of the troops remains to be determined. Creosote pills were also issued during the second summer, and each soldier carried a little tin box of them and was supposed to take one after each meal. They are exceedingly vile tasting, and if the Japanese soldier really followed his instructions regarding the use of the pills he must be a very faithful man indeed. The instructions on the box are stated to have been: "To beat the Russians take three daily," an ingenious appeal to the soldiers' patriotism.

Vaccination is compulsory and necessary, for smallpox is very common among the Chinese. Venereal diseases, while common enough in Japan, are rare in Manchuria, for the simple reason that there are few loose women, and these were kept under strict medical control by the Japanese surgeons.

As an item of interest it may be mentioned that the casualties from horse management in the armies exceeded those due to the bayonet, a convincing testimony to the viciousness of the Japanese pony.

Responsibility for enforcing sanitary rules rests with the battalion commanders, acting on the advice and in consultation with the medical officer. It seems to be taken for granted that the men will obey orders without close and constant supervision, and this is probably true of the Japanese more than of the soldiers of any other country. The effectiveness of supervision and enforcement of sanitary rules is judged by the health statistics of the units. The general good health of the Japanese army during the war was due not so much to supervision as to the teaching of the army as a whole the importance of sanitation, coupled with the earnest and sincere patriotism of the individual soldier. The lesson learned in the China-Japan war was taken to heart and bore good fruit in the Russo-Japanese war.

MEDICAL STATISTICS.

In drawing comparisons between the disease statistics of the Russo-Japanese and other wars there is a constant tendency to contrast only typhoid and dysentery cases, to the resultant advantage of the Japanese medical methods. While this is true as far as it goes, it is not a wholly fair comparison. Every race has its peculiar diseases, and while the Japanese enjoyed a singular immunity from enteric fevers, they suffered heavily from beriberi, a disease which rarely affects the white race. While beriberi was not regarded as fatal, provided the patient was sent to Japan, there to recuperate, it none the less affected the well being of the Japanese armies to a considerable extent and necessitated constant drafts of recruits to maintain the strength of the field units. A transport captain at Dalny stated that during the summer of 1904 an average of 1,000 cases of beriberi were dispatched daily to Japan. While this statement is, perhaps, somewhat exaggerated, it nevertheless affords an index of the effects of sickness in the Japanese armies and shows that they had their troubles in this respect.

As showing the casualties due to disease and wounds the following statistics of the First Division at Port Arthur are of interest:

	August.	September.	October.	Total.
Beriberi	313	856	335	1,504
Dysentery	4	67	129	200
Typhoid	0	25	119	144
Intestinal diseases and disorders	23	184	205	412
Other diseases	25	172	325	522
Bullet wounds	831	1,297	321	2,449
Bayonet and saber wounds	8	6	2	16
Shell wounds	489	709	241	1,439
Miscellaneous	124	204	61	388
Total	1,817	3,519	1,738	7,074

The high proportion of shell wounds as compared with bullet wounds is noteworthy. The losses of the First Division were smaller than those of the Ninth and Eleventh Divisions at Port Arthur.

The monthly percentages of sick in the Third Army during the first seven months of 1905, as furnished by the chief medical officer, were as follows:

January	9.04	May	6.79
February	9.74	June	7.33
March	9.34	July	8.46
April	6.93		

The larger percentage during January, February, and March arose from foot soreness due to shoes while marching from Port Arthur and during the battle of Mukden. The increase in sickness during June and July can not be charged to anything connected with the war, since, even in ordinary years in Japan, there is an increase of sickness during the summer months. Thus for 1903 the percentage of sickness in Japan for July and August reached 13+, or about 5 per cent more than for July, 1905, in Manchuria.

The fact that the general health of the troops in Manchuria was better than in Japan was remarked on several occasions by Japanese officers. In the Second Army during the fall of 1904 statistics showed that the men had actually gained in weight notwithstanding the campaign. This may be attributed, in part at least, to the more liberal and varied ration furnished in the field with its higher proportion of nitrogenous components.

The accompanying medical statistics of the Third Japanese Army from June, 1904, to July, 1905, were kindly furnished by the chief medical officer of the army and may be regarded as official. Particularly noteworthy is the increased healthfulness of the troops during the second summer and the practical disappearance of beriberi. The high precentage of gun wounds, nearly 20 per cent of the whole, is also noteworthy. This high percentage is due no doubt to the seige of Port Arthur where artillery played so important a part. In the Second Army during the battle of Liaoyang the percentage of artillery wounds was but 7.99 of the total casualties, not differing materially from the results obtained in the Franco-Prussian war.

Noteworthy also are the heavy casualties of the Ninth Division, which had 22,938 killed and wounded during the war, amounting to 164 per cent of its normal combatant strength.

Statistics of sickness in the Third Army from the moment of its landing up to the present time (June, 1904, to July, 1905).

	New patients.	Recovered.	Dead.	Sent back.
1904.				
June	506	339	4	163
July	3,515	2,399	11	1,105
August	11,294	6,845	26	4,423
September	7,043	4,365	20	2,658
October	4,632	3,181	20	1,431
November	4,104	2,982	7	1,115
December	2,484	1,893	8	583
1905.				
January	1,576	1,100	8	468
February	1,642	1,073	5	564
March	1,414	892	4	518
April	1,004	741	8	518
May	1,131	855	7	269
June	1,133	832	12	289
July	1,375	1,041	9	325
Total	42,853	28,538	149	14,166

In the above list total numbers of patients in the lines of battle and commissariat quarters are shown. Wounded are not included.

Patients classified by the nature of sickness.

FIELD DISTRICT.

	Total number of patients.	Nonepidemic.	Epidemic.		Beriberi.	Percentage.		
			Dysentery.	Typhoid.		Nonepidemic.	Epidemic.	Beriberi.
1904.								
June	489	433	2	11	43	88.55	2.66	8.79
July	3,295	2,209	124	30	932	67.04	4.67	28.29
August	10,985	5,483	360	14	5,128	49.92	3.40	46.68
September	6,690	4,096	109	13	2,472	61.23	1.82	36.92
October	4,424	3,171	268	81	904	71.68	7.89	20.43
November	3,938	2,997	59	71	811	76.11	3.30	20.59
December	2,396	1,922	12	24	438	80.22	1.50	18.28
1905.								
January	1,365	1,095	4	9	257	80.22	.95	18.83
February	908	776	2	3	127	85.46	.55	13.99
March	767	739	6	.....	22	96.34	.78	2.88
April	617	586	3	9	19	94.98	1.94	3.08
May	647	609	4	11	23	94.13	2.32	3.55
June	592	550	8	8	26	92.91	2.70	4.39
July	853	788	15	18	39	92.38	3.05	4.57
Total	37,966	25,454	976	295	11,241	67.04	3.35	29.61

COMMISSARIAT DISTRICT.

1904.								
June	17	15	.....	.....	2	88.24	.....	11.76
July	220	156	33	.....	31	70.91	15.00	14.09
August	309	154	6	1	148	49.93	2.26	47.81
September	353	165	7	3	178	46.75	2.83	50.42
October	208	150	3	6	49	72.12	4.34	23.55
November	166	139	1	5	21	83.73	3.62	12.65
December	88	74	1	4	9	84.09	5.68	10.23

Patients classified by the nature of sickness—Continued.

COMMISSARIAT DISTRICT—Continued.

	Total number of patients.	Nonepidemic.	Epidemic.		Beriberi.	Percentage.		
			Dysentery.	Typhoid.		Nonepidemic.	Epidemic.	Beriberi.
1905.								
January	211	184	.....	.....	27	87.20	.....	12.80
February	784	691	.....	.....	43	94.14	.....	5.66
March	647	585	1	3	58	90.42	.62	8.96
April	387	355	.....	3	29	91.73	.78	7.49
May	484	423	.....	10	51	87.40	2.06	10.54
June	541	474	9	6	52	87.62	2.77	9.61
July	522	448	21	4	49	85.82	4.79	9.39
Total	4,887	4,013	82	45	747	82.12	2.59	15.29

Number of killed in battles (June, 1904, to July, 1905).

First Division	3,012
Seventh Division	2,951
Ninth Division	5,448
Eleventh Division	4,319
Auxiliary force of armies	3,637
Total	19,367

Statistics of the dead and wounded classified by the kind of wounds.

	Rifle wound.	Gun wound.	Bayonet wound.	Miscellaneous.	Untraceable wound.	Total.
First Division	8,163	3,101	61	1,277	918	13,520
Seventh Division	7,444	1,918	162	1,503	424	11,451
Ninth Division	14,998	4,399	80	2,001	1,500	22,938
Eleventh Division	7,809	2,409	120	2,268	1,697	14,303
Auxiliary force of armies	7,147	3,210	103	2,236	1,618	14,374
Total	45,521	15,037	526	9,285	6,217	76,586

	Percentage.				
	Rifle wound.	Gun wound.	Bayonet wound.	Miscellaneous.	Untraceable wound.
First Division	60.38	22.93	0.45	9.45	6.79
Seventh Division	65.00	16.74	1.41	13.11	3.47
Ninth Division	65.21	19.18	.35	8.72	6.54
Eleventh Division	44.60	16.84	.84	15.86	11.86
Auxiliary force of armies	59.72	22.38	.72	15.56	11.67
Total	59.44	19.63	.69	12.13	8.11

Statistics of wounds, classified by their severity.

	Severe wound.	Less severe wound.	Slight wound.	Total.	Percentage.		
					Severe.	Less severe.	Slight.
First Division	2,697	6,758	1,053	10,508	25.68	64.32	1.00
Seventh Division	2,323	6,092	85	8,500	27.33	71.67	1.00
Ninth Division	4,903	12,474	113	17,490	28.03	71.32	.65
Eleventh Division	2,948	6,619	417	9,984	29.53	66.30	4.17
Auxiliary force	2,441	7,879	417	10,739	22.74	73.38	3.88
Total	15,312	39,822	2,085	57,219	26.76	69.60	3.64

Number of field hospitals and wounded received by them.

	Hospitals established.	Total number of the wounded received by the hospitals.	Average number received by each hospital.
First Division:			
Completely established	27	18,830	628
Partly established	6		
Seventh Division:			
Completely established	11	9,180	524
Partly established	13		
Ninth Division:			
Completely established	18	21,490	1,075
Partly established	4		
Eleventh Division:			
Completely established	15	12,035	669
Partly established	6		
Total:			
Completely established	71	61,535	720
Partly established	29		

In the above list only wounded in battle are shown, and 562 wounded Russians are included.

THE JAPANESE TRAIN BATTALIONS.

Each division of the Japanese army has a train battalion, which takes charge of all divisional transport except the ammunition columns, which are in charge of artillery soldiers, both the infantry and artillery columns. The train battalion is the nucleus and school of instruction for the entire system of divisional transport. The men serve with the colors for three years, and their principal duties in time of peace consist in training drivers, of whom four batches per year of about 120 each are given three months' training in handling the various classes of military supplies and in managing the transport ponies and carts. In this way a large reserve of transport or auxiliary train soldiers is formed from men too small or otherwise physically unfit for the line.

In time of war sufficient of these transport soldiers are called out to serve as drivers for the divisional trains and for duty at the landing bases and étape stations, thus avoiding any drafts on line troops, whose sole business is to fight. The wisdom of such course must necessarily commend itself to every intelligent mind. In time of war the train battalion is broken up to supervise the transport and the battalion organization ceases to exist. A mounted detachment of the

battalion accompanies all transport columns, usually in the proportion of one train man to every eight transport soldiers. These mounted train men are armed with the carbine and act as escorts to their columns. The transport soldiers normally wear side arms only, but during the battle of Mukden it was noted that they had all been provided with captured Russian rifles, which were carried strapped to the cart seats.

No valuable information was forthcoming regarding the number of train and transport soldiers required by a division on a war footing, and, as these were broken up into numerous small groups or columns, no opportunity for counting or estimating presented itself. The mobilization table places the personnel of the train battalion on a war footing at three companies with an aggregate strength of 1,202. The noncombatant strength of a division has been generally reckoned at over 5,000, including about 1,200 in the medical department. On this basis the number of transport soldiers per division would amount to about 3,000.

Besides the transport soldiers required for the divisional transport, many are called out for service along the lines of communication, at depots, base hospitals, etc. Thus 3,000 such soldiers were specially called out for general service at Dalny.

The entire transport and supply system is so organized that no demands are made upon the line troops, and the harmful system of detailing fighting organizations to look after the needs of the commissary and quartermaster departments, as practiced by us, is entirely obviated.

THE HORSE HOSPITAL.

Besides the veterinarians who accompany cavalry and artillery units, there is with each army a horse hospital which is under the jurisdiction of the army étape inspector. The horse hospital for the Third Japanese Army does not appear to have been organized until after its arrival at the north, and was first opened at Hsiaopeiho about the beginning of February. Later it was moved to Lanchiatun, near Mashanchiatzu, on the Hsinmintun highway, and still later it was moved to Wangchiawopeng, about 2 miles north of Fakumen. The following notes are the results of several visits to the hospital during the summer of 1905.

All veterinary matters on the army lines of communications are supervised by a senior veterinarian having the rank of major. The horse hospital was under the immediate charge of a veterinary lieutenant with 5 assistant veterinarians (civilians) and about 50 trained soldiers and farriers, with hired Chinese coolies as required by circumstances.

On the occasion of my first visit, July 7, 1905, there were 98 sick horses under treatment from the three divisions of the Third Army, mostly from the train. Besides the sick horses there were some 20 Chinese ponies, purchased at an average of 245 yen per head by the Japanese Government for issue, and some 25 cases of cured animals awaiting reissue. The horse hospital is distinct from the horse depot of the divisions, which is in charge of a cavalry officer with an attendant veterinarian.

The sick cases are segregated, according to the nature of their illness, in paddocks of various sizes. There were more cases of sore back, caused by the transport-cart harness, than anything else. The sick included several cases of wounded horses, one of which dated from the battle of Mukden—a wound in the jaw from a shrapnel bullet—which had at first healed and then broken out again.

The sick horses are fed 3 sho of barley and 1 kwamme of hay daily, less than horses at work. They are also taken out in small batches to graze along stream beds and edges of fields, but on the whole receive little grass or green forage considering the opportunities available at this season of the year. The horses are fed twice daily, in accordance with the Japanese system, with sometimes a little hay in between. Horses requiring special diet are fed crushed barley or bean mash. There is very little bran available, scarcely any wheat being grown in this part of Manchuria.

There were no cases of infectious diseases in the hospital. Horses are quarantined and inoculated for anthrax before leaving Japan, this disease being prevalent. Glanders are unknown in Japan, but occasionally cases occur among Chinese animals. Generally speaking, however, both Japanese and Chinese horses are hardy and not liable to disease. The Chinaman, moreover, is a good horse manager, and his animals are, as a rule, in excellent condition. Watering and

feeding troughs in stable yards are of stone, exposed to sun and air, which is conducive to health of animals.

Cases of foot troubles requiring water treatment are tied in a pool of water just outside the village. Treatment for lameness is by fomentation, burning, and blistering, along European lines.

About two-thirds of the cases treated were stated to recover.

The patients looked fearfully thin and in poor condition, evincing lack of management and faulty feeding.

Farriers use hot shoeing and trim the hoof in the rough with a chisel and mallet. It was noticed that the frogs were trimmed. The Japanese horseshoe has fourteen nail holes, seven on a side, but only seven or eight nails are driven when reshoeing, leaving the vacant holes for nails which are driven in the field when the shoe becomes loose, a few nails and a shoeing hammer being carried in the wallets by each mounted man.

The horse hospital can be divided into five units if required. When the army is at a halt most of the veterinary work in cavalry and artillery units is attended to by the veterinarians attached to those organizations, but when the army has to move, sick and lame horses from the artillery and cavalry are sent to the horse hospital or sections of the latter sent forward to open branches.

One of the principal functions of the horse hospital was the castration of vicious animals who are either dangerous or unmanageable. Several operations were witnessed, and they were performed in a scientific manner. A bed of kaoliang or straw is first laid down and then covered by a canvas sheet. A disinfecting fluid is then sprayed over the sheet and surrounding ground from a tank. The patient is then brought alongside the bed of straw and a stout strap with iron ring buckled around each foot. A running rope is then passed through the four rings and the horse is ready to be thrown. A harness, consisting of belly band and crupper with a combination of webbing straps, is then put on. By suddenly hauling in on the running line the animal's feet are drawn together. A simultaneous pull on the webbing straps on the harness causes the horse to fall over on the bed of straw.

The upper hind foot is then released from the running rope and strapped to the harness at the shoulder. Meantime the horse has been blindfolded and a twitch applied. The parts are washed with soap and antiseptic solution before cutting. A German ecraseur instrument is employed in the operation. Castrated animals receive no dressing after operation. Their tails are tied up, and the flies irritate them dreadfully. They are kept in a cool, airy, mud house until recovery, which is in about a fortnight. Of a hundred cases of castration in a few weeks, there were no cases lost.

Notwithstanding indifferent horse management, the natural hardiness of the Japanese animal, never taxing them beyond their capacity in the matter of work, and a liberal supply of veterinarians resulted in maintaining the army transport animals, like the men, in a remarkably healthy state.

THE HORSE DEPOT.

A horse depot forms part of the divisional organization and supplies remounts and reserve animals for the artillery and train. The depot is normally in charge of a cavalry officer.

A visit to the horse depot of the First Division in August, 1905, at Takou, 13 miles northeast of Fakumen, revealed the fact that this particular depot was in charge of a train lieutenant. His personnel comprised 1 veterinarian, 8 noncommissioned officers, and about 150 men from the cavalry and train, mostly the latter. There were only 60 horses in the depot at the time of inspection. The maximum number of animals on hand for the three months preceding my visit was 170, but the commandant stated that the depot sometimes held several hundred animals. The animals were paraded for inspection and showed up well, especially those intended for the cavalry and artillery. They all came from Japan, no Australians having been forwarded.

SYSTEM OF COMMUNICATIONS BETWEEN UNITS OF THE FIELD ARMY.

The duty of maintaining communications between the different units of the field army devolves on the field telegraph detachments, which correspond to the Signal Corps in the United States Army.

ORGANIZATION.

In time of peace there is no separately organized telegraph detachment, but certain men, presumably those who are already practical telegraphers, are detailed from the engineer battalions to Tokyo, where they receive instruction.

In time of war one field telegraph detachment to each division is organized from the engineer battalion, whose peace organization is changed from four companies to three of war strength. This telegraph detachment, 195 officers and men, is commanded by a major or captain, under the direct orders of the division commander. The personnel continues to wear the engineer uniform, but discards the rifle and the ammunition pouches, wearing side arms only.

An army telegraph detachment is formed by details from the divisional detachments and placed directly under the orders of the army commander. It is commanded by a major or captain and varies in strength according to the size of the army and other circumstances. For the Third Army, during the summer of 1905, it numbered over 300 men.

As the combatant strength of a division is about 14,000 men, the field telegraph detachment forms about 1½ per cent of the command. In conversation with a staff officer, toward the close of the war, I was informed that experience had shown that an increase would be necessary in future wars.

EQUIPMENT AND METHODS OF TRANSMITTING AND RECEIVING INFORMATION.

Both the telephone and the telegraph are employed for transmitting information. The normal allowance of material to different units is as follows:

Army headquarters, 130 km. of wire and 15 sets of instruments.

Division headquarters, 50 to 60 km. of wire and 5 sets of instruments.

Independent cavalry brigade, 40 km. of wire and several sets of instruments.

Artillery units do not normally carry any telephone equipment but, when needed to establish fire-control stations, are supplied from the divisional or army detachments as circumstances may require.

Two kinds of telephones are employed, an ordinary backboard instrument with call bell, similar to the ordinary com-

mercial telephone, and the "Ewata" telephone, so called from its inventor. The latter is a compact, portable little box and a combined receiver and transmitter packed separately from the box. This instrument employs a buzzer instead of call bell and has plug connections. The Ewata is mainly for use by the cavalry. Both forms of telephone use a ground return.

The telegraph instrument is the ordinary Morse recorder, operated by rectangular porcelain cells using copper sulphate.

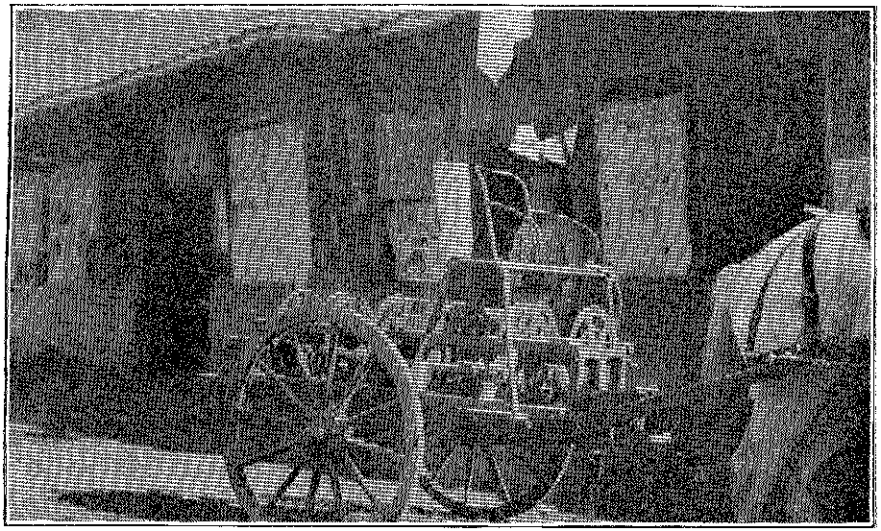
The principal kinds of wire employed are as follows:

1. Heavy rubber insulated, stranded copper core.
2. Bare copper wire about 14 B. W. G.
3. Galvanized-iron wire for telegraph.
4. A very fine insulated (paper apparently) copper wire.

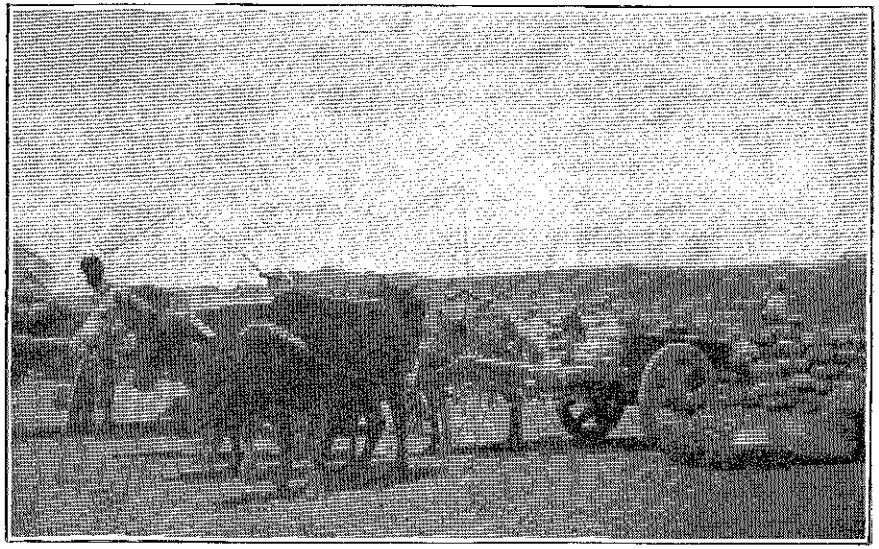
Wire is carried on reels, five reels on a frame, on the ordinary transport cart. In laying wire the reels are carried by two men who pay out wire as fast as they walk along. Pole men follow. When pressed for time or when supply of poles is inadequate, the insulated wire is used, being run through the fields and lifted clear of the ground only at road crossings. The very fine insulated wire is carried on a special reel suspended from the neck of a man who pays it out as he walks along. This fine wire is so light that it can be supported on the kaoliang stalks or equally flimsy supports. It has, however, only a limited application.

The field telegraph poles are 12 feet 2 inches long and $1\frac{5}{8}$ inches diameter, made of a light wood resembling ash. Bamboo poles, plugged and banded at the end, are also used; the foot of the pole is shod with iron. The insulator is of ebony, 3 inches long, $1\frac{1}{2}$ inches diameter at base and 1 inch at the top, mounted on a square iron spike driven into the end of the pole. Across the top of the insulator is a slot $\frac{1}{2}$ inch by $\frac{3}{16}$ inch, with diagonally opposite lower corners undercut. By giving a slight turn to the pole the wire is bound in the slot so that it can not jump out readily. When extra high poles are required for clearing roads, buildings, or other obstacles, the ordinary pole is mounted on top of a 12-foot pole.

The army telegraph detachment has charge of the reserve supply of wire, instruments, etc., which are issued to the divi-



25. CART WITH REEL-FRAME.



26. CHINESE CART AT PULANTIEN.

sional detachments and replaced by requisition on Tokyo. All telegraph and telephone material is manufactured in Japan.

As a general proposition when the army is at rest the communications to the front are by telephone and to the rear by telegraph, although division headquarters may also be connected with army headquarters by telegraph and army headquarters to Manchurian headquarters by telephone. During battle when the army and division headquarters are on the move the telephone is used exclusively. Sometimes adjoining brigades and divisions are directly connected by telephone, but this is exceptional. The cavalry brigade is connected directly with army headquarters and also with nearest division or brigade headquarters.

When an army occupies a fixed position for any length of time the telephone is freely used for connecting up not only the tactical units of the army but its various depots and administrative offices. During the long halt after Mukden the headquarters of the Third Army at Fakumen maintained a central telegraph and telephone office with a regular switch board for the different telephones and four telegraph instruments, three to division headquarters and one to Manchurian headquarters. Most extensive use of telephones was made in the Third Army before Port Arthur, not only all headquarters being connected up but the various siege batteries and sap heads, so that any part of the besieging line could be reached at a moment's notice. The resulting saving in time and convenience may readily be imagined. In taking messages by telephone they are repeated back for verification, the time noted, and then written out in duplicate, using carbon paper.

So far as my observation extended the Japanese field telegraph detachments did remarkably good work during the war, keeping up connections at all times between the main army units regardless of weather or whether the army was on the move or at a halt. I have seen a section of the telegraph detachment march abreast of army headquarters, reeling out wire and, the moment a halt was made, drive a bayonet in the ground, attach ground wire, and commence talking with scarcely a moment's delay.

Visual signaling is but little used in the field. The helio-

graph is not used and flag signaling is limited to the semaphore system, using two small sun flags. Apparently one noncommissioned officer in each company and battery carries a set of semaphore flags. The only occasion on which I observed flag signaling used was at Port Arthur, where it was employed by an observer on the flank to direct the fire of a mortar battery located in a ravine.

The ordinary Japanese transport cart was used for transporting the material and equipment of the telegraph detachments. Wire reels and poles were carried in suitable frames set on the cart body. The boxes containing the instruments and material are painted yellow and are lashed to the carts like any other supplies. Generally a number of Chinese carts carrying various packages accompanied the transport column, indicating that the regulation allowance of transportation was insufficient. As the telegraph detachments were always more or less broken up into small parties scattered over a considerable terrain, no opportunity for observing the total transportation presented itself, and information on this point was not otherwise available.

The foregoing applies only to the telegraph and telephone service within the sphere of the field armies. The service of communications along the lines of communication is in charge of an étape telegraph detachment, a branch of the office of the inspector-general of the lines of communication.

The connecting link between the field telegraph service in Manchuria and the cable service to Japan was secured through a military cable from Pitzewo to Chemulpo, laid at the time the Second Army landed. From Chemulpo the line of telegraph followed the line of the railway from Seoul to Fusan, and thence by commercial cable to Japan.

The free use of the telegraph and telephone for connecting up the units of the field armies was rendered possible largely owing to the passive attitude of the Chinese and the lack of enterprise of the Russian cavalry, and very few interruptions of the service occurred. Where hostile inhabitants and an active enemy have to be reckoned with it may well be questioned whether an extensive telephone and telegraph service will alone meet the requirements of maintaining connections, and whether it will not be necessary to supplement it by some system of visual signaling.

JAPANESE TRANSPORT AND SUPPLY SYSTEM.

The head of the entire Japanese transport and supply system is the director-general of étape, whose department exists in time of war only. The director has functions conforming generally to those of the Quartermaster-General of our Army, with, however, some important differences. The office is regarded as most important, as may be judged from the fact that the incumbent is attached to the Imperial Headquarters and may sit, but not vote, in the Supreme Military Council.

The organization of the bureau, as laid down in the printed regulations, is as follows:

1. Department of communications.
   - (*a*) Étape telegraph.
   - (*b*) Étape postal service.
2. Transportation department.
   - (*a*) Base commanders.
   - (*b*) Station commanders.
3. Intendance department.
   - (*a*) Quartermasters.
   - (*b*) Field treasurers.
4. Department of sanitation.
5. Staff officers.

Under the director-general of étape are the army étape inspectors, one for each army, whose functions are analogous to those of the chief quartermasters of our field armies. These army étape inspectors are under the orders of the army commanders as well as under the director-general of étape.

The organization of an army étape inspector's bureau, as prescribed in printed regulations, is as follows:

1. Chief staff officer.
2. Adjutants.
3. Staff officers.
4. Gendarmes.
5. Telegraph.
6. Post.
7. Transportation department.
   - (*a*) To the front.
   - (*b*) To the rear.

11536—07——5

8. Field sanitary service.
   (*a*) Étape hospitals.
   (*b*) Transport of sick and wounded.
   (*c*) Veterinary and horse depot for officers' mounts.
9. Intendance.
   (*a*) Field treasurers.
   (*b*) Purchasing agents.

Under the army étape inspectors are the étape or station commanders on the lines of communications. The organization of a station commander's force, as prescribed in the regulations, is as follows:

1. Noncommissioned officers.
   (*a*) Cooking.
   (*b*) Quartering.
   (*c*) Receiving agent.
   (*d*) Dispatching agent.
   (*e*) Personnel.
2. Gendarmes.
3. Auxiliary trainmen.

Such is the prescribed organization of the étape service, which takes entire charge of the transport, supply, and medical service in rear of the field armies, bringing all these under a single head at the Imperial Headquarters in Tokyo.

Actually the above organization underwent some modifications as the war progressed, chief among which were the following:

1. After Liaoyang three of the four Japanese armies became united, and although the line of communications to the Yalu was still maintained, practically all supplies were obtained from Dalny and Yingkou via Liaoyang. In other words, the separate lines of communication formerly existing became more or less merged. To meet this condition the occupied territory in rear of Liaoyang was placed under the Liaotung garrison with General Nishi, late of the Second Division, in command, and the entire étape service from Dalny to Liaoyang placed under a single service in all respects similar to an army étape service.

2. Until Mukden the director-general of étape of the Imperial Headquarters communicated directly with the army chiefs of service, Manchurian army headquarters; in other words, having no control over the étape service. After the

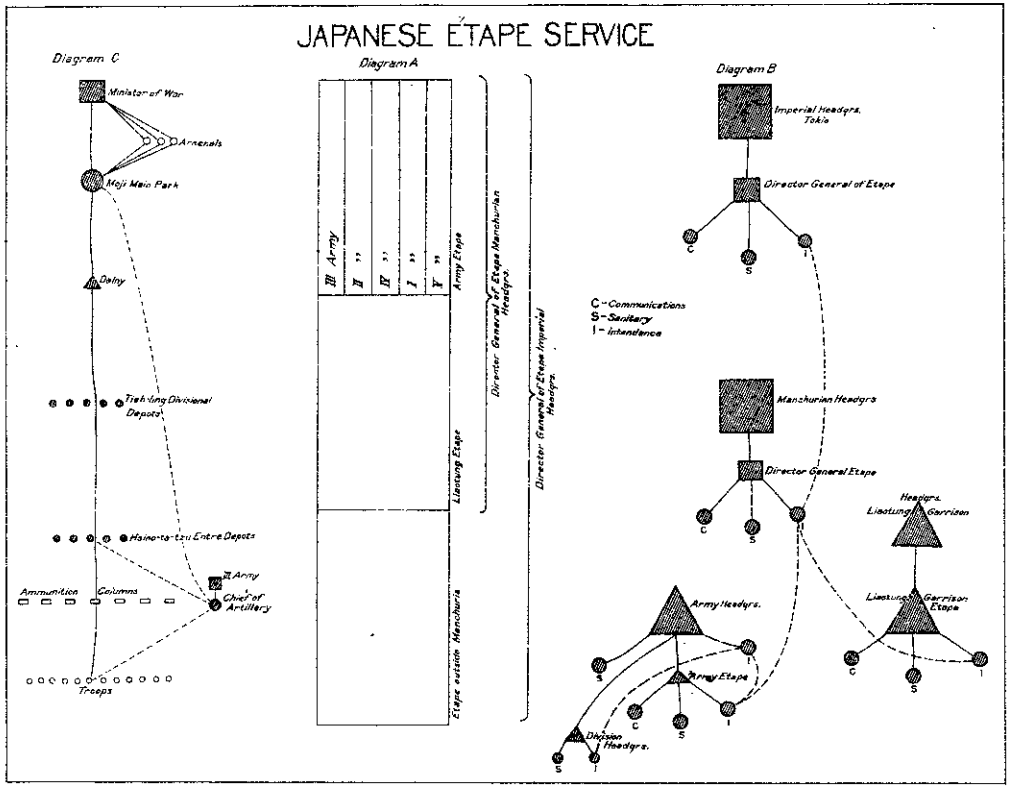

JAPANESE ETAPE SERVICE
Diagram C
Minister of War
Arsenals
Moji Main Park
Dairy
Training Divisional Depots
Hainoto-tzu Entre Depots
III Army
Chief of Artillery
Ammunition
Columns
Troops
Diagram A
III Army
II "
IV "
I "
V "
Army Etape
Director General of Etape Manchurian Headqrs.
Director General of Etape Imperial Headqrs.
Liaotung Etape
Etape section Manchuria
Diagram B
Imperial Headqrs. Tokio
Director General of Etape
C
S
I
C - Communications
S - Sanitary
I - Intendance
Manchurian Headqrs
Director General Etape
Headqrs. Liaotung Garrison
Army Headqrs.
Army Etape
Division Headqrs.
Liaotung Garrison Etape

PLATE III

battle of Mukden the director-general of étape was transferred to the Manchurian army headquarters, leaving to the Imperial Headquarters only the étape service outside of Japan.

The organization of the Japanese étape service corresponds in its general features to that of the German army.

Referring to Plate III, Diagram A shows the relations existing between the various étape services as a whole. In Diagram B is shown the relation existing between the various officials of the étape service with special reference to the intendance department. A similar relation obtains in the case of the sanitary service. The intendance and sanitary officials are detailed from their respective departments, while the communications department is in charge of staff officers. Diagram C shows the method of maintaining the ammunition service. There is no separate ordnance department in the Japanese army, the chief of artillery at army headquarters performing the functions of an ordnance officer in our armies.

Supplies for the army are obtained either by purchase under contract, calling for delivery at some port of embarkation, or by manufacture in Government establishments. The latter method applies chiefly to clothing and ammunition, although some provisions are also put up by the army stores department in Tokyo.

The possession of a heavily subsidized merchant marine made a large fleet of transports immediately available upon the outbreak of the war. Of the several subsidized steamship companies in Japan, the Nippon Yusen Kaisha is the largest and claims 260,000 tons of shipping, including a number of 5,000 to 6,000 ton vessels engaged in the European and American trade. These subsidized ships were called in as fast as needed and fitted out at the naval base for transport purposes. The ships are taken over from the several steamship companies with their crews complete.

The main port of embarkation or naval base in Japan is Ujina, near Hiroshima. This port is in a well-sheltered part of the Inland Sea, having rail and water connections with all parts of the Empire. It should be remembered that Ujina is a port of embarkation prescribed in the regulations, and that it was used as such both in the China war of 1894-95

and in the Boxer war of 1900–1901. This previous experience, together with a certain amount of existing facilities, enabled the port to be used at once without confusion.

Osaka and Moji were used as ports of embarkation to a limited extent. The completion of the harbor works at Osaka in the fall of 1904 made available the one and only port where ships of 6,000 tons could tie up alongside a wharf. Osaka Harbor consists of a detached breakwater, a sea wall, and a pile pier some 800 feet long and 60 feet wide. Moji is the main ammunition depot as well as the coaling port for all transports.

The different naval bases are in charge of directors of transport, who are officers detailed from any branch of the service. The director of transport at Ujina was a colonel of engineers while those at Osaka and Dalny were colonels of artillery.

Inasmuch as the duty of guarding the sea line of communications devolves upon the navy, some relation must necessarily exist between the latter and the army transport service. The regulations prescribe that the director of transport at the naval base shall be assisted by a naval officer whose duties, as translated to me by an official interpreter, are "to attend to the naval signals and to receive orders as to the destination of the vessel, which are communicated to the captain thereof after leaving port." The larger transports also carry a naval officer, who is designated the "superintending officer." Thus, out of four crossings between Japan and Manchuria on different ships, the three largest carried naval officers, while the fourth, a smaller vessel, did not. Until after the destruction of the Port Arthur squadron all ships leaving Japan were required to call at the naval rendezvous in the Elliot Islands, where they received orders from the fleet with instructions when and how to reach their final destinations. The functions of the naval officer on board seem to be limited to interpreting naval signals from the fleet and the signal stations en route. During the period when the Vladivostok squadron was active the transports were required to hide their lights at night.

The fitting out of the transports to adapt them for their special purposes is exceedingly simple, economical, and practical. Space between decks intended for troop accom-

modation is subdivided by the introduction of an intermediate deck, supported by rough 4 by 4 inch wooden posts braced together and wedged between the floor and the ceiling. By inserting an intermediate deck in the space above the main and in that above the orlop deck four troop decks become available. These troop decks are then covered over with straw mats 3 feet wide by 5 feet 8 inches long, which completes all the berthing arrangements on a Japanese transport. Temporary wooden steps down the hatch openings give access to the different levels. The minimum floor space allowed each soldier under the regulations is a rectangle 6 feet by 2 feet, with about 3 feet of head room, so that the soldier may sit comfortably, Japanese fashion, without striking his head. Ventilation is effected by the use of canvas air chutes and port scoops. These, with the open hatches, extending through two decks, keep the air reasonably pure, although short of what would be expected by American officers. The soldiers sleep on the berthing floor as near the hatches as possible, and store their equipments around the perimeter farthest from the opening. During rainy weather a canvas awning is spread over the hatch opening. The necessity for battening down hatches rarely or never occurs, as the transports can always make shelter in a few hours in case of rough weather. From Moji to Dalny is but 704 miles, which is covered in from forty-eight to sixty hours, with sheltered anchorages among the islands off the southwest Korean coast. One thing that did not produce a favorable impression was the smoking and use of uncovered candles in the confined berthing spaces. The fact that none of their transports took fire must be attributed to the general good fortune which seems to have attended the Japanese throughout the war.

The toilet conveniences on board transports are simple wooden privies built on the spar deck, usually in groups of one urinal and three closets. These privies consist essentially of a zinc-lined wooden trough with a good slope, the urinal occupying the upper end. This trough discharges outboard into a canvas tube, leading down close to the water. The trough is flushed at frequent intervals, using a hose, and the contents swept overboard through the canvas tube. Lime is freely used, and the privies were remarkably free from

odor, in spite of the crudity of the arrangements. The striking features about the toilet arrangement are the paucity of the accommodations. On the *Aki Maru*, a 6,000-ton ship, I could find but three urinals and eight closets when the ship was carrying 1,000 soldiers. As may be imagined, the toilet accommodations were pretty severely taxed during the entire day. The only bathing facilities observable were the canvas tank and the hose.

The cooking arrangements consist of a number of steam boilers housed in a simple wooden shed erected on the after spar deck. All Japanese food is uniformly prepared by boiling, whether the food be rice, fish, meat, or vegetables. Naturally this conduces to a great simplification of the installations. The cooked food is carried to the berth decks, by soldiers, in galvanized iron buckets holding ten rations and is distributed with wooden ladles into the soldiers' mess tins. The covered hatch of the lowest berth deck is utilized as a place for eating and recreation. Here individual soldiers sang, recited, or danced for the entertainment of their comrades grouped about on the floor or sitting on the edges of the upper berth decks.

The simplicity of all the arrangements for berthing and messing, together with the national habit of using the floor as bed, chair, and table, enables the Japanese to transport considerably more troops per ton of shipping than would be possible with us. I was informed by one of the transport directors that during the China-Japan war they had calculated upon 1 registered ton per man, but found this allowance too small, and that they now allow at least 1½ tons per man. As an actual fact, the *Sanuki Maru*, 5,000 tons, upon which I crossed in December, 1904, carried 2,300 troops and some 100 horses without any appearance of crowding.

For transporting horses, knockdown stalls are constructed in any part of the ship from the hold to the spar deck. These stalls are quite simple and ingenious. They consist essentially of a front and rear row of stanchions with detachable side rails and wooden feed boxes sliding up and down in wooden cleats spiked to the front stanchions. A continuous half-round rail is spiked to the rear stanchion. Cleated platforms on the floors of the stalls complete the arrangements. By removing one or more of the feed boxes

and the side bars the animals are led, one at a time, into a range of stalls, beginning with the farthest, and the side bars replaced successively. The horses are fastened to the front stanchions by two head lines, which prevent them from biting their neighbors, which, being stallions, they would otherwise be sure to do. The horses all wear straw shoes, both to prevent them from slipping and to reduce the noise that would otherwise result from their pawing the floor. These straw shoes consist of a pad about three-fourths of an inch thick, with two cords, one front loop, and two rear loops. To attach the shoe the horse's hoof is placed upon the pad, each cord passed around the front of the hoof through the rear loop and back around the front of the hoof, where the two cords are twisted together and then passed through the front loop and fastened by a number of turns and half hitches. In this way the pad is fastened to the hoof, without any possibility of chafing, and held securely in place. These straw shoes are in common use in Japan and may be purchased at any wayside village for the sum of 1½ cents gold per pair.

In rough weather the animals are supported by canvas slings fastened to the side bars of the stalls. Forage and water, the latter in canvas buckets, are lowered to the different decks as required for feeding. As in the case of the men, ventilation is provided by the open hatches, aided by canvas wind chutes. In the hold and on the spar decks the ventilation is sufficient, but between decks, owing to insufficient head room, it is decidedly bad, and the animals appear droopy and of indifferent appetite in consequenee. What I have seen of stable management on board ship is distinctly bad, the stalls being poorly cleaned and forage wasted. Too much grain and not enough long forage is habitually given.

The first-class passenger accommodations are reserved for officers and, being of the usual type, call for no remark. Each ship destined for troop and horse transport carries a suitable complement of medical officers and veterinarians. A simple wooden shed on the after spar deck serves as a dispensary.

The entire transport arrangements are characterized by extreme simplicity and economy, but are nevertheless well adapted to their purpose. From our point of view there is

much that is open to criticism, but with a nation possessing the peculiar characteristics of the Japanese much of this criticism must fail. I am satisfied that the entire cost of fitting out a 5,000-ton ship for transport purposes on the Japanese plan does not cost more than $1,000. Not only is the economy a creditable feature, but the time required to fit out a ship is a minimum. It should be added here that many transports, especially the smaller ones, were used as cargo boats entirely and were not fitted out or used for transporting men or horses.

As to the number of transports employed during the war, I was informed by a transport captain that about 120 was the maximum, of which about 30 were ships of 5,000 tons or over. After the bulk of the troops had been transported to Manchuria a number of the transports were reported in the daily press as having been released.

With the exception of Osaka and Dalny, none of the ports of embarkation or debarkation had dock facilities, and all men, horses, and supplies had to be lightered to and from the ships. This was effected by the native sampan, a flat-bottomed boat propelled by a single scull, and being as large as 30 to 40 feet long and 10 to 12 feet beam. For embarking horses the sampan is brought stern-on against a floating stage connected to the quay wall or shore by an inclined wooden ramp with side rails. A cleated platform connects the floating stage with the bottom of the sampan. Five horses, 40 men, or 5 tons of stores constitute the average loads. Many hundreds of these sampans were carried to the Korean and Manchurian coast for use in landing operations.

At Ujina, the main naval base, there are extensive storehouses, barracks, and hospitals, all of simple and inexpensive construction. When a transport is to be loaded she hoists a signal flag to guide the lighters. Supplies intended for shipment are stacked in the open or under cover near the landing stages. A flag corresponding to that of the transport is attached to the supply stacks, which are immediately attacked by gangs of coolies, who transfer the indicated supplies to the sampans, which are sculled as fast as filled to the ship. When stores and horses are aboard the troops are embarked and proceed to their berth

spaces, which have been previously marked with the organization or the number of men to occupy them. Everything proceeds with the greatest smoothness and dispatch, and with a marked absence of noise and confusion, notwithstanding the numerous boats and personnel required to load and unload. The transports coal at Moji, usually on the return trip. The coal is put aboard by contractors in the same manner as practiced by merchant vessels.

Various points of debarkation were used in Manchuria and Korea, depending upon the particular army concerned and the progress of the campaign. Troops and supplies for the First Army were at first landed at Chemulpo and later at Chinnampo as soon as the advance of the army had uncovered this point. After the battle of the Yalu the mouth of this river became the port of debarkation for the advance upon Liaoyang. The Second Army debarked at Yentaiwo, a few miles south of Pitzewo, which served as a landing place until after the battle of Nanshan, when Liushutun, in Dalny Bay, and later Dalny, became available, Pitzewo being abandoned. When the Second Army had reached Kaiping, a temporary landing was established at Hsiungyocheng, the supplies being landed at Liushutun, moved overland to Chinchou Bay, and reshipped in Chinese junks. After the occupation of Tashihchiao and Yingkou, the latter became the main point of debarkation for the Second Army, and Hsiungyocheng was abandoned. For the Fourth Army Takushan was used as the point of debarkation for its advance to Liaoyang. After the battle of Liaoyang and the junction of the three field armies at this point, the base at Takushan was abolished, and all three armies were supplied via the railroad from Dalny and Yingkou. The Yalu base and line of supply were still maintained, but do not appear to have been used to any considerable extent until the appearance of the Fifth Japanese Army, the so-called Army of the Yalu, in January and February, 1905. This army was posted on the right of the First Army in the mountainous country southeast of Mukden and was supplied entirely by way of the Yalu. With the opening of navigation in the spring of 1905, the Liao River was utilized as a supply line for the Third and partly for the Second, First, and Fourth armies.

Coming now to the subject of land lines of transport, it

will be readily understood that in a country so poorly supplied with passable roads as is Manchuria the existing railway lines play a most important part, so important, in fact, that they may be said to have dominated to a large extent the strategy of the war. Certain it is that both belligerents kept their fronts more or less squarely across the railroad and confined their operations to a limited distance on either side. The Chinese Eastern Railroad runs from Port Arthur to Harbin, a distance of 550 miles, with spurs to Dalny and Yingkou, the latter connecting with the railway running through Shanhaikwan to Hsinmintun. There are also several minor spurs, such as the ones to Liushutun, Yentai coal mines, and Fushun. The railway was thrown open to through traffic but a short time before the outbreak of the war and its permanent way was not yet fully completed, several of the stream crossings in the lower portion of the Liaotung Peninsula being of a temporary character. It is an exceptionally well built line, having light grades and easy curves. The gauge is 60 inches, with about a 75-pound rail. Stations are from 15 to 18 miles apart, usually at but not in Chinese towns and villages of importance. In their retreat up the peninsula the Russians made no attempt to injure the permanent way, but managed, through design or good fortune, to save all their locomotives, so that the Japanese were at first unable to use the railway effectively, although they had captured several hundreds of cars between Pulantien and Dalny. Had the Japanese been able to secure a few broad-gauge locomotives it would have facilitated their operations materially, both as regards time and economy. As it was, it became necessary to narrow the gauge to 42 inches and to transport rolling stock from Japan.

The work of altering the gauge and operating the railway was intrusted to the department of communications of the home Government, which has charge, among other things, of the State railways. This department dispatched a force of workmen to Manchuria and commenced the shipment of rolling stock. Cars and locomotives were shipped knocked down and assembled at Dalny. Right here I want to say that the record of the Japanese railway department was not a particularly brilliant one, and that the deliberation practiced in developing a satisfactory railway service would not

for one moment be tolerated by us. Dalny was occupied the end of May, 1904, and the first train did not reach Liaoyang until October 1, four full months later. The process of narrow-gauging was a most simple one, a single rail only being shifted, first removing the inner line of spikes. Nor was any particular effort made to increase the train movements to anything like what was demanded to supply the needs of the armies until after the battle of Mukden. Meanwhile the inadequate railway transportation had to be supplemented by thousands of Chinese carts and the expenditure of millions of yen.

Pending the alteration and equipment of the railway the Japanese utilized the captured Russian cars by organizing a system of push trains, each car being moved by from 15 to 18 coolies or train soldiers. These trains were operated in strings of from 20 to 30 cars, making 15 to 18 miles daily, which was the average distance apart of stations. While more economical than the Chinese cart, these push trains did not help the transport materially, owing to their slow speed. As the work of narrowing the gauge progressed a train service was gradually developed, the push trains being meantime kept ahead. The push-train service was not maintained beyond Yentai.

The daily train movements, few in number at first, were gradually increased as more rolling stock became available, until at the end of the campaign eight trains were dispatched daily each from Dalny and Yingkou via Tashihchiao to Liaoyang and Tiehling. To provide for the increased train movements between Tashihchiao and Tiehling, amounting to sixteen trains daily, additional sidings were put in on this stretch of the road, a distance of about 125 miles. With the heralded approach of the Baltic Squadron the Japanese commenced to accumulate at Dalny and Yingkou, in the fall of 1904, a six-months' reserve supply of stores for all their armies in Manchuria. Dalny is an open port the year round. Yingkou, usually closed by the 15th of November, remained open a full month later, owing to the mild winter. To house these stores extensive sheds were erected at Dalny and Yingkou. These sheds consisted of simple framing covered with corrugated galvanized sheet-iron roofs and sides. Similar sheds were also erected at the advanced depots at Liao-

yang and Tiehling. At the latter place I counted 38 sheds 200 by 50 by 15 feet to the eaves, and 5 sheds 200 by 36 by 10 feet to the eaves.

Assuming 10 pounds per day as the requirements per man, the generally accepted figure, covering all classes of military supplies, and estimating the total number of Japanese to be fed at 600,000, a number not far wrong at the end of the campaign, 3,000 tons of supplies would be required daily. This, in fact, was stated by a station agent to be the case on March 1, 1905, before the Japanese had attained their maximum numbers. Owing to the fact that the Japanese had to transport large quantities of fuel—wood and charcoal—and that they drew so little on the resources of the country, I am inclined to believe that 10 pounds per man per day did not meet their requirements. A Japanese freight car carries only 6 tons, so that one train of 30 cars would carry 180 tons, and 16 trains, the maximum reached at the end of the campaign, would carry 2,880 tons. This is assuming that every car of every train carried freight only, which was not the case. Although the troops usually marched from Dalny, they were occasionally moved by trains, and a certain number of passenger cars were kept moving for the transport of wounded officers and high officials. Thirty men or six horses could be carried in a car, the latter being placed three at each end with their heads toward the center of the car.

Before the railway became available and for long after, until it had reached its maximum capacity and the Liao River line had been added, the deficiency in rail transport had to be supplemented by the Chinese cart. This fearful and wonderful vehicle is the outcome of centuries of experience, and about the only thing that will stand the wear and tear of the so-called Manchurian roads. In normal times the bulk of the carting is done in the winter months when the ruts and inequalities of the roads become filled with snow and ice and worn smooth by traffic. It is then that the natives haul their products to market and lay in their annual stock of supplies. The exigencies of the war, however, called for transportation the year round. The roads of Manchuria are simply tracks which wander from village to village along the lines of least resistance. When a spot gets too bad the carter simply strikes out in a new path, often through cultivated ground,

ruthlessly laying waste a strip of growing grain. Fences are unknown, and the farmers' efforts to confine the roads by digging pits and throwing up embankments along the edges of his fields are too often labor wasted. Road building is an unknown art, the idea of reducing the resistance having apparently never occurred to the natives who seem to prefer the more costly method of increasing the power until as high as seven animals may be seen hooked up to one cart, which may be any possible combination of ponies, donkeys, mules, or oxen. Seated upon the shafts or walking alongside, the carter guides and controls his motley team by voice and whip, without the use of lines.

The Chinese cart consists of a strongly framed platform resting upon a wooden axle turning with the wheels. These latter have four felloes, supported by one main and two secondary braces. The braces are of oak and the felloes of some tough-grained wood resembling elm. The heavy grooved tires, in four sections, are spiked to the felloes by eight large spikes to each section. Each felloe has thirty large flat-headed spikes driven through from the outside and clinched on the inside. The outside gauge of the wheels is 3 feet 10 inches. The carts invariably follow the ruts made by their predecessors, so that these become so deep that at times the axle scrapes the ground. The cart is so heavy and strong that it is practically unbreakable, and plows its way through mud or rumbles over stones with equal certainty and indifference.

During the height of the rainy season any general movement is simply out of the question in the valley of the Liao River, and it is about all the troops can do to keep their daily necessities supplied by pack trains from the nearest depots, which have been stocked to meet this contingency.

It is not too much to say that but for the Chinese cart the war would have been impossible for the Japanese, who had no system of army trains such as were employed by us during the civil war. Transport by Chinese carts was a costly proposition. The average daily cost of carts was 7 yen, for which 20 bags of rice would be carried from 15 to 18 miles. From Dalny to Liaoyang it is 10 étape stations, which brings the freight charges for 20 bags of rice to

70 yen, or 3½ yen per bag, practically trebling the cost price in Japan. As giving some idea of the magnitude of the transport service I may mention that at Pulantien at the end of July, 1904, there were employed 800 Chinese carts and 3,000 Chinese coolies, while at Hsiungyocheng at the same time there were employed 700 carts and 2,000 coolies. Twenty bags of rice, weighing 1,200 pounds, is the maximum load that I ever saw on a cart.

Besides the Chinese carts, hand carts, pack coolies, and even Chinese wheelbarrows were occasionally employed along the étape lines in the earlier stages of the war to help out the transport service. At Pulantien a string of wheelbarrows could be seen coming from the direction of Pitzewo, each barrow carrying 2 bags of rice or barley, with one coolie pushing and one pulling by a rope. By such Lilliputian methods did the Japanese manage to keep up their supplies.

The land line of the First Army from the Yalu was aided by a light field railway with push cars to Fenghuangcheng, a distance of about 38 miles, and I was given to understand that the Fifth Army had three such lines laid well up toward its front. Upon my return through Mukden in September, 1905, I was told by General Kodama that steam field railways of 60 cm. gauge had been laid from Mukden to Hsinmintun and to Antung on the Yalu, the latter via Yentai and the Motienling Pass. The lines of these field railways were in evidence, but no cars or locomotives. The line to Hsinmintun suggests the possibility of the Japanese contemplating the use of the railway from Tienstsin to Hsinmintun as a supply line, if, indeed, this was not already done.

It is difficult to understand the failure of the Japanese to more generally use steam field railways, which could have been built quite easily in most places. If this failure was dictated by motives of economy it looks like a false economy, for the money expended in cart and coolie hire would, in my judgment, have amply paid for the cost of field railway installations.

Another noteworthy feature of the Japanese supply system was the fact that they drew practically nothing from a country abounding in resources. Although there was plenty of kaoliang, millet, and bean cake, barley was religiously

transported from Japan as the principal food for their ponies, eked out with small quantities of compressed hay or fodder from Australia or America. The failure to utilize local forage could not have been due to any fastidiousness on the part of the Japanese horse, for the latter will eat anything down to tree bark and wood shavings. The mules and ponies of the Chinese thrive upon the local forage, and, in spite of extra hard work due to the war, looked on the whole much better than the Japanese ponies. The Japanese soldier, too, must have his rice above all things, and disdains the kaoliang porridge, which is the staple diet of the Chinese and which the Russian soldiers were not above eating on occasions.

It must of course be admitted that given their normal and accustomed food both men and horses will do better work and remain in better health than with food foreign to their tastes. The Japanese troops were certainly well fed and supplied from every point of view and showed the result in their excellent physical condition which all agree was better than when living in garrison in Japan. This result, however, was attained only at the cost of a severe strain upon the transport and a consequent sacrifice of mobility.

With the breaking up of the ice in the Liao in April, 1905, this stream became available as a supply line and was immediately put into operation. The Liao is a great trade artery during the season of navigation, and on its banks are accumulated the various products of the country by carting during the winter for shipment to Yingkou. The boats employed in this traffic are heavy flat-bottomed junks with a single lateen sail. The boats are about 30 feet long and 12 to 15 feet wide, drawing less than 2 feet when loaded. Their maximum capacity is about 7 tons, but when navigating the highest reaches of the river they reduce their loads. They are manned by a crew of four men and make the round trip between Yingkou and Hsiaotatzu, the head of navigation fixed by the Japanese, in one month. It is stated that there are some 15,000 junks on the river, of which probably 5,000 were employed by the Japanese, judging from the daily arrivals at Hsiaotatzu.

Tungchiangkou was at first selected as the advanced river depot, probably because it was the recognized head of navigation for the Chinese trade, but, owing to the low ground

extending for several miles from the river on both banks and the consequent soft roads, the Japanese later selected Hsiaotatzu, some 8 miles higher up. This place is on a low bluff, and here some three months' supply for the Third Army had been accumulated at the close of the war.

The average daily arrivals of boats at Hsiaotatzu was about 100, representing 700 tons of stores. Owing to the tortuous course of the river the direction of the wind does not affect navigation very much and poling and towing are frequently practiced. The boats often ground on bars and banks, but are generally worked off by the boatmen, who do not hesitate to jump into the water for this purpose. To provide for the passage of the boats the numerous bridges on the Liao were all provided with draw spans.

The Japanese divided the river navigation into three stretches, the first to Hsinmintun, the second to Tiehling, and the third to Hsiaotatzu. A Japanese train soldier accompanied every boat in the capacity of overseer.

From the advance depot of the étape line supplies are transported to the divisional depots, which carry normally a ten days' supply. The distribution to the division depots is in charge of the army étape inspector. From the division depots supplies are distributed by the division trains which accompany the arm when on the march. Supplies for the division depots are usually stacked in the open under paulins. The Japanese tried to color their paulins with an infusion of oak bark, but without success. Had the Russian cavalry been more enterprising it would not have lacked opportunities for destroying supplies which were conspicuously marked by the white paulins in a country as open as Manchuria.

There are four provision columns to each division, each carrying one day's ration for the command. With but four days' supply in the division trains it follows that the division can not proceed farther than two marches without an advance of the divisional depot. In other words, the army étape line must be prolonged as the troops advance and must never fall behind more than two marches.

As an illustration of the practical working of the Japanese supply system when an army is on the march and when at a halt, I have selected the Third Army during and after the battle of Mukden as an example. After the capitulation of

Port Arthur the Third Japanese Army commenced its northward movement without delay. The artillery and other material was shipped over the railroad to Liaoyang, but the troops, with the exception of several battalions which had been hurriedly dispatched by train to Yingkou to meet General Mishchenko's raid, marched overland, being fed and quartered at the several étape stations along the line of communication from Dalny to Liaoyang. The movement was completed by February 20, 1905. The Third Army was now assembled behind the Taitzu, in rear of the Japanese left wing, and billetted in the villages between Hsiaopeiho and Tashaling. General Nogi commenced his flank march on February 27, his army consisting at first of three line divisions, one Kobi brigade, one artillery brigade, and one cavalry brigade—about 75,000 men of all arms, including noncombatants. The advance was based immediately upon Hsiaopeiho, where supplies sufficient for one month for three divisions had been previously accumulated. This supply depot had been filled, partly from Liaoyang and partly from Yingkou direct via the Chinese town of Newchwang. From Liaoyang to Hsiaopeiho is about 20 miles, with an intermediate étape station at Tashaling. Hsiaopeiho is virtually in front of the initial position of the Third Army, and, in fact, this depot was established in this advanced position with only a cavalry screen in front. Before the advance began the general staff of the Third Army had selected the étape line and fixed the same as far as Shahotzu, the line passing through Shakoutzu, Tahoangchipu, and Shahotzu. The further extension of the étape line was to depend upon the progress of events. On the 9th of March a station was opened at Mashanchiatzu and after the battle the line was still further extended to Tsailopu.

I started from Liaoyang on the morning of March 6 to ride over the line of communications of the Third Army, via Tashaling and Hsiaopeiho, and had a good opportunity for observing the workings of the Japanese étape service. The various étape stations were in charge of officers of different branches of the service, captains and majors, and, judging from their ages, reserve officers apparently. Streams of carts were passing to the front and rear, including Chinese

carts, handcarts, and Japanese pontoon wagons. The latter appear to have been utilized to help out the deficiency in transport and could very well be used for this purpose as there was no use for the bridge trains at this time, the streams all being frozen hard. At Hsiaopeiho there was an enormous quantity of supplies stacked in the open under paulins, and the station presented a very busy appearance with the hundreds of carts coming and going. At both Tahoangchipu and Shahotzu the station commandants complained of the difficulty of securing sufficient Chinese carts to supply the demand. About 300 carts were required to supply the daily minimum demands, whereas they had been able to secure only about half that number, although they were paying as high as 11 yen per day for carts. Apparently the Chinese carters had been carried off by the retreating Russians or had been overcome by fear and fled. The latter view of the case is supported by the statements of an English-speaking corporal employed in the étape service, who told me that great trouble was experienced in keeping the carters up to their work, as they were constantly trying to run away with their loads when near the advanced depots. During the height of the battle the étape service was limited to forwarding only the daily food requirements of the troops, such things as forage, fuel, and medical supplies being out of the question on account of the deficiency in transport. Streams of wounded were observed coming to the rear, some on stretchers carried by Chinese coolies, some in empty carts returning from the front, and a large number on foot, the latter being light cases. All the étape stations were organized with a commandant, a lieutenant as assistant, some five or six noncommissioned officers, and a detail of train soldiers. Notwithstanding the heavy strain on the transport service during the battle, I received most excellent treatment, including comfortable sleeping accommodations in Chinese houses and an abundance of wholesome food.

A significant feature of the étape service was the forwarding of reserve troops during the battle. I observed a number of detachments of reserves, in one case as many as a thousand of all arms, who showed by their fresh clothing and new equipments that they had just arrived from Japan. It was quite evident that in their preparations for

the battle of Mukden the Japanese had included the forwarding of reserves to make good their anticipated losses and that some of these reserves actually joined during the fight.

After the battle of Mukden the Third Army was faced about and took up a line along the left bank of the Liao, Tsailopu being the advanced étape station. On the 17th of April the army crossed the Liao and took up a line through Fakumen. The rail head was meanwhile advanced to Hsintaitzu and three bridges thrown across the Liao at Shifossu, Lamutun, and Kaotaitzu. On the 4th of May the Third Army made its final advance to the line Kangpienhsien to Chinchiatun, which it held until the termination of hostilities. Meantime the Liao River line had been put into operation, first to Tungchiangkou and later to Hsiaotatzu, while the rail head was advanced to Tiehling and later to Kaiyuan and Changtufu.

Tiehling became the main advanced depot on the rail line. From here an étape line was maintained to Fakumen, with one intermediate station at Ssuchiatzu. So far as the Third Army was concerned, this line was used mainly for the field, post, and reserve troops. Practically all food supplies for the Third Army came by way of the river from Yingkou, being landed at Sanmiencheng, Tungchiankou, or Hsiaotatzu. From Sanmiencheng an étape line ran to Fakumen through Takuchiatzu and from Hsiaotatzu one to Kangpienhsien. Ammunition for the Third Army arrived by rail at Tiehling, where it was transshipped by junk to Hsiaotatzu. Sick and wounded were evacuated mainly through Hsiaotatzu and Tungchiangkou, whence they were taken by boat to Tiehling, there to be entrained for Dalny.

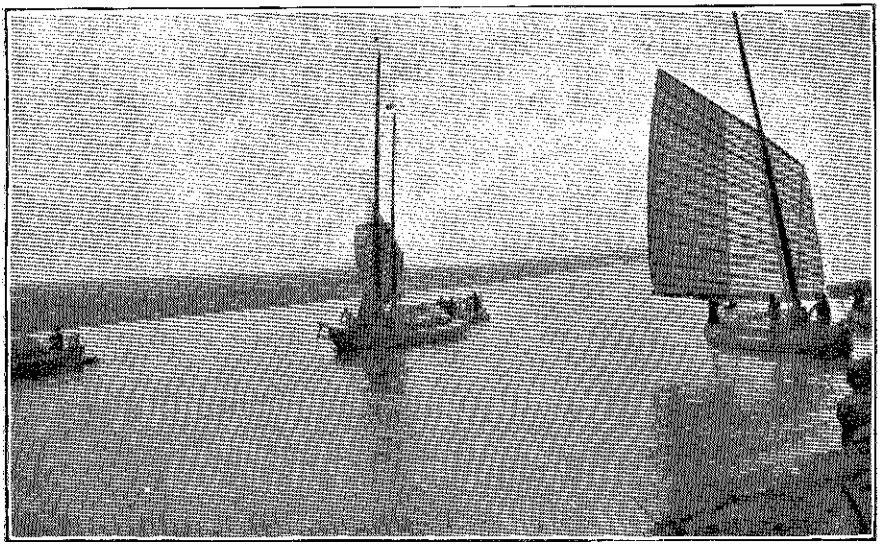
To provide for the rainy season, which comes during July and August, the different advanced depots were stocked up with a month's reserve supplies, which were still further distributed in smaller depots so as to be convenient to the troops. This proved a most fortunate provision, for during the first two weeks of August all wheeled traffic was at a standstill along the low ground adjoining both banks of the Liao.

During the battle of Mukden the headquarters of the Third Army étape inspection were at Hsiaopeiho. Some time in June these were moved to Fakumen. Major-General

Obata was the étape inspector of the Third Army, and was assisted by a staff of three officers, in addition to the chiefs of intendance and of the sanitary service.

The Japanese pony cart is a toy affair quite in keeping with the miniature equipment of the Japanese. It is strong and well built, and stood the wear and tear of the rough roads remarkably well. Its weakest points are the shafts, which occasionally broke at the junction with the body. The pony harness developed a number of weak spots, mainly the saddle, which, being insufficiently padded and having the shaft band rigidly attached, produced many sore withers, due to the rough roads where the wheel would suddenly drop into a rut 18 inches deep and bring a violent wrench on the saddle. This was remedied in the field by the use of blanket padding under the saddle. In one of the divisions all the regulation saddles were replaced by small buck frames with rollers over which the shaft strap could play freely—an idea borrowed from the Chinese cart harness. In the veterinary hospital at Telissu in August, 1904, I counted nearly 200 ponies, nearly every one of them suffering from frightful wounds in their withers, chunks of flesh having literally been torn out by the cart saddles. The breast strap also produced a good deal of chafing, due, no doubt, to the angle of draft, and was pretty generally discarded by the end of the war in favor of the Chinese collar and wooden hames, as shown in the photograph. The gauge of the Japanese cart is 3 feet 8 inches, and, whether by accident or design, fits that of the Chinese cart, which was a most fortunate circumstance, for the latter always run in the same ruts, and any vehicle of a different gauge would certainly be wrenched to pieces. The maximum load of the cart is about 350 pounds, or 6 bags of rice, which is the greatest I saw on the best of roads. More often 3 or 4 bags were all that could be carried.

The light baggage of the troops is carried on pack ponies, which are also used for drawing supplies from the divisional depots when the state of the roads renders wheel transport impossible. The pack saddle is a very serviceable outfit and, in my opinion, a great improvement over the aparejo. It is simple in construction, easily put on and off, and I never saw any sore backs from its use. It consists essentially of two



27. JUNKS ON LIAO RIVER.

28. JAPANESE CART.

arched ribs, reenforced both sides by thin sheet steel, the ends of the ribs bearing upon two boards sewed to the padding. The padding is cut away over the withers and back so that no pressure can come on these parts. A blanket pad is placed under the saddle, which is kept from slipping by the crupper and the breast strap. The lashing ropes are permanently fastened to the saddle, and when not in use are coiled up out of the way. Many of the loads are arranged simply to be hooked to the ribs, which have two hooks each for this purpose. The idea of the saddle seems to have been borrowed from the English service in India. The usefulness of the saddle depends largely upon the fact that all Japanese military supplies are done up in boxes or packages of convenient size and weight, so that they may be readily attached and balanced upon the saddle. The bag of rice, weighing 60 pounds, is the heaviest and bulkiest package comprised in the regular list of supplies. The box of infantry ammunition weighs about 80 pounds and is the heaviest single package, but it is of small size. It is provided with two short chains and is simply hooked to the pack saddle.

Supply packages weigh on the average from 35 to 40 pounds. The following are the dimensions and weights of some of the principal supplies:

Supplies.	Dimensions.	Weight.
Box of dried fish	12 by 12 by 31 inches	35 pounds.
Box of vegetables	12 by 13¼ by 30 inches	Do.
Box of biscuit (60 packages)	12 by 14 by 23 inches	
Box of sugar	8 by 10 by 34 inches	50 pounds.
Box of vegetables	8 by 10 by 24 inches	28 cans.
Do	13 by 13 by 27 inches	35 pounds.
Australian compressed fodder	11 by 15 by 24 inches	
Dried salmon	13 by 14 by 30 inches	Do.
Box Japanese soy	7½ by 10 by 23 inches	
Tubs Japanese sauce	13 inches high by 13 inches diameter.	
Canned beef, 96 cans	9 by 11 by 26 inches	
Box of horseshoe nails	9 by 10 by 27 inches	
Horseshoes	25 pairs to the box	
Saké barrel	2 feet high by 22 inches diameter.	
Box cigarettes	24 by 21 by 42 inches	
Bale of socks (500)	20 by 20 by 30 inches	
Bale puttee leggings (160 pairs)		
Bale of blankets (12)	16 by 22 by 30 inches	
Bales of shirts and trousers	22 by 12 by 26 inches	

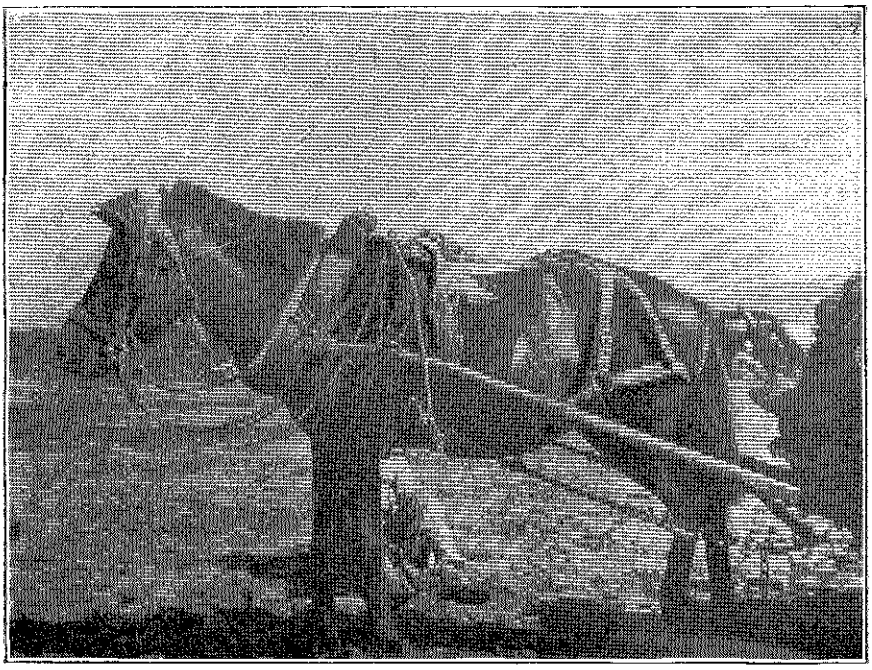
Grain bags are of uniform size, holding 60 pounds of rice and about 40 pounds of barley. All grain is put up in rice-straw matting, that for rice being either double or

with an inner bag of sacking. To distinguish the contents grain bags are bound with grass rope of different colors—red for barley, white for rice, and green for oats, of which very little was used. Packing boxes are of lighter material than used by us, usually half-inch stuff, and reenforced around the edges. To still further strengthen the boxes, they are liberally wound with grass rope. So far as my observation extended, the packing for military supplies was sufficient, and broken packages or bags were rarely seen.

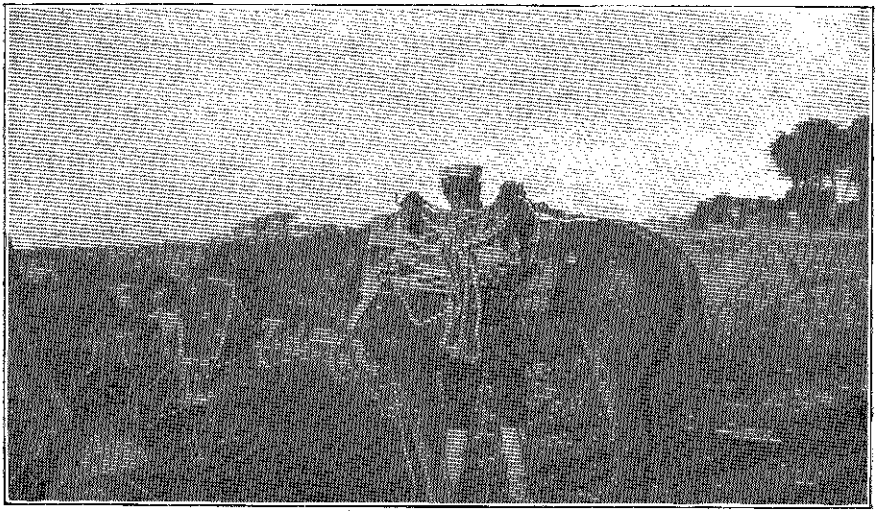
The light baggage of an infantry battalion consists of 21 ponies—18 for ammunition, 2 for intrenching tools, and 1 for medical supplies. The battalion heavy baggage consists of 30 ponies carrying one day's rations and the cooking outfits.

With regard to the number of carts accompanying a division, exact figures were not obtainable, as the Japanese, acting under superior orders, declined all information touching the strength and organization of their army units. I counted many provision columns and found them running from 160 to 190 carts, and have been told that there were about 200 carts to a column. The ammunition columns call for 136 carts each for infantry and artillery. Each of the 6 field hospitals calls for 22 carts. With an allowance for the field telegraph detachments, bridge column, headquarters, etc., about 1,500 carts are required as a minimum. In addition to the wheeled transport 600 ponies are required for the battalion pack trains. When it is remembered that for every pony there is a transport soldier, it will be readily understood that the number of noncombatants in the division is large. From the best sources of information, the number of train and transport men per division is over 4,000. The divisional trains are all in charge of the train battalion.

The Japanese obtained their transport ponies in Japan through the prefectural governments. The animals, though small, are tough and wiry and capable of considerable endurance. Certain it is that the loss in horse flesh during the war was remarkably small, and the Japanese seemed to be able to supply their needs from their home country. That the country was pretty well drained is shown by the fact that in the spring of 1905 a consignment of Australian horses was



29. JAPANESE TRANSPORT PONY AND HARNESS.



30. JAPANESE PACK SADDLE.

bought and shipped to Japan, but I never heard of their coming to the front. Manchuria is filled with fine draft animals, ponies, and mules, but the Japanese bought very few from the natives. In one instance I came across a herd of about 40, which, I was informed, had been purchased locally at an average price of 235 yen per head. The Japanese appear to have husbanded their resources in horse flesh most carefully, which was further aided by the slowness of their movements, obviating any severe tax upon the endurance of their transport animals.

In conclusion, we have not much to learn from the Japanese methods of transport and supply, which could find little application to our Army. A system which requires eight men and eight horses to transport what one of our four-mule escort wagons with one driver can carry is not likely to be looked to as a model. Probably the system is as good as any that could be devised by the Japanese, considering their peculiar national characteristics and the quality of their available transport animals. If we have anything to learn from the Japanese it is that we should work out some system of army transport and supply complete as to details and suited to our national habits. Our mules are the finest draft animals in the world, and we have as good wagons and harness as any nation on earth, and there should be no difficulty in doing this. Last, but not least, we should secure some form of personnel to replace the present insubordinate and undisciplined horde of teamsters and civilian employees upon whom we have largely depended hitherto. This force should be amply large to care for all the service of supply for the Army and render unnecessary the custom of detaching combatant troops for duty in the transport and commissary departments.

NOTES ON ARMY ORGANIZATION AND GENERAL STAFF.

The organization, tactics, and training of the Japanese army are assimilated to those of the German and French armies, the influence of the former nation being the more pronounced.

The division is the largest permanently organized unit and is a complete organization in all respects.

The organization of the staff of a division, as actually noted in the field, was as follows:

1. Lieutenant-general commanding.
2. The chief of staff, a colonel or lieutenant-colonel.
3. Three officers of the general staff, majors or captains.

These staff officers are apparently detailed to different duties as the commanding general directs, one as intelligence officer, one to assist the chief of staff generally, and the third to attend to line of communication work.

4. Four adjutants, the senior a major or captain. The senior has charge of all routine official correspondence connected with interior economy and discipline of the division, appointments, transfers, and also the Japanese (not European) press correspondents. The remaining adjutants are special service officers and aids combined. They carry verbal orders in the field and can be detailed to assist any of the other staff officers as required. All adjutants, regardless of the organizations, wear yellow and white shoulder sashes.
5. An intendance officer.
6. A chief medical officer.
7. A camp commandant, a detailed officer.

The staff of an infantry brigade consists of two adjutants, either captains or one captain and one lieutenant. The senior adjutant looks after the brigade operations, while the junior attends to the personnel and routine matters.

The regiments are commanded by colonels or lieutenant-colonels, with a captain as regimental adjutant.

Both the brigades and regiments are tactical units and appear to have little or nothing to do with questions of supply, the battalions indenting direct upon division headquarters. This arrangement is most commendable, doing away with a great deal of unnecessary paper work and simplifying the whole subject of supply.

The maintenance of the field units is assured through a depot organization modeled on European lines. For the Russo-Japanese war it was necessary to mobilize the regiments in January and February, 1904, at which time there were some 900 new men, who had joined only the month before, in the ranks. These new men were left behind and the regiment filled to war strength from the first reserves. A depot battalion of some 1,500 men was then formed from

the 900 new men, conscript reserves (i. e., men who had received short annual training), some first reserves, and a sprinkling of old soldiers. This depot battalion occupies the barracks of the regiment and is put under the command of a major who is a spare major of the regiment, the remaining officers being partly from the regiment and partly from the reserve list. The depot battalion is put under training, and, as men are drawn from it to make good losses at the front, fresh conscripts from reserves or the annual drafts, if latter fall due, are taken in to keep up the depot battalion.

At the same time regiments of Kobi (second reserve, corresponding to landwehr in Europe) are formed, some of two and some of three battalions. The Kobi men have served seven and one-third years with the colors and first reserve. The term of service in the Kobi, formerly five years, was changed to ten years by imperial edict during the progress of the war. The Kobi men are quartered in the towns and villages, being billeted on the inhabitants. The Kobi regiments are commanded by lieutenant-colonels of regiments of the line. After a short period of training the Kobi regiments are brigaded, two or three regiments to a brigade, according to whether the regiments have three or two battalions. Most of the Kobi regiments have three battalions.

Normally it is contemplated to form one Kobi brigade for each line division, but actually a greater number of regiments were called out and some of the Kobi brigades organized into divisions. Each Kobi brigade is supposed to have one battery, one squadron, and one company of pioneers, but it is doubtful whether they all possessed their full complement of the four arms. In February, 1905, I was informed by a Japanese officer that eighty Kobi regiments had been called out to date. The Kobi troops were largely employed to guard the lines of communication and to garrison occupied territory in Korea and Manchuria. Kobi regiments also maintain a depot organization, after leaving for the front, from which they repair their losses. By this system the line and Kobi regiments are separately maintained.

Besides the Kobi organizations, Japan also organized during the war a number of new line divisions, complete in all respects. These new divisions made their appearance during the summer of 1905, one of them, the Fourteenth, being

attached to the Third Army. Rumors of the arrival of the Fifteenth and Sixteenth Divisions were also circulated in August, 1905, but this requires confirmation. It is, however, certain that the Japanese were bringing up large reenforcements along the line of the railway at this time. It is also surmised that the troops dispatched to Sakhalin belonged to a newly organized line division.

A competent authority has stated that on the termination of hostilities Japan had 1,000,000 men under arms. With her population of 45,000,000 she had by no means reached the limits of her resources in men, and every town and village was filled with squads of soldiers undergoing instruction. But the quality of her troops had undergone a marked change. Under the exigencies of war and the many severe battles the splendid first line troops had pretty well disappeared from the ranks, which were now filled by men of inferior physique and deficient training; in other words, more or less raw levies. These later troops lacked none of the dash and spirit of their predecessors, but were simply less seasoned and skillful.

Japan's chief difficulty, however, lay in the scarcity of suitable material for company officers. At the very outset of the war it was necessary to appoint a large number of noncommissioned officers to fill up the existing vacancies in the grade of lieutenant. As the war progressed the number of thoroughly trained and professionally educated officers in companies and battalions constantly grew less, their places being filled by reserve officers and promotions from the ranks.

While the efficiency of the personnel of the army was somewhat diminished by the heavy casualties incurred during the progress of the war, the fighting qualities of the troops showed no visible depreciation. The Ninth Division, which fought at both Port Arthur and Mukden, had very few of its original men left when it entered the latter battle, yet it fought most gallantly and suffered more than any other division of the Third Army. I was informed that the Ninth Division had suffered a total of 21,000 casualties at Port Arthur and Mukden, equal to 140 per cent of its combatant strength. The same division is credited

with having lost 8,000 dead from all causes, battle and disease.

With regard to the fighting qualities of the different divisions, while all fought splendidly, those from the country districts were undoubtedly a shade better than those from the large cities.

In time of war the divisions are formed into armies, or, more properly, army corps, of from two to four divisions, commanded by a full general with a numerous staff. As an example of the staff organization, that of the Third Army at Port Arthur is given herewith:

1. General Baron Nogi, commander in chief.
2. Major-General Idichi, chief of staff.
3. Subchief of staff, Lieutenant-Colonel Oba.
4. Two officers of the general staff, senior a major, in charge of operations.
5. Two officers of the general staff, senior a major, in charge of intelligence, records, foreign attachés, press correspondents.
6. Two officers of the general staff, senior a major, in charge of lines of communication.
7. One naval officer, a commander. This officer is exceptional, and his presence was due to the naval artillery used in the siege.
8. One chief medical officer, a major-general.
9. One chief intendant, a major-general.
10. One chief of artillery, a major-general.
11. One chief engineer, a colonel.
12. One camp commandant, a major.
13. Six adjutants, senior a lieutenant-colonel, in charge of routine work.
14. One expert in international law, Doctor Ariga, member of the foreign office. This official was attached at Port Arthur only on account of the international questions arising in connection with the siege.
15. A corps of official interpreters, having assimilated rank from major to lieutenant, and speaking various languages, English, German, French, Russian, and Chinese.

Most of the general staff officers of the Japanese armies have received foreign education, chiefly German and French, and nearly all speak one or the other of these languages, but rarely English. Japan having modeled her army along German and French lines, these countries have naturally been selected as the proper ones to which to send her army officers.

Naval officers, on the other hand, speak English almost universally and many have received training in England.

With one single exception, all the army and line division commanders were from the infantry branch of the service. The exception is the Eleventh Division, whose first commander, General Tsuchiya, was wounded at Port Arthur and was succeeded, temporarily at least, by General Samejima, an engineer officer. The higher leaders are all soldiers of the old school who have won their spurs in the civil wars, some of them going back to the time of mediæval weapons. While lacking perhaps in the refinements of modern military education, they are natural-born soldiers, possess strength of character, and are idolized by their men. The personal character of the leaders, in connection with a thoroughly trained and up-to-date general staff, presented an ideal combination for handling large masses of troops in the field.

JAPANESE ADMINISTRATIVE GOVERNMENT OF OCCUPIED TERRITORY.

In all the larger towns of the occupied territory a Japanese administrative office was organized under an officer detailed for that purpose. The object of the administrative office was not to replace the existing civil administration under Chinese officials, but by cooperation with the local authorities to maintain order, establish confidence among the inhabitants, and to secure sanitation. The office does not administer justice and has no powers of punishment. Among the places where administrative offices were maintained were Port Arthur, Dalny, Haicheng, Liaoyang, Mukden, and Fakumen.

The workings of the Japanese administrative office may be illustrated by the case of Fakumen, a large town of some 20,000 inhabitants, which was the headquarters of the Third Army during the last four months of the war. The administrative officer was Major Iwai, of the gendarmerie, appointed by General Nogi. Ordinarily the administrative officers were appointed by Marshal Oyama. Major Iwai reported to the inspector-general of the Third Army Étape, and the latter reported either to General Nogi or to Marshal Oyama.

Major Iwai's duties consisted of investigating the condition of affairs among the inhabitants and of advising with the Chinese officials. If a thief or other malefactor were caught he was sent to the Chinese officials for trial. Persons suspected of being spies were taken in charge by army headquarters. Major Iwai's jurisdiction extended over a radius of 8 miles from Fakumen, and his staff comprised 1 adjutant, 2 surgeons, 2 interpreters, 2 noncommissioned officers, and 5 gendarmes.

On occupying the city the Japanese conferred with the Chinese and arranged for the local military mandarin to police the city with his soldiers. (Fakumen is governed by a military mandarin and is under the jurisdiction of the Kaiyuan magistrate).

Major Iwai cooperated and corresponded with the military mandarin and had power to compel the latter to obey his orders, and, in case of refusal, to arrest him and to send him to the Kaiyuan magistrate for trial.

The city was governed in town matters by a committee of leading citizens, under a president selected from their number. A subcommittee, acting under Major Iwai, looked after the sanitation, for which purpose the town was divided into three sanitary districts, each again into three subdistricts.

Fines were imposed for violation of sanitary regulations and the money so collected applied to expenses of sanitation. The cost of repairing streets was charged against the abutting owners, who were also responsible for their maintenance. Public latrines were built at a number of points and paid for by the citizens on assessments fixed by the town council.

The first heavy work of street improvement was performed largely by the Japanese soldiers, of whom some 500 were employed daily for some time. Thereafter the citizens were required to look out for the maintenance of the improvements. The street improvements consisted mainly in ditching the streets and in hauling in a top dressing of gravel from the river bed running through the town.

In the interests of better sanitation the Japanese administrative office maintained a dispensary for the treatment of the Chinese, and a disinfecting office after July 15, 1905. The latter consisted of 1 surgeon, 1 medical noncommissioned

officer, 2 hospital corps men, and a few Chinese coolies. The disinfecting office had a cart, which distributed lime and a carbolic-acid solution.

Each main sanitary district was visited daily by a surgeon, or a noncommissioned officer, and three Chinese members of committee.

Efforts were made to reduce the pest of flies by the use of improvised fly traps and a concoction made by boiling a poisonous weed with rice.

Prices of staple supplies and of labor were fixed by the Chinese committee and, after approval by Major Iwai, were posted throughout the town, being binding alike on buyer and seller. The following was the scale of prices on July 12, 1905:

	Yen.		Yen.
Cart, per day	5.50	Mutton, per catty (1⅓ pounds)	0.40
Cart, per li (2½ miles)	1.20	Ducks, each	1.00
Mechanics, per day	.70	Chickens, according to size	.60–.90
Coolies, per day	.60	Eggs, each	.02
Pork, per catty (1⅓ pounds)	.20		
Beef, per catty	.25		

For the purpose of sanitation, two committees were formed to regulate all sanitary matters:

1. A committee of general sanitation composed of Major Iwai and staff, with surgeons and officers from the military units.

2. A Chinese committee, appointed by the first committee. The members of the Chinese committee wore a distinguishing badge, and had a distinguishing flag over their office.

In houses occupied by troops the senior officer or soldier was held responsible for the enforcement of sanitary regulations. In houses unoccupied by troops the Chinese committee was held responsible for cleanliness and sanitation.

The principal sanitary regulations prescribed by the chief committee were as follows:

1. Every room to be properly cleaned and swept and all windows and doors to be left open for ventilation during good weather.

2. All yards and outhouses to be kept clean and refuse emptied into pits.

3. All stables to be kept clean.

4. Good locality selected for latrine in each house with hole at least 3 feet deep. Dried earth or ashes to be thrown in after use.

5. Sanitary committee must constantly supervise public latrines and report any cases of neglect to the Chinese committee responsible.

Coolies must be employed to keep latrines clean.

Each household in selecting refuse pits must pay attention to the following points:

(*a*) It must be put in a hollow outside the city where no drainage from it can reach the town.

(*b*) The number of refuse heaps must be limited to the requirements.

(*c*) A notice in Chinese and Japanese to be placed over each refuse heap.

7. Every householder must carry his refuse to the dust heap, where it will be burned if possible. (Dust carts were organized to carry off refuse from each house.)

8. Each householder must sweep his part of the road daily, and when rain has ceased sweep off any standing water.

9. A ditch must be kept each side of the road, care being taken that it drains properly. Each house is responsible for the repair of the road in its front.

10. Anyone committing a nuisance on the streets will be arrested and taken to the governor's office.

11. All ground near wells must be kept clean and care taken to prevent drainage into them.

12. Any case of sickness among Chinese to be at once reported to the administrative office (Major Iwai).

Rules 2, 3, 7–12 are under the supervision of the Chinese committee, who will be responsible.

The following additional regulations were also made by the Chinese committee:

1. Every dog must have a label with owner's name. Untagged dogs will be killed.

2. Mad dogs will be killed at once. If a mad dog bites anyone the owner will be punished.

3. Pigs must be kept in a sty. Owners of stray pigs will be severely punished.

4. Anyone committing a nuisance will be liable to a fine of between 50 sen and 5 yen. If unable to pay they will be employed as coolies.

5. Every man must select places for a latrine and refuse pit and keep these places in order or be punished.

As a consequence of the sanitary measures instituted by the Japanese, the town was greatly improved and the streets were maintained in a passable condition throughout the rainy season. The numerous cesspools formerly existing in the compounds were drained and many of them filled in with sand and gravel. Quarters occupied by the troops were not only rendered sanitary, but were also beautified by the soldiers, who

constructed miniature gardens with wild flowers and plants gathered from the surrounding hillsides, so that their compounds took on a very attractive and refreshing appearance, contrasting strongly with those occupied by the Chinese, for whom cleanliness and aesthetic surroundings possessed no charms.

The dog regulations resulted in weeding out the many worthless and repulsive curs with which every town and village is cursed. The proceeds from the sale of their hides were applied to street improvements and sanitation. More than 5,000 dogs were reported as having been destroyed in Mukden.

In fact, the physical transformation of Fakumen during the summer of 1905 was nothing less than wonderful, and if the example set by the Japanese produces any lasting effect upon the future cleanliness of the inhabitants it will be a great blessing.

For convenience in transacting business with the inhabitants the Japanese put in circulation a special form of war notes in denominations of 10, 20, and 50 sen and 1, 5, and 10 yen. These notes were redeemable in silver at any administrative office and were freely accepted by the inhabitants both of Manchuria and Korea.

MANCHURIA AND ITS INHABITANTS.

South of Chinchou the Liaotung Peninsula is exceedingly broken and hilly, with maximum elevations of 1,000 feet above sea level. The hill formations are irregular and much involved, with no well-defined direction for the ridges. The hills are quite bare and the slopes very steep, with rock outcrops, usually granitic, at times pure quartz. The soil is sandy and sterile and the crops poor as compared with those farther north. Some Indian corn is grown in this section, but its quality is poor. The staple crops are kaoliang and millet, as elsewhere.

From Chinchou northward to Pulantien the country is more open and the hills lower and with gentler slopes. The soil is a reddish sandy loam and more fertile than to the south.

From Pulantien northward the topography becomes gradually more rugged and the hills higher and with a well-

defined northeast and southwest trend to the ridges. After passing Telissu elevations become less and the country once again more open until we reach the plains of Hsiungyocheng, which extend unbroken to Kaiping, where the ground rises sharply to the divide which marks the watershed of the Liao. At Tashihchiao we are fairly in the plain of the Liao, which extends unbroken to Tiehling.

After entering the plain of the Liao the railway follows its eastern edge, hugging the foothills of the mountain chain to the east. Occasionally this mountain chain throws out subsidiary spurs at right angles, forming ridges, which were utilized by the Russians as defensive positions as they fell back along the railway. To these subsidiary ridges belong the one at Anshantien, which the railroad pierces, and the one at Liaoyang, known as the Shoushanpu, which the railway skirts at its western end.

Between the Liao River and the railroad as far north as Tiehling the country is perfectly flat, without the slightest sign of an elevation. From the Shoushanpu and Anshantien ridges one can have an uninterrupted view for 50 miles to the west and trace the course of the Liao by the numerous junks, whose white sails stand out conspicuously in the somber gray landscape.

At Tiehling the river breaks through one of the subsidiary spurs of the main mountain chain to the east. This spur continues to the west of the Liao and spreads out into an irregular hill mass with maximum elevations of 700 feet and occupies all the country on the right bank of the river included in the great bend at Tiehling and an unknown distance west from Fakumen into Mongolia.

North of Tiehling, between the river and the railroad, lies the extensive and fertile Kaiyuan plain, which extends northward a distance of 30 miles with a greatest breadth of 20 miles at its northern end. North of this plain the ground rises and becomes undulating as far as Changtufu, where personal knowledge ends.

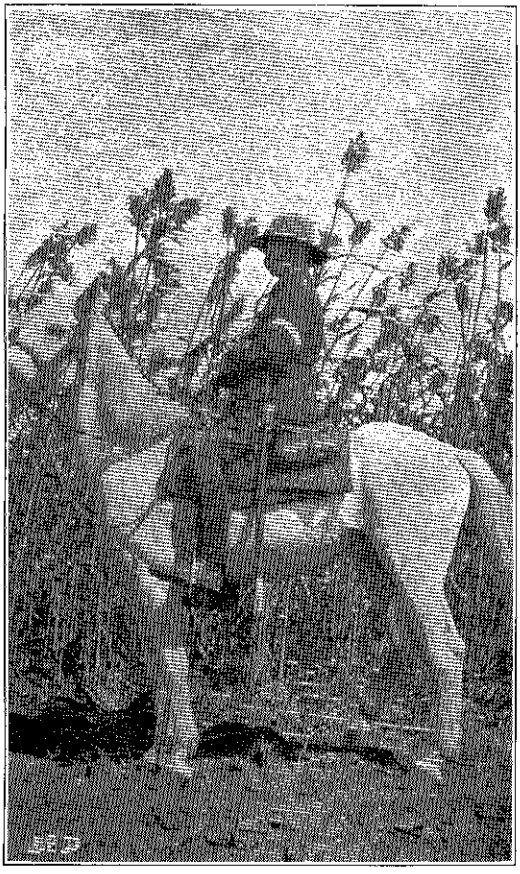
After entering the plain of the Liao the soil becomes remarkably fertile and the entire plain is one unbroken field of grain during the summer months. The same is true of the Kaiyuan plain and the hilly country west of the Liao

about Fakumen. If anything the crops grown on the hill slopes and undulating valley floors to the north are more luxuriant than those of the Liao plain. Every foot of available ground is under cultivation, even on steep hillsides. The staple crop is the Chinese corn or kaoliang, sometimes called large millet. It is a species of sorghum, and until the seed cluster develops at the top can hardly be distinguished from Indian corn. Its stalk is more slender and its height greater, averaging at maturity about 11 feet. By actual measurement stalks of from 13 to 14 feet have been found. Kaoliang is planted in rows about 2 feet apart, the seed being first sown quite thickly and after sprouting being thinned out so as to leave the plants about 1 foot apart in the rows. Judging from the size of the end clusters and the intensity of cultivation, the yield per acre must be something enormous. The seed is small, reddish brown, and about the size of No. 2 shot. The grain forms the staple food for man and beast, being eaten as a porridge by the former and fed with chopped straw to live stock.

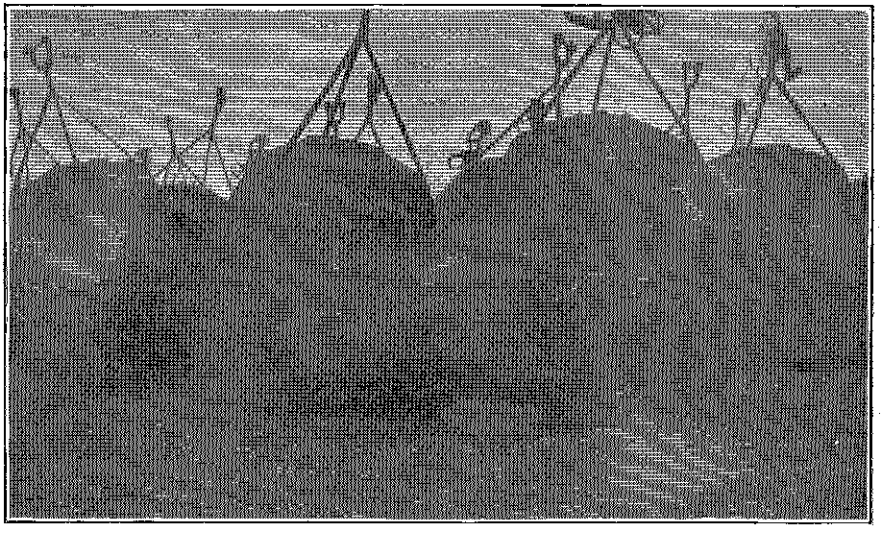
Besides being the principal food staple kaoliang supplies many other wants of the natives. From the outer layer of the stalks are woven the mattings which find so extensive application in the household and in the construction of grain bins. The stalks are used for building inclosures, thatching, and partitioning walls, being plastered with mud in the latter case. From the grain is made the "samshui," or Chinese whisky. But, most important of all, the stalks and roots form the principal fuel in a country which is practically treeless and where winter temperatures of 30° F. below zero are common. To economize fuel, the kitchen flues are led under a mass of brickwork along one side of the living room, and this mass of brickwork, called kang, serves as both bed and stove.

Next in importance as a crop is the small millet, the same as is grown in America for hay. Its seed, which forms most luxuriantly in heavy heads, frequently 6 inches long, is ground into flour, while the straw forms the principal long forage for live stock.

Almost as important as the small millet is the Manchurian bean crop, the chief article of export. The Manchurian bean is a small white, round bean, resembling a pea in



31. KAOLIANG FIELD, KAIYUAN PLAIN, SEPTEMBER, 1905.



32. RUSSIAN MINES FROM KERR BAY, NANSHAN.

shape, growing on vines which reach a height of 2 feet. When the crop matures the luxuriant leafage drops off, leaving the naked vines with their numerous little pods, each containing from 2 to 3 beans. The vines are simply raked up and the beans flailed out. This bean is grown mainly north of Mukden, and forms a large item of the crops of the Kaiyuan plain. From the bean is expressed an oil, and the residue, called bean cake, is used as horse feed or exported, via Yingkou, to Japan and south China, where it is used as a fertilizer.

Besides the crops above named, hemp, buckwheat, cotton, opium, and indigo are grown. The first two are of some importance, hemp furnishing the natives with material for making rope and cordage, and buckwheat being used for the manufacture of the excellent Chinese macaroni.

With the intense cultivation practiced by Chinamen generally, the soil would soon become exhausted were it not fertilized. Every particle of manure or household waste is carefully garnered during the year in the village manure pile, to be spread on the fields when the season for planting arrives. A common sight is old and feeble men and little children, too young to work in the fields, trudging along the roads and carefully picking up all the droppings from the draft animals.

The inhabitants of Manchuria are mainly Chinamen who have emigrated from the northern provinces in comparatively recent years. The original Manchu population, the conquerors and present ruling class in China, are represented in Manchuria only by the bannermen, a species of soldiery, who are designed to maintain order under the civil officials, but are apt to ally themselves with the hunhus, or robber bands, which infest the country, more especially along the Mongolian border. These bannermen, although of Manchu origin, have lost their language and are to all intents and purposes Chinamen in their speech, dress, and habits. They are designated as red, white, blue, or yellow bannermen, according to the color of their uniforms. They are armed with all manner of obsolete weapons from flintlocks down to Russian Mausers, but have generally no ammunition. With their banners and gaily colored uniforms they present a picturesque appearance, but are worth-

less as soldiers, being without training and cowardly. Many of them entered the service of the Russians and Japanese as volunteer cavalry or as spies, being paid 30 yen or rubles per month. The original Manchu language seems to have entirely disappeared save for the inscriptions on tombs and monuments, where it generally appears side by side with the Chinese idiographs, from which it is easily distinguishable.

Tombs and monuments are indeed the sole remaining evidences of the departed Manchu and Mongolian conquerors, who have been entirely absorbed by the subjugated race of Chinamen. Chief among these monuments are the famous Mukden tombs, which are too well known to call for further mention. Many other tombs, however, exist along the Mongolian border, most noteworthy being those at Kunyuling, Laoling, and Hsiaoling, 8 to 10 miles west and northwest from Fakumen.

Neither side can be said to have derived any valuable assistance from their employment of bannermen and hunhus. As spies they possessed neither skill nor ability to judge of military situations, and those who escaped having their heads cut off or being shot brought little information of value. That at least was the estimate of the Japanese. Many spies were executed by the Japanese during the summer of 1905 in the Third Army, and scarcely an evening passed that a batch was not decapitated at army or division headquarters.

The inhabitants of Manchuria live in low one-storied houses, surrounded by walls forming compounds, which are entered through a gateway which can be strongly barred by heavy wooden gates. Not infrequently the more important compounds are arranged for defense, having projecting corners to secure flank fire and loopholes or crenelations along the walls.

That the hunhus are no idle jest was demonstrated by their raid on the village of Wanghutun, about 5 miles west of Fakumen, on May 18, 1905. The villagers having failed to respond to a contribution of 15 pounds of silver levied by the robbers, a portion of the village was set on fire in sight of the headquarters of the Third Japanese Army. General Mishchenko's cavalry was making a raid around the left flank of the Japanese line at the time, and it is generally believed

that the foray of the hunhus had some connection with the Russian movements.

In the southern part of the Liaotung Peninsula the houses and walls are of stone, which is abundant. In the plain of the Liao and northward the poorer houses and walls are of mud and the better class of gray brick. Chinchou, Kaiping, Haicheng, Liaoyang, and Mukden are walled towns, the walls being brick and of great height and thickness, with ornamental gates, usually one on each face. The bulk of the population, however, lives in small villages, averaging from 50 to 100 houses and with from 500 to 1,000 population. Every village of any importance has its temple, usually the most pretentious structure in the place and often ornately built, with carvings and mural paintings, but too often permitted to fall into decay, for the Chinaman seems never to repair anything that he has once built. Each house or family, as it really is, comprises a considerable number of dwellers from the custom of sons continuing to live with their fathers after marriage. The family of the owner of the house occupied by the attachés at Fakumen counted 37 members. No accurate census of the population of Manchuria appears to have ever been made, and it has been estimated from 6,000,000 to 12,000,000. From the number of villages throughout all the extent of region seen by me and the crowded manner in which the Chinese live, I am inclined to believe that the higher figure is more nearly correct. A glance at any accurate map of any portion of the country in which the armies operated will serve to show how numerous the villages are. In fact, one can hardly go half a mile from one without striking another village in some direction.

The low height of the houses and their gray color, harmonizing with the soil, makes it difficult to pick up the villages in flat country until one is almost upon them. Usually, however, a few cottonwoods or willows on the horizon is an indication of a settlement. Nothing more somber or subdued can be imagined than a Manchurian landscape save for the few summer months when the luxuriant crops lend a touch of brightness to the coloring. A gray soil, gray houses, the people all dressed in indigo-dyed cottons—there is a singular absence of all bright or warm colors which wearies and oppresses the beholder.

There are no fences or other inclosures to the fields, which are cultivated in common by the villagers. Isolated farm houses are exceedingly rare save toward the Mongolian border, where the ground has only comparatively recently been taken up for cultivation.

All that portion of Manchuria covered in my travels was treeless save for the few cottonwoods and willows maintained as ornaments for villages and burial grounds. Looking into the distance, one could note a fringe of trees on the horizon, giving the impression of extensive woods, but on nearer approach they were found to be simply the projection of the few village and cemetery trees. Such trees as existed were found in the plains and valleys, the hilltops being invariably bare.

The great bulk of the population is engaged in farming. Their implements are exceedingly primitive, and all labor is done by hand or by farm animals, from the planting of the seed to the grinding of the grain. The plow is a rough wooden frame with an iron share, which throws the earth equally to both sides like a cultivator.

In planting kaoliang or millet a furrow is first traced and the seed sown by hand or spread by an ingenious arrangement of a gourd with a bunch of straw projecting from a spout. By suitably regulating the compactness of the straw and tapping the gourd the seed is made to flow out evenly. After the seed is down a furrow is run on each side, covering the seed, and the planting is complete. The furrows never run straight, but in a sweeping curve. The harvesting is all done with the native sickle, a painfully slow process. Thrashing is accomplished on a prepared smooth clay floor by flails or by driving a donkey with a stone roller over the seed heads. The grain is winnowed by the wind, of which latter there is an abundance.

To supply the necessary labor for cultivating and harvesting many Chinese coolies annually flock to Manchuria from the northern Provinces during the summer months and return again for the winter.

The country abounds in live stock, there being many fine ponies, mules, donkeys, pigs, sheep, and goats. Cattle are but sparingly found in Manchuria, but Mongolia seems to be well supplied, and many herds of excellent oxen were encoun-

tered, being driven into the lines to supply beef to the troops. Very little poultry was seen, but this may have been due to the armies which occupied the territory.

The inhabitants appear to be good-natured, industrious, and peaceable people. The men are tall, strong, and robust, and the women not unprepossessing Above all things, the Chinaman is domestic, and his chief aim in life appears to be to amass wealth and to rear a large family. In this latter respect he seems to be fairly successful, if one may judge from the swarms of children seen on the streets and in the compounds. In spite of their filthy surroundings, unclean habits, and vermin-infested houses, the natives are remarkably healthy looking and, judging from the number of aged people, a long-lived race. Although apparently indifferent to their surroundings and to all principles of sanitation, the houses of the well-to-do in the larger towns often displayed evidences of refinement and taste, abounding in handsome pieces of carved furniture, panels, screens, and other articles of bric-a-brac.

In many of the villages along the Mongolian border the attachés were probably the first foreigners ever seen, and naturally our presence aroused the greatest curiosity and excitement. Women and children fled precipitately around the corners of walls or behind doors to watch the unwonted spectacle from their hiding places, while the men swarmed out into the streets and crowded about us.

Women and children were generally removed from the villages lying between the lines and in the immediate sphere of battles. A common sight preceding and following battles were the refugee families leaving their homes or returning to them, carrying their children and household effects piled high on Chinese carts. But while women and children were thus removed from the scene of danger, the men would continue the cultivation of the fields, often when under fire.

The climate of Manchuria is not unlike that of the Dakotas or Montana, with long, cold winters and short, hot summers. The average annual precipitation is about 20 inches, most of it falling during spring and summer. The rainy season comes in July and August and is characterized by a succession of showers, several of which may fall in one day, with occasional intervals of several days without rain.

During the fall and winter there is very little precipitation and much sunshine prevails. During the autumn, winter, and spring months high winds and dust storms are common and intensely disagreeable, the dust penetrating every crevice and blinding and choking the traveler. Heavy frosts occur at the end of September, and in October ice forms on still water. At Liaoyang on October 8, 1904, ice over one-fourth inch thick was measured on still ponds and thereafter ice formed regularly every night. The summers, though short, are extremely favorable to growing crops, and but for this circumstance Manchuria would not be the garden spot it is.

In spite of the cold climate the inhabitants wear cotton clothes only. For winter wear their garments are padded and their number multiplied as the cold increases, being gradually removed with the advent of warm weather. Much of the cotton used is still made on hand looms, although most of it now comes from American mills, usually as plain, uncolored sheeting, the natives doing their own dyeing. Besides cotton goods, considerable American flour and condensed milk were seen in the larger towns, but very little else in the way of American manufacture or products.

SUBMARINE MINES.

A nation which guards its military secrets so jealously as does Japan can not be expected to be very communicative concerning its submarine-mine system, and any information on this point was out of the question.

So far as concerns the operations at Port Arthur, the mines employed by both sides were intended mainly for injuring the enemy's ships in the open sea and involved the use of a class of mines not comprehended in the ordinary mine defense of harbors. These mines appear to have been floating mechanical mines strung on cables at intervals such that a vessel striking the cable would swing the mines against her hull.

Besides the floating mechanical mines, both sides also employed fixed mines, the Japanese in the defense of their home harbors and the Russians at Port Arthur, Dalny, and adjoining bays. At least two classes of fixed mines are known to have been used by the Russians, one the ordinary, well-known mechanical mine, with five projecting lead cylinders contain-

ing each a galvanic element which becomes active when the lead cylinder is bent or deformed by being struck by a vessel. Many such mines were planted in Dalny Bay and neighboring waters. A group of these mines, removed from the near-by waters and stored at Nanshan, is shown in the accompanying photograph. These mines have riveted cases, two spherical segments riveted to the frustum of a cone, the case being 30 inches high over all and 30 inches diameter. The top dome has five 1½-inch brass-bushed holes for the mechanical lead studs and galvanic elements, while a 5½-inch loading hole is made in the side of the frustum near its top. The mine has three bales, and is moored by a three-eighths inch diameter wire mooring rope. From small particles adhering to the inside of the case, the explosive is either gun cotton or pyroxylin.

A form of electrically controlled mine seen at Port Arthur was a riveted case 3 feet high and 3 feet diameter at the widest part. Like the mechanical mine, it was a frustum of a cone with a spherical dome at the larger end. The case had two loading holes, one in the top 6½ inches in diameter and one in the bottom 9½ inches in diameter. The cable entered through a stuffing box on the side of the case. Instead of bales the case was provided with two short chains to which the mooring rope, five-sixteenths of an inch in diameter, is attached. No details as to the interior arrangements were ascertainable. These mines were planted just outside the harbor entrance and operated from a point on the Tiger's Tail Peninsula, as shown by the cables, which were visible at low water, where they left the shore.

With regard to details touching the mine-laying vessels *Amur* and *Yenesei*, which I was directed to ascertain and report upon, the former was found lying on her side in the Port Arthur dry dock, her smokestacks making an angle of about 35° with the horizontal. She is a stanchly built vessel of at least 2,000 tons burden, about 300 feet long and 35 feet beam. She has twin screws, and, according to a Japanese naval officer, an opening in the overhang at the stern through which loaded mines can be dropped while the vessel is under headway. This feature could not be verified, owing to the submersion of the stern at the time of inspection. She is liberally supplied with davits of very substantial construction and

has powerful steam capstans fore and aft. No details of the interior arrangements could be learned; in fact, the condition of the vessel in the dry dock precluded any inspection of her interior. A Japanese naval officer is authority for the statement that the sister ship, *Yenesei*, was blown up and sunk by one of her own mines.

Nothing is known of the character of the mines employed by the Japanese in their home waters. Both Nagasaki and the entrance to Tokyo Bay were mined, or at least the Japanese gave the impression that they were. All merchant vessels were required to enter and leave during daylight hours and were piloted through the channel by navy launches. Presumably a safe channel had been left for the convenience of commerce, and the whole arrangements strongly reminded one of the methods pursued by the Engineer Department of the United States Army when it mined certain harbors during the Spanish-American war.

Although the Russian fleet had been so effectually destroyed in the naval battle in the Sea of Japan, the Japanese still had their mines in operation as late as October 17, 1905, on which date the steamer upon which I was leaving for America was piloted across real or imaginary mine fields under guidance of a naval launch.

MACHINE GUNS.

The Japanese troops do not appear to have been supplied with machine guns at the outbreak of the war. The fact, however, that they appeared soon after indicates that their manufacture and issue must have been previously determined upon, if not actually begun. The first issues were made to General Nogi's army before Port Arthur and to the cavalry brigades. A few machine guns were mounted in the Panlung forts after their capture at the end of August, 1904, and I saw six such guns at a review of Prince Kanin's cavalry brigade at Liaoyang in September, 1904. The issue of machine guns to the infantry of the northern field armies does not appear to have commenced until after the battle of the Shaho.

The Japanese machine gun is of home design and manufacture and belongs to that class in which the mechanism is actuated by the action of gas pressure operating upon a

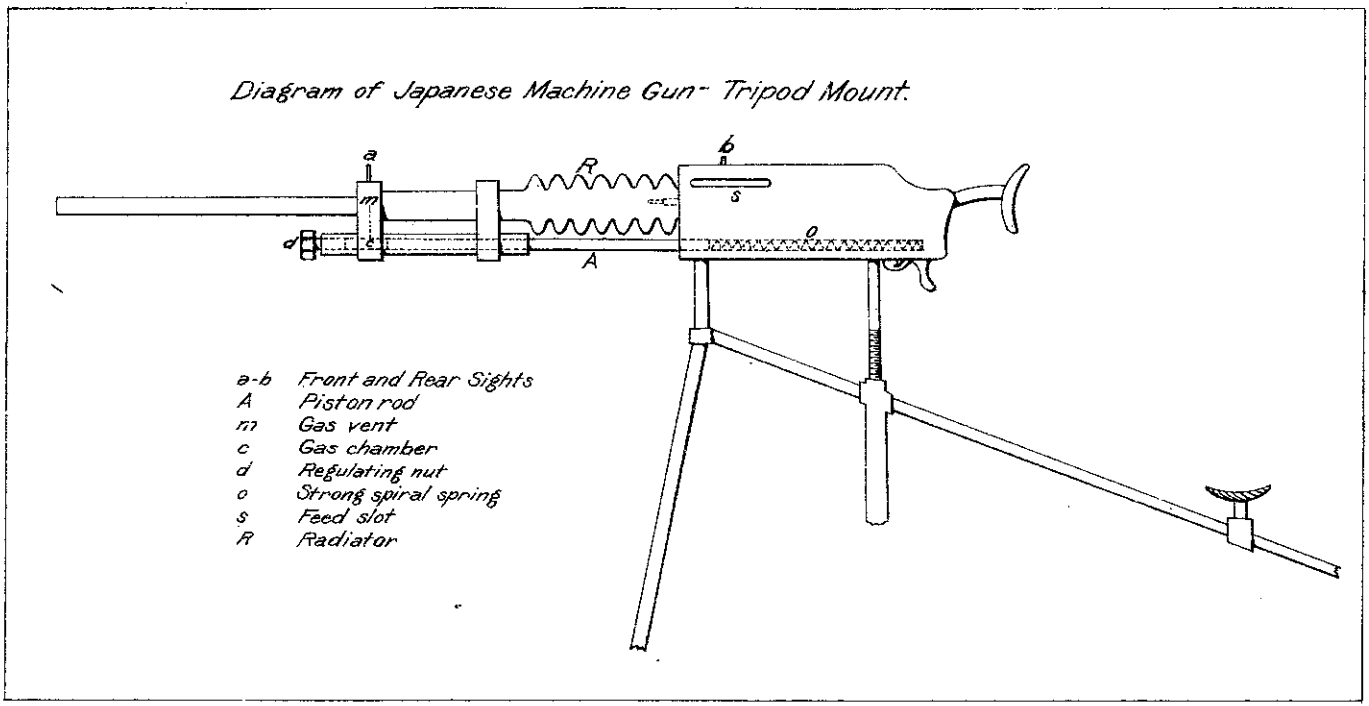
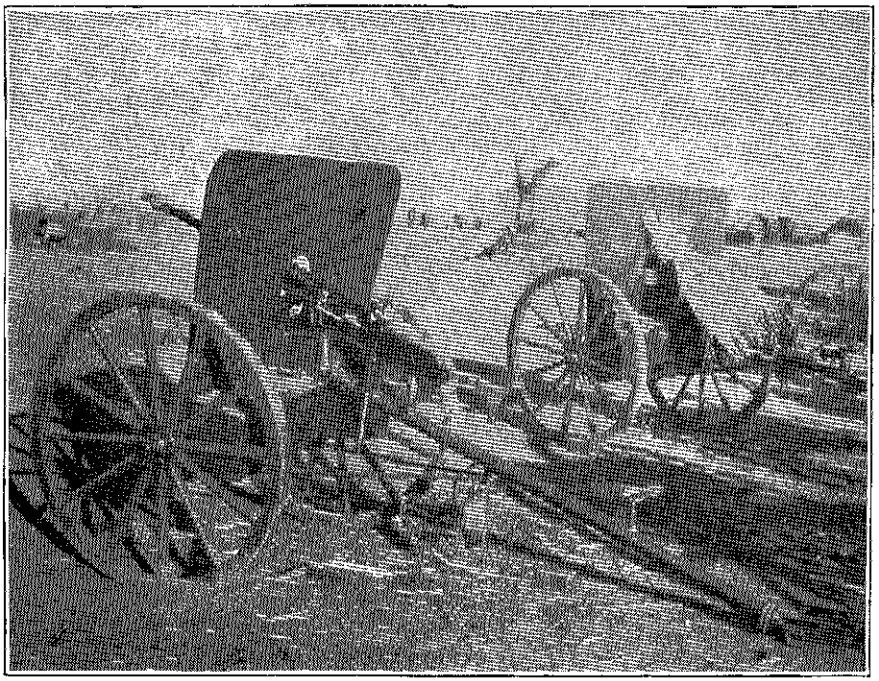
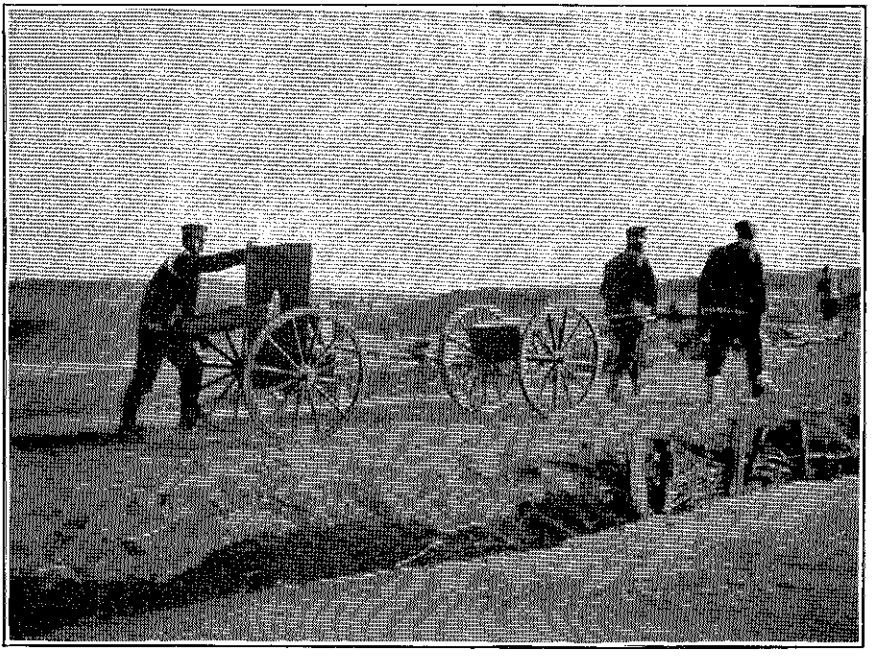


Diagram of Japanese Machine Gun- Tripod Mount.
a
b
R
m
s
d
A
o
a-b Front and Rear Sights
A Piston rod
m Gas vent
c Gas chamber
d Regulating nut
o Strong spiral spring
s Feed slot
R Radiator

PLATE IV



33. JAPANESE MACHINE GUN.



34. JAPANESE MACHINE GUN.

plunger or piston and not by the direct force of recoil as in the Maxim. It uses the same ammunition as the infantry rifle (Murata, caliber .26) and is rated as firing 600 rounds per minute. Two forms of mounting are employed, the tripod and the wheeled, the former for fortress use and the latter for mobile troops.

Referring to Plate IV, a gas vent, *m*, communicates with a gas chamber, *c*, attached laterally to the barrel. The pressure in the gas chamber is regulated, within limits, by the nut, *d*, which varies the capacity of the chamber. The piston rod, A, is acted upon by the gas pressure at its forward end and is driven to the rear against a strong spiral spring, *o*, which moves the piston rod forward after the gas pressure has ceased to act. The reciprocating motion of the piston rod actuates the mechanism, which is entirely inclosed in the housing and performs the various operations of feeding, firing and ejecting, through a suitable train of gearing. Cooling is effected by the radiator, R, a circumferentially grooved mass of metal attached to the barrel.

The cartridges are mounted on a strip of sheet brass from which clips are punched and bent around the cartridges to hold them in position. A series of holes along the edges of the brass strip engage the teeth of pinions which feed the strip forward as the piston, A, moves backward and forward. The cartridges are pried from their clips by fingers and drop into position when the bolt is withdrawn. Thirty cartridges are mounted on one strip, which is fed into the slot, *s*, from the left side. The trigger must be kept down by pressure all the time, otherwise the spring, *o*, can not operate to return block forward. The gun is provided with shoulder piece and gunner's seat as shown. The gun alone weighs about 73 pounds and with tripod 115 pounds. It is sighted to 2,000 meters. The gun is stated to work very satisfactorily and, owing to the positive motions, jamming does not occur easily.

At the close of the war each of the two cavalry brigades was equipped with 6 machine guns and each infantry regiment with 3 guns, and it was contemplated to increase the allowance to 6 guns for each regiment, infantry or cavalry. The guns are served by infantrymen who are extra regimental and selected from men having mechanical knowledge.

Tactically the guns are used primarily for defense and

reserve their fire for short and mid ranges, up to 600 or 800 meters. On the defensive line of the Third Army after the battle of Mukden many machine-gun emplacements were noted. These consisted mainly of blinded casemates, 8 feet wide, 10 feet deep, and 3 feet 6 inches high, with from 18 to 24 inches of overhead cover. Importance is laid on concealing the guns, and it was claimed that none had been knocked out by the Russian artillery.

In the cavalry brigades the machine guns were organized into sections of 2 guns under an officer, so that sections could be detached with squadrons. In the First Cavalry Brigade, General Akiyama, 4,000 rounds per gun per day was the greatest rate of fire attained. Machine guns were popular in the Japanese army and were highly spoken of by the officers.

FIELD FORTIFICATIONS.

The Japanese armies assumed the initiative at the outbreak of the war and retained the same during its progress. Field fortifications consequently did not play so important a part in the Japanese operations as with the Russians, who resorted to field fortifications on an extensive scale. From Port Arthur, Takushan, and the Yalu northward along the lines of advance of the several Japanese armies, the whole country was literally honeycombed with Russian trenches, and afforded an instructive and interesting object lesson on the subject of field fortifications. Many of the Russian positions had been prepared with great care and with an abundance of time. The main Russian fortified positions along the railway were at Nanshan, Telissu, Kaiping, Tashihchiao, Haicheng, Anshantien, Liaoyang, the Sha River, the Hun River, and Tiehling.

At Nanshan the parapets of the Russian trenches were relatively high and prominent. In fact, the Russians made no attempt at concealing their trenches in their positions preceding the battle of Liaoyang, and their works were very conspicuous on the bare hillsides, even at great distances, the freshly turned earth and the prominent profile of the parapet plainy marking their location. At Liaoyang and subsequently attempts at concealment by covering the freshly turned earth with sod and by adopting flatter slopes for the parapet became manifest.

Wherever possible, the Russians located their defensive lines on the highest ground available. While this gave them a command and better view over the ground traversed by the attack, it necessarily made it difficult to conceal their own works upon the steep hillsides, which were uncultivated, bare, and open. The soil on hillsides was, moreover, generally rocky and made deep trenches impossible, so that parapets had necessarily to be built high to secure cover.

An examination of the various profiles of Russian fire trenches showed that they conformed to the generally adopted standards for field fortifications. Where necessary, the trenches were traversed for protection against enfilade fire, both attached and detached traverses having been employed. Bombproofs and splinterproofs were also provided, either along the trench, or in rear, with covered communications leading to them. These were of the usual type of construction, a timber framework covered with earth or stone or a simple trench roofed over with timber.

In the matter of field forts and redoubts, two types employed by the Russians on their inner line at Liaoyang are shown on Plate V. The larger work is the one next east of the railway and the largest and strongest of the line. Its trace consisted of two faces, two flanks, and a broken gorge. The face ditches are unflanked, while those of the flanks are swept by infantry fire from orillons, as shown. The gorge ditch is flanked by a central open caponier. The work had emplacements for four machine guns on the face. The gorge parapet is defiladed by a large interior traverse. Bomb proofs are located under the face parapets and under the interior traverse. Wire entanglements were laid in the gorge and flank ditches, being extended along the line of the latter in a shallower ditch to a salient. Four rows of deep military pits with a low wire entanglement on top extend entirely around the redoubt. The parapet has a command of 10 feet over the level plain in which the work is located.

The smaller works of the Liaoyang line had either a straight face or a broken face, similar to the larger work, with two flanks and a straight gorge. The interior of the redoubt was defiladed by traverses containing the bombproofs. Additional types of Russian field redoubts are

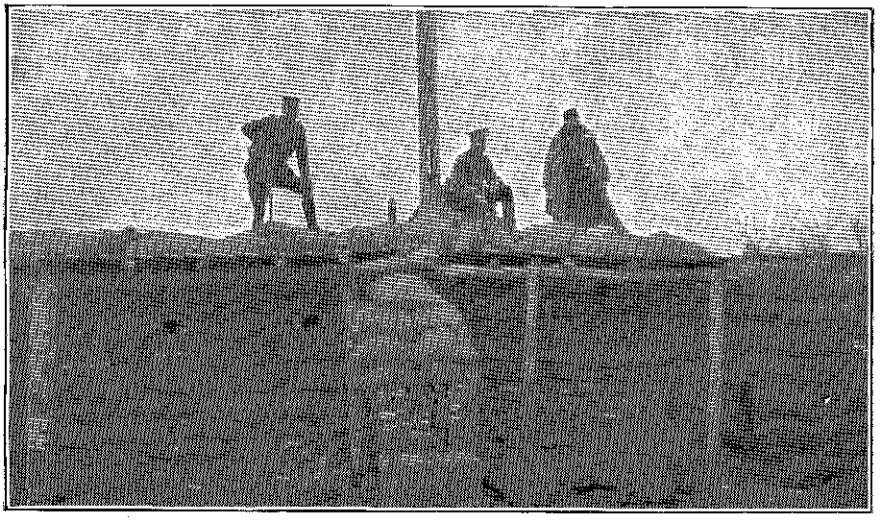
shown in Plate VI, a redoubt west of Mukden near Likuanpu, and in Plate VII, a redoubt near Shanlantzu near Putilov Hill. The latter has a very flat profile and is very shallow from front to rear. In my judgment, it has the best profile and trace of any seen during the war, affording good cover, small artillery target, and strong frontal fire for infantry. The Japanese constructed a somewhat similar redoubt near Kangpienhsien (Plate VIII), and it is surmised that the Shanlantzu redoubt served as a model.

All the field forts and redoubts observed at Liaoyang, the Shaho, and Mukden were located on practically level ground in a plain, and their traces were perfectly regular and in strict compliance with text-book designs.

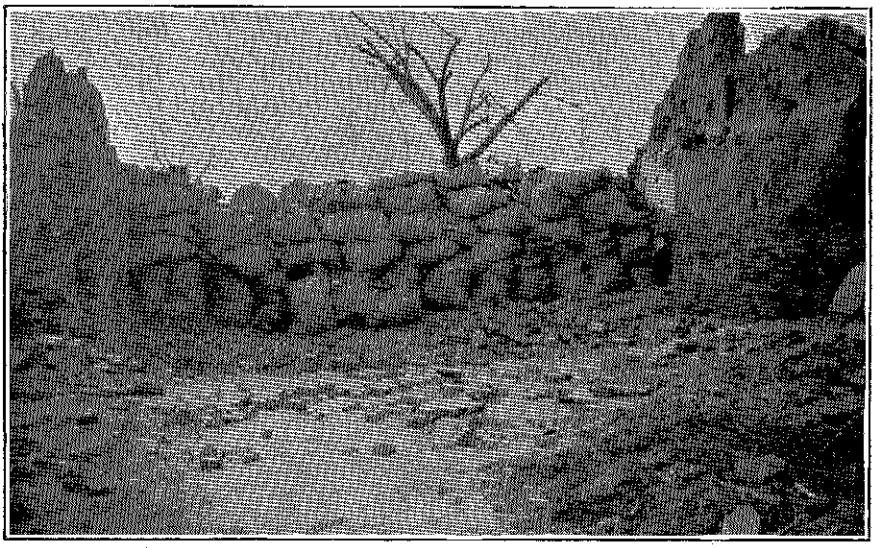
The polygonal trace with a broad front and shallow depth appears to best meet the requirements for a closed work under modern conditions, affording a strong frontal fire and a minimum target to artillery. While the reduction in depth of closed works imposed by the searching power of artillery reduces the volume of flank fire and diminishes the value of such works in an extensive fortified line in flat country, forts and redoubts have not lost all their importance and are still needed to afford points of support to a defensive line. The employment of machine guns, moreover, enables small works with short flanks to deliver a volume of fire which makes the size of works and their garrisons a matter of minor importance.

It is to be noted that none of the redoubts or forts provide for the emplacement of artillery in their interiors. The artillery was placed either in the line of the trenches connecting the forts and redoubts or, more generally, in a retired position several hundred yards in rear of the front line. The Russian defenses at Liaoyang, Shaho, and Mukden are said to have been planned by General Velitchko, an eminent Russian engineer.

The opposing lines on the Shaho from Linshengpu eastward to Lamutun are interesting chiefly because of their proximity to each other. For a mile and a half the lines were nowhere more than 500 yards apart, and in front of Linshengpu they approached each other to within less than 200 yards. In this part of the Shaho lines the fieldworks



35. JAPANESE LINES, LINSHENGPU, SHA RIVER.



36. JAPANESE LINES, LINSHENGPU, SHA RIVER.

RUSSIAN DEFENSES AT LIAOYANG

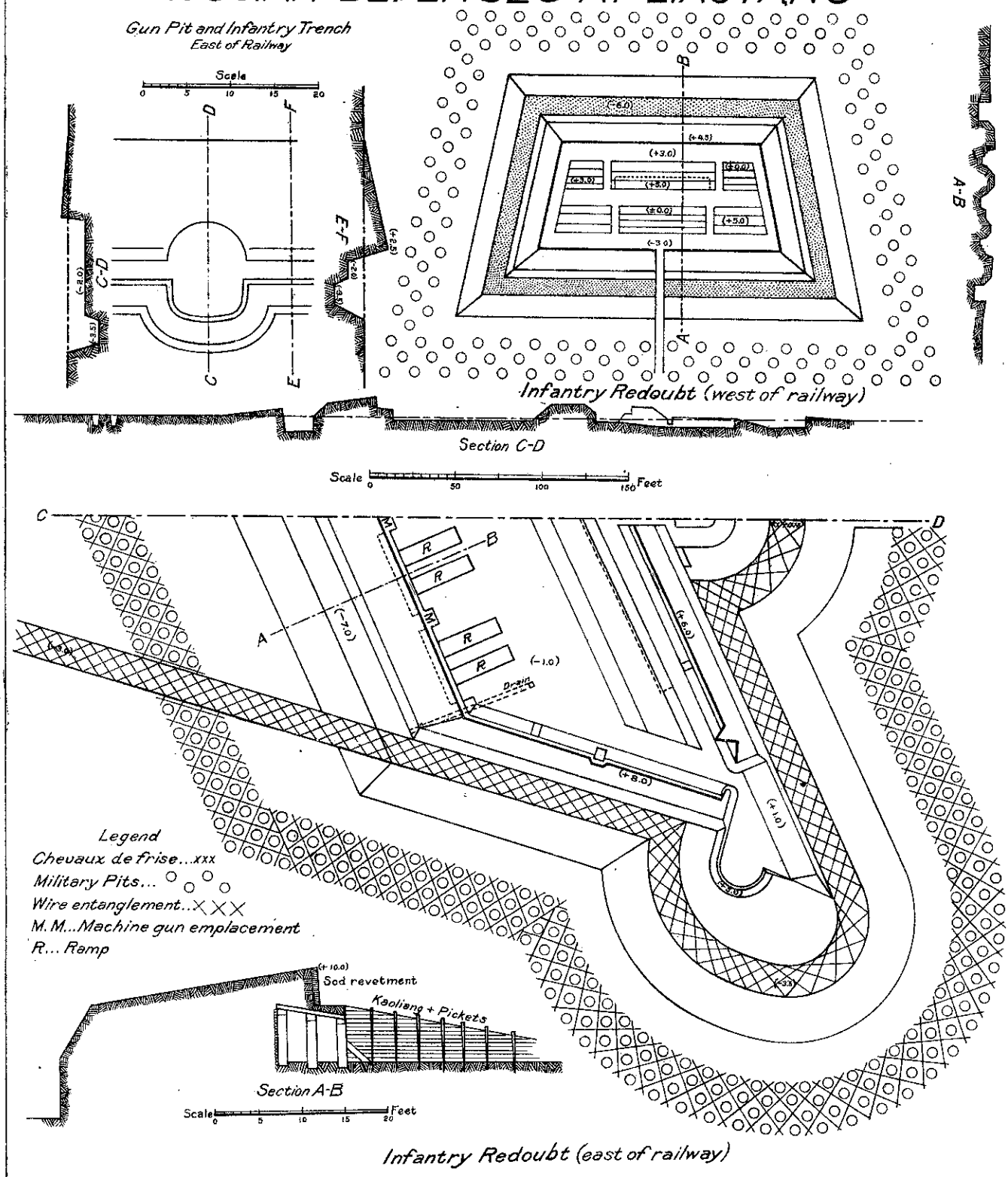


PLATE V

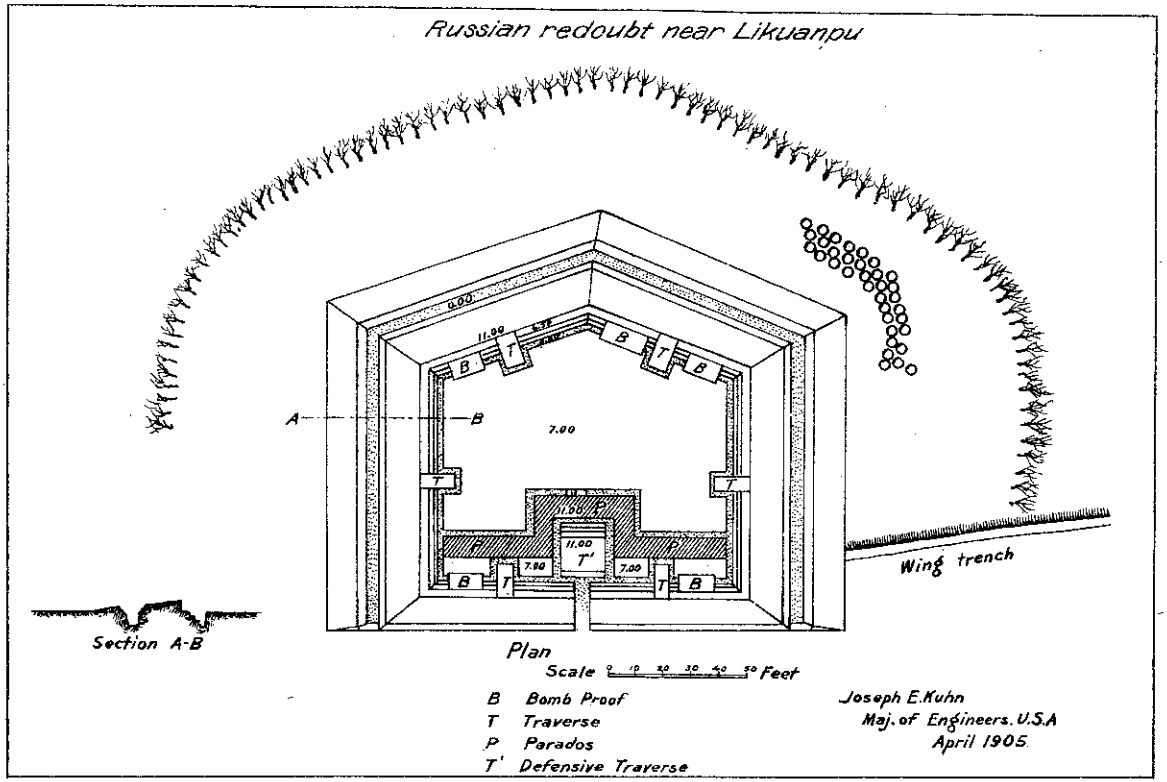

Russian redoubt near Likuanpu
A
B
7.00
11.00
Wing trench
Section A-B
Plan
Scale 0 10 20 30 40 50 Feet
B Bomb Proof
T Traverse
P Parados
T' Defensive Traverse
Joseph E. Kuhn
Maj. of Engineers, U.S.A
April 1905

PLATE VI

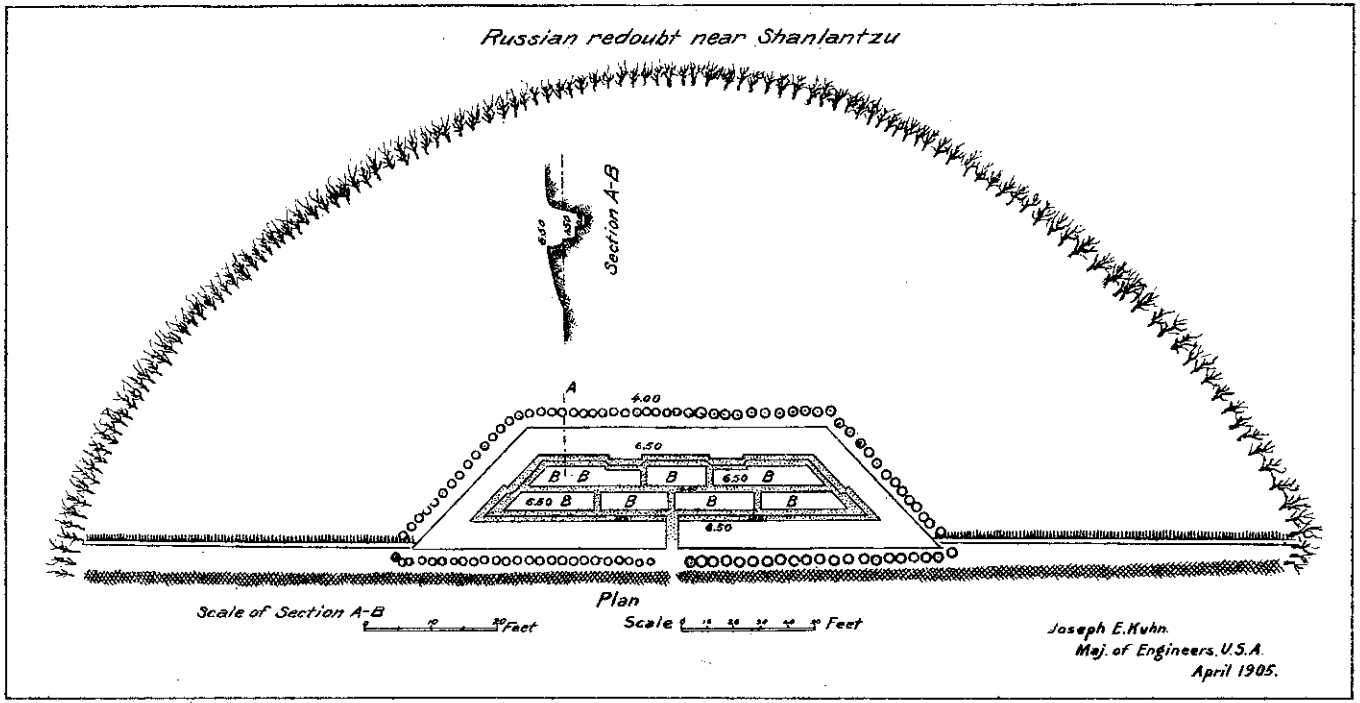
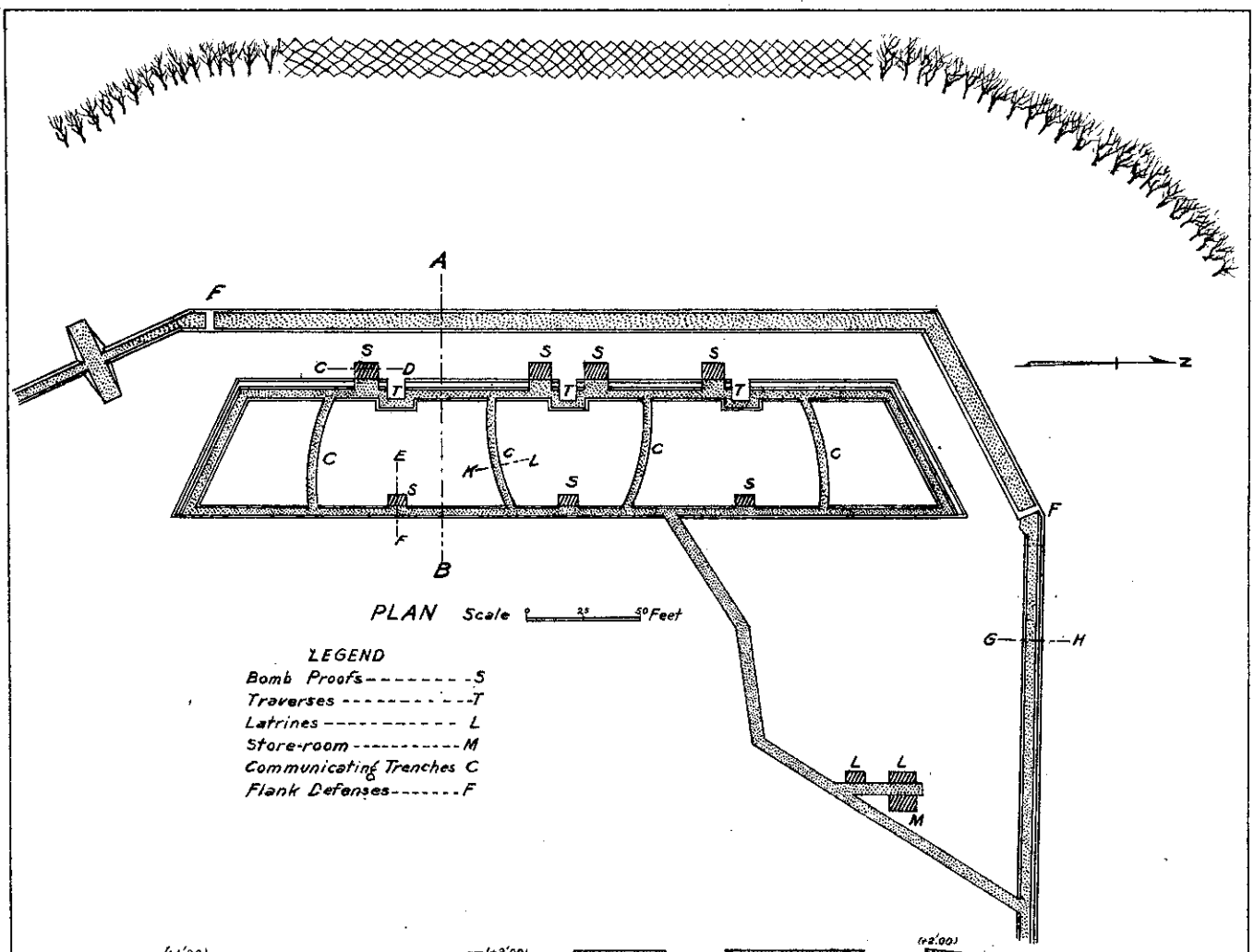
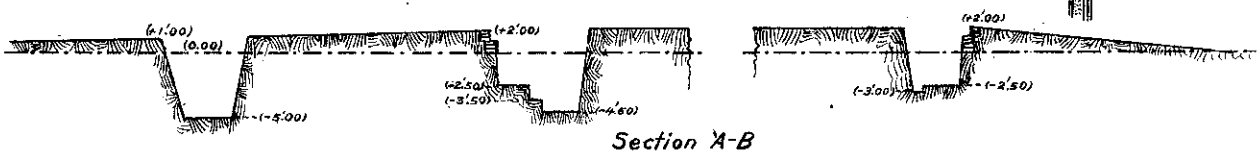
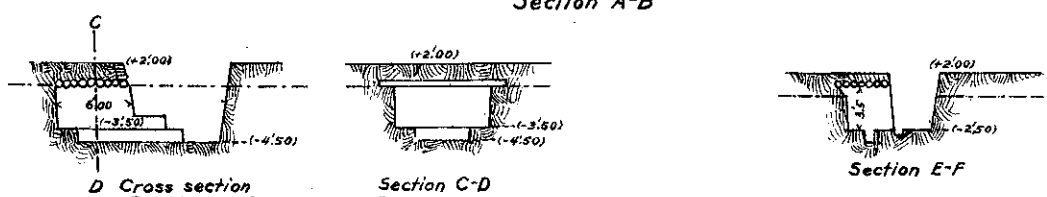
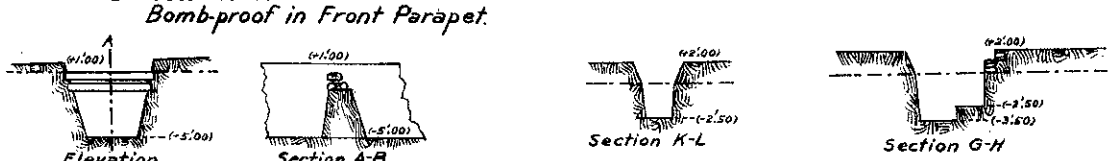

Russian redoubt near Shanlantzu
Section A-B
6.50
4.50
A
4.00
6.50
B
6.50
Plan
Scale of Section A-B
Feet
Scale
Feet
Joseph E. Kuhn.
Maj. of Engineers, U.S.A.
April 1905.

PLATE VII









Note:
The dash and dot line represents the original ground surface.

JAPANESE FIELD REDOUBT NEAR KANGPIENHSIEN

PLATE VIII

partook more of the character of siege works, the trenches being very deep and provided with abundant bombproof and splinterproof cover.

The scarcity of timber and brush greatly limited the materials available for revetment work, and sand bags were, in consequence, extensively used for this purpose. Occasionally sod and stone and less occasionally pickets and kaoliang stalks were employed for revetments. Owing to the natural firmness of the soil slopes could be maintained at a steep angle in cuts without revetments of any kind, and many of the trenches were constructed in this way.

Sections of normal Japanese trenches on their fortified lines of resistance at Haicheng, Liaoyang, and north of Mukden at Kangpienhsien and Chinchiatun are shown on Plate IX. In general the Japanese fortifications were characterized by lower parapets, with flatter superior slopes, and wider trenches than the Russian works, a portion of the excavated material being thrown to the reverse side of the trench. The form of parapet adopted by the Japanese lends itself better to concealment, but the width of trench renders it more exposed to shrapnel fire. The greater width of trench has for its object, of course, the securing of lateral communication.

In their lines north of Mukden near Chinchiatun the Japanese introduced ditches along several portions of the front. These ditches were located 20 to 30 feet in front of the fire trench and were flanked by field caponiers located at the salients or reentrants and connected to the fire trench by a sunken and covered passageway.

The ditches were about 6 feet deep, 5 feet wide at the bottom, and with side slopes of 2:1 to 3:1. Machine gun casemates were also introduced along the parapet, their dimensions being 8 feet wide by 10 feet deep by 3 feet 6 inches high, with splinterproof cover some 18 inches thick. No projections are allowed above the fire crest excepting only the lookout stations, which are located on the most commanding points a few yards in rear of the fire trench. These are made bombproof and kept as low as possible consistent with having the sighting slit overlook the foreground.

The Japanese trenches shown on Plate IX were intended primarily for defense. In their attacks on the Russian posi-

tions, the Japanese firing lines, lines of support, and reserves frequently constructed hasty intrenchments as they advanced over the fire zone. These intrenchments were of the simplest form to give cover quickly, being thrown up with the portable intrenching tools carried by the soldiers and giving cover lying down or kneeling. They served to cover the successive advances of the infantry line, being occupied in turn by the firing line, lines of support, and reserves, and being continuously strengthened by the rearmost lines. Many of these light intrenchments were seen at Liaoyang, and from them the positions of the Japanese infantry at the different stages of the fight could be seen.

A feature of all the more elaborate Japanese trenches was the small berm, about 10 inches below the crest, designed as an elbow rest and to give greater steadiness to the rifle. This feature impressed me as possessing considerable merit. When practicable the Japanese always employed artificial concealment for their trenches, covering the freshly turned superior slopes with millet straw, bean vines, or kaoliang stalks gathered from the adjoining fields, or even planting a row of kaoliang stalks in an upright position as shown in the photograph herewith.

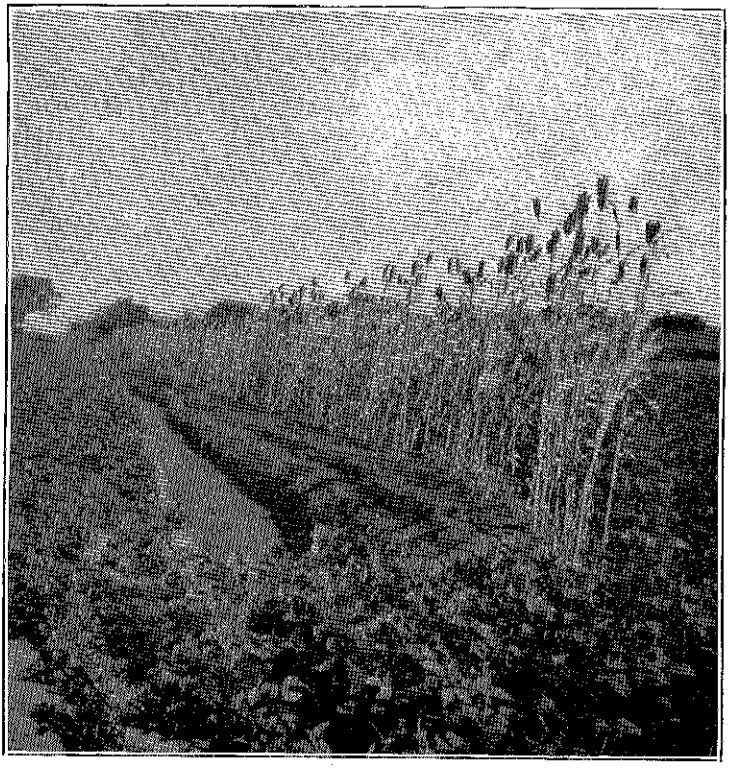
In the matter of concealing their works the Japanese took infinitely more pains and displayed a far greater skill than the Russians.

When loopholes were used in field works they were made most frequently with sand bags or sod. When available, brick and stone were also employed.

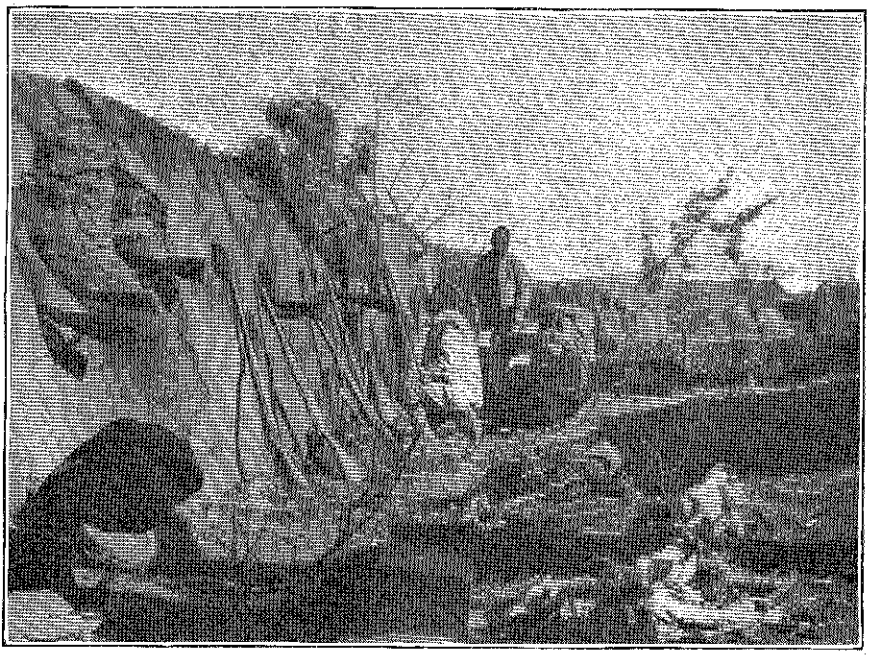
At Liaoyang and Haicheng the Japanese trenches had little mounds of mud on the superior slopes, as shown in Plate IX. In the absence of more suitable material these mud mounds afforded a simple and fairly effective form of head cover.

The numerous villages which dot the plains of Manchuria were the scenes of many severe combats, and by the nature of their construction lent themselves well to purposes of defense with comparatively little preparation. The outer inclosing mud walls are usually from 6 to 8 feet high and 2 to 3 feet thick at the base, sufficient to keep out a rifle bullet except possibly at very close range. These walls could be

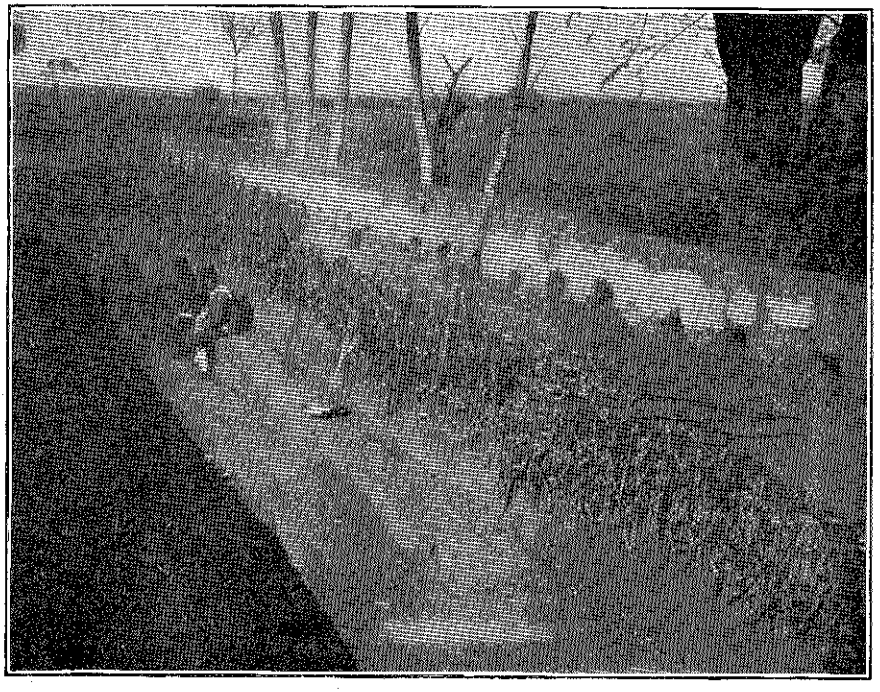
37. LITAJENTUN, PREPARED FOR DEFENSE, NEAR SHA RIVER.



38. JAPANESE HASTY TRENCH, LIAOYANG.



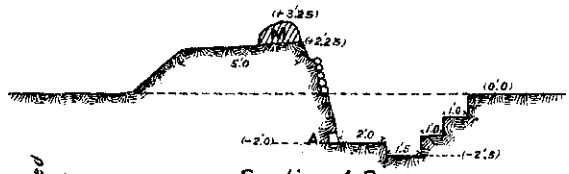
39. PREPARED WALL, LINSHENGPU, SHA RIVER.



40. PREPARED WALL, LAMUTUN, SHA RIVER.

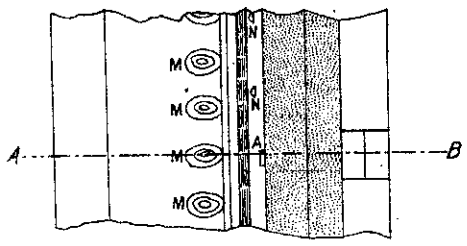
TYPES OF JAPANESE FIELD FORTIFICATIONS

Scale 0 1 2 3 4 5 6 7 8 9 10 Feet.



Section A-B

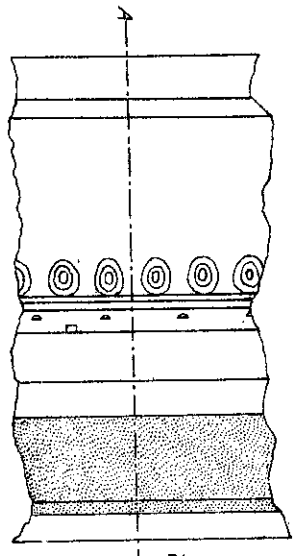
Note: Interior slope revetted with Kaoliang in bundles.



Plan

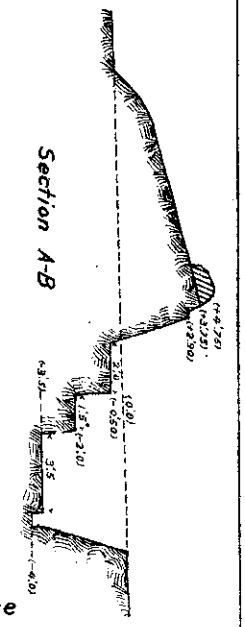
Infantry trench on Line of Resistance at Haicheng.

Legend
A Ammunition Recess.
N Niches for foothold.
M Mud Mounds.

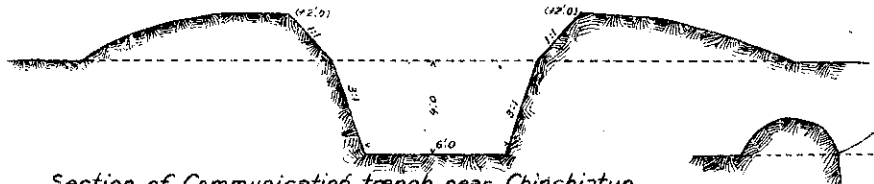


Plan

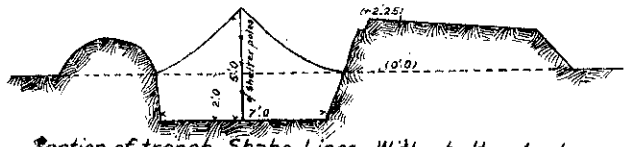
Infantry trench on Line of Resistance at Liaoyang.



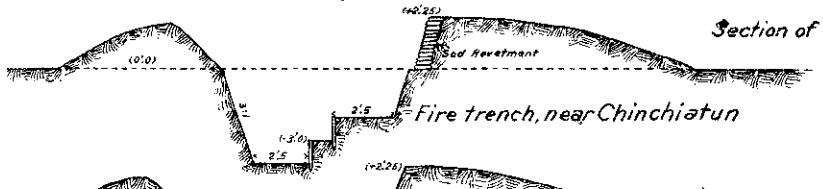
Section A-B



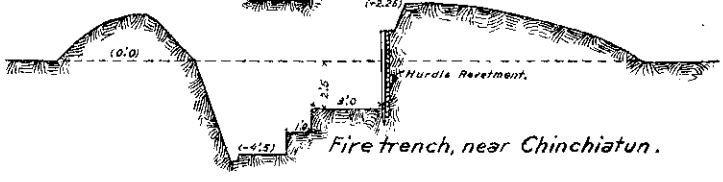
Section of Communicating trench near Chinchiatun.



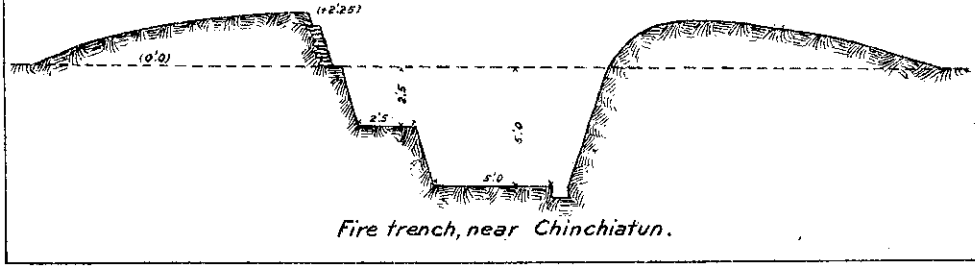
Section of trench, Shaho Lines. With shelter tents.



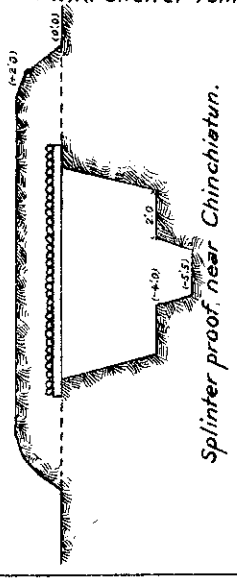
Fire trench, near Chinchiatun



Fire trench, near Chinchiatun.



Fire trench, near Chinchiatun.



Splinter proof, near Chinchiatun.

PLATE IX

loopholed or crenelated quite easily and quickly to give one or two tiers of rifle fire with all needful cover against infantry and artillery fire, excepting only high-explosive shell. The accompanying views show some of the arrangements employed in fortifying villages.

Overhead cover along the fire line was not generally used in the field works, although very common at Port Arthur. In a few cases where the lines were held for a long time in close proximity, as on the Shaho, overhead splinter proofs were constructed.

In the matter of obstacles the Russians showed a decided predilection for the deep military pit constructed strictly on text-book lines, each pit with its sharpened stake at the bottom. Nearly the entire front of the Shoushanpu position was covered with a triple and quadruple row of these pits, while all the redoubts of the inner line were similarly surrounded. At the lowest calculation the development of the several lines of deep military pits in front of the Second and Fourth Japanese Armies at Liaoyang must have exceeded a line 4 miles long of four rows. The labor expended on this form of obstacle was something tremendous and, in view of its comparative inefficiency, can hardly be said to have been well expended. The deep pits were usually covered by a low wire entanglement made of smooth wire easily surmountable.

Wire entaglements, both low and high, of the regulation form of construction, were frequently employed, but being poorly built (stakes weak and insufficiently driven) and smooth wire being generally used, the obstacle was far from being as effective as it can be made. In this, as in other matters, the deficiency of suitable material was mainly responsible. The wire employed was largely galvanized-iron telegraph wire.

Abattis was but sparingly employed, owing to the absence of timber and the necessity of reserving the available supply for more important purposes. The old-fashioned stone fougasse was also used by the Russians, notably at the eastern end of Shoushanpu ridge where a number appear to have been fired with some success. Ordinary earth mines also appear to have been used in the ditches or foreground

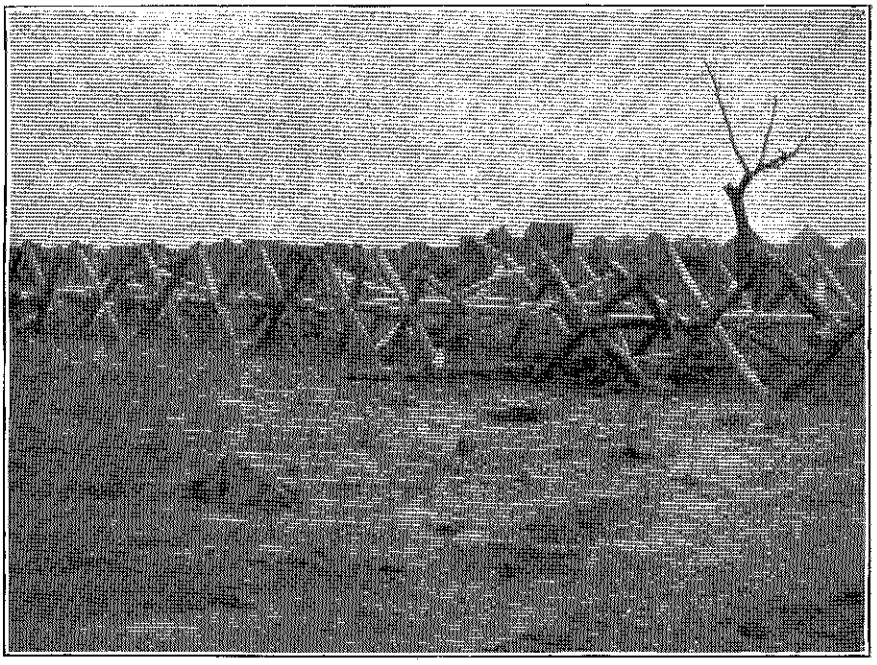
of some of the redoubts and forts of the Russians, as evidenced by the lead wires seen in several of the latter.

Between the lines in front of Linshengpu a somewhat novel type of obstacle was noted, the Russians employing a line of "trestles" and the Japanese a line of "tripods." The Russian "trestles" were about 10 feet long and 4 feet high, made like a large sawbuck, the legs being braced to crosspiece of wooden braces, spiked to the braces and crosspiece. The "trestles" were placed in contact with their longer dimension perpendicular to the front and barbed wire strung back and forth between them. The Japanese "tripod" consisted of three stout stakes 7 to 8 feet long wired at the middle and the ends spread on the ground. Four rows of tripods were placed in contact, both front and laterally, and barbed wire then strung back and forth. The line of Russian "trestle" obstacle was over 400 yards long, while the line of Japanese "tripod" obstacle was about 150 yards long. The two lines were less than 100 yards apart at their nearest point. Both were exceedingly formidable, and it is doubtful whether a man could have crawled through either of them. They both involved an immense amount of labor in their construction and were devised to meet a special situation where hostile lines 200 yards apart faced each other for four and one-half months. Both were constructed under fire, and the mystery is how the work was accomplished.

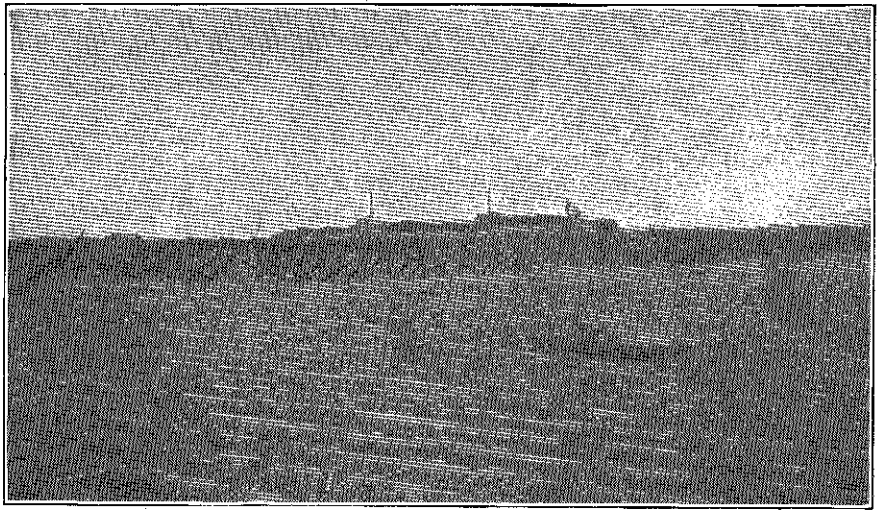
At Liaoyang the Russians utilized the kaoliang in front of their lines as an obstacle when clearing the field, by breaking down the stalks 18 or 20 inches from the ground in all directions, constituting a species of slashing. This was done to a distance of 500 to 600 yards in front of the fire line and made a very effective obstacle. A man could pick his way over such a broken-down kaoliang field, but anything like a rush was out of the question.

The Japanese employed only low wire entanglements and abattis for obstacles.

In conclusion it can not be said that the war has shown any startling developments in the matter of field fortifications. From the point of view of the engineer both Russians and Japanese followed pretty much the orthodox types. The value and importance of concealment has long been recognized, and the war did no more than to emphasize this fea-



41. RUSSIAN "TRESTLE" OBSTACLE, LINSHENGPU, SHA RIVER.



42. JAPANESE "TRIPOD" OBSTACLE, LINSHENGPU, SHA RIVER.

ture. Low, flat parapets lend themselves better to concealment, while deep, narrow trenches furnish the best cover. Whether one form of profile is better than another will depend upon circumstances. For purely defensive purposes the deep and narrow trench is unquestionably the best, but where offensive movements are contemplated a more open trench of the Japanese type is preferable, not only because it affords good lateral communications and an easier exit, but because its more open construction is better suited to maintaining a proper temper in troops who are to assume the offensive.

As was to be expected, the material damage inflicted by artillery on fieldworks proved a negligible quantity, but some form of head cover was shown to be necessary to give protection and confidence to the troops when long exposed to shrapnel fire.

CHARACTER OF PERMANENT FORTIFICATIONS AND METHODS OF CONDUCTING SIEGES, AS ILLUSTRATED BY THE SIEGE OF PORT ARTHUR.

The operations against Port Arthur began on May 5, 1904, with the landing of General Oku's army, consisting of the First, Third, and Fourth Line Divisions, with one artillery brigade of 72 field guns. This force had been embarked at Ujina and transported via Chemulpo to the selected landing place at Yentaiwo, some 3 miles south of Pitsewo. The landing was effected under cover of the Third Squadron of the Japanese naval forces, commanded by Vice-Admiral Kataoka, which first put ashore a detachment of marines. At Yentaiwo there is a flat sandy beach, with shoal water extending some distance from the shore. The first troops disembarked had to wade through shallow water in order to reach land, but the work of constructing landing stages was immediately commenced so that the sampans which did duty as lighters could be brought alongside.

While the main body of the army was disembarking the Japanese continued reconnoitering the country north and south of Pulantien, and on May 16 had cleared the front as far south as Chinchou. Meanwhile the Fifth and Eleventh Divisions were arriving, the former landing at Pitsewo

between May 20 and 24, and the latter at the same place between May 21 and 30.

Leaving the Fifth and Eleventh Divisions to protect his base at Pitsewo, General Oku prepared to advance against Chinchou and Nanshan with the remainder of his army. At the latter place the Russians opposed their first determined resistance in a carefully prepared position consisting of a line of redoubts and batteries armed with siege guns with advanced trenches and numerous obstacles. This position was carried by the Japanese on May 26 with the assistance of a fleet of gun and torpedo boats stationed in Chinchou Bay. The official reports put the Japanese losses at 4,204, of whom 749 were killed, and it is claimed that 774 Russians were buried.

As a consequence of the battle of Nanshan the Russians evacuated Dalny and fell back to Kensan. Dalny was occupied by the Japanese on May 28, and the work of preparing the port as a base for future operations commenced immediately, the navy removing the mines in Talienwan Bay.

After the battle of Nanshan General Oku moved north along the railway with the Third, Fourth, and Fifth Divisions to meet the Russian advance under General Stackelberg. The First and Eleventh Divisions were left behind to form the nucleus of the besieging army, and were placed under the command of General Baron Nogi. The Japanese now took up a fortified position about 5 miles west of Dalny. This position was held until June 26, the Russians making no offensive attempts, although they outnumbered the Japanese during this period.

On June 26 the Japanese advanced their left and center and stormed the Kensan heights with comparatively little loss. On July 3, 4, and 5 the Russians made desperate attempts to recapture the position, but without success. The fighting is reported to have been very severe and included a night attack by the Russians, with bayonet fighting. The slopes of the position are very steep, and there is much dead ground in consequence. The Japanese now remained in their new position for an entire month, pending the arrival of additional troops via Dalny, which had in the meantime been prepared to receive transports. On July 15 the Ninth

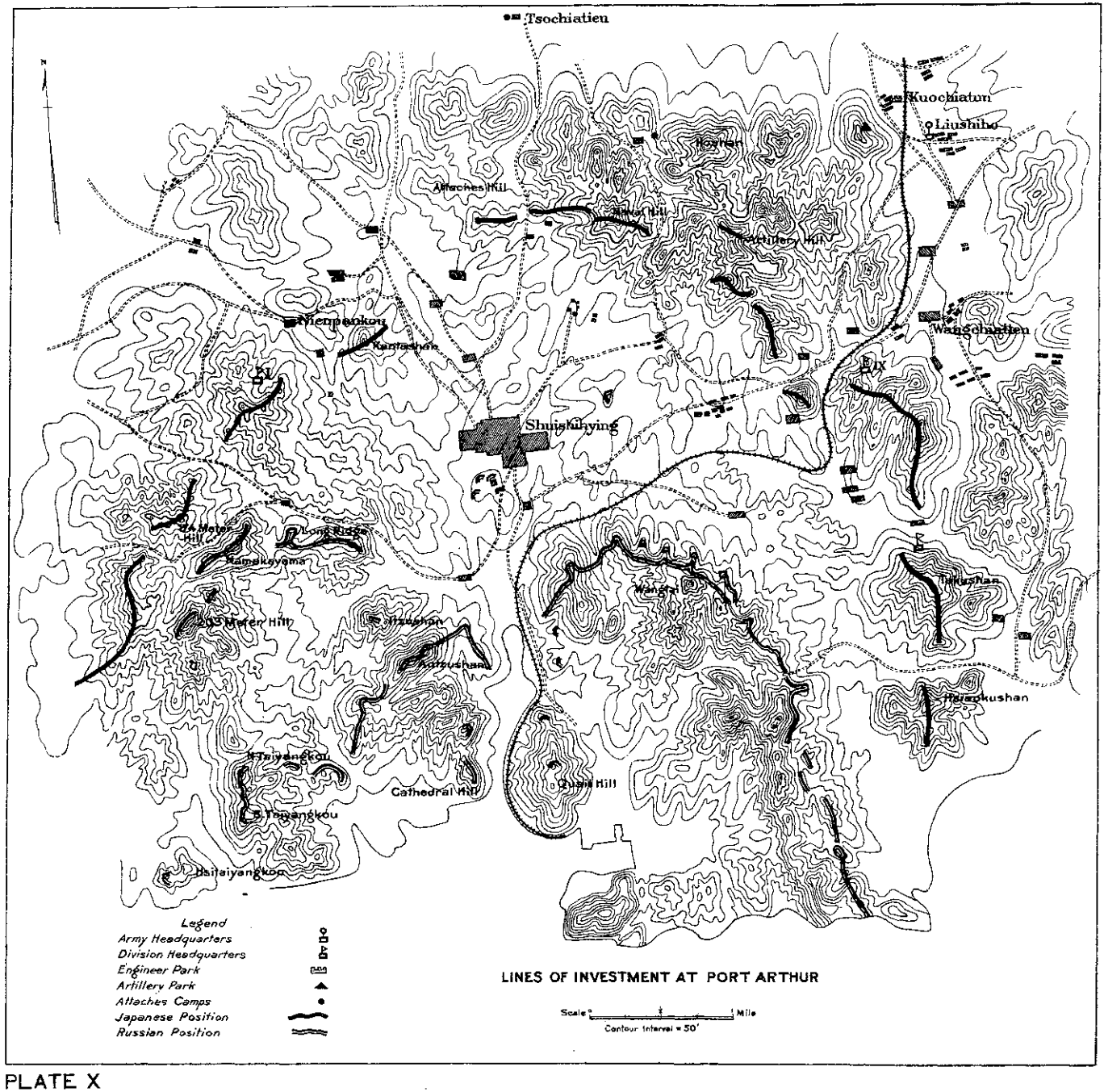

Tsochiatieu
Kuochiatun
Liushiho
Hoshan
Attaches Hill
Artillery Hill
Wangchiatien
Kienpankou
Kanzushan
XI
IX
Shuishihying
203 Meter Hill
Long Ridge
Kamakyama
Wangtai
Tekuzhan
Hsiaokushan
Kaizushan
Taiyangkou
Cathedral Hill
Quail Hill
Tangangkou
Haitaiyangkou
Legend
Army Headquarters
Division Headquarters
Engineer Park
Artillery Park
Attaches Camps
Japanese Position
Russian Position
LINES OF INVESTMENT AT PORT ARTHUR
Scale
1 Mile
Contour Interval = 50'

PLATE X

Division was landed, bringing the strength of the besieging army to three line divisions, two Kobi brigades, and an artillery brigade.

On July 27–28 the Japanese resumed the offensive and carried the Russian position through Antzuling. The ground over which the Japanese advanced is exceedingly broken, giving good cover and enabling the artillery to support the attack until the last moment. The Russian batteries and trenches were badly placed and afforded conspicuous targets. In these fights in hilly country the Japanese infantry carried from 200 to 300 rounds on the person, as it was practically impossible to distribute ammunition after the troops became closely engaged. The infantry also discarded their knapsacks and shoes, preferring the native straw sandals, which afforded a better foothold on the steep slopes.

After being dislodged from their position at Antzuling the Russians fell back to the ridge of heights fronting and some 2½ miles from their permanent fortifications. On the night of July 31 the Japanese surprised the Russians and captured the central portion of the line and compelled the Russians to retire behind their permanent works. The right flank of the Russians, however, still held the advanced hill masses of Takushan and Hsiaokushan, while the left held 174-Meter Hill, Kantashan, Namakayama, and 203-Meter Hill. With this last operation the investment of the fortress may be regarded as having been completed. (Pl. X).

DESCRIPTION OF THE TERRAIN.

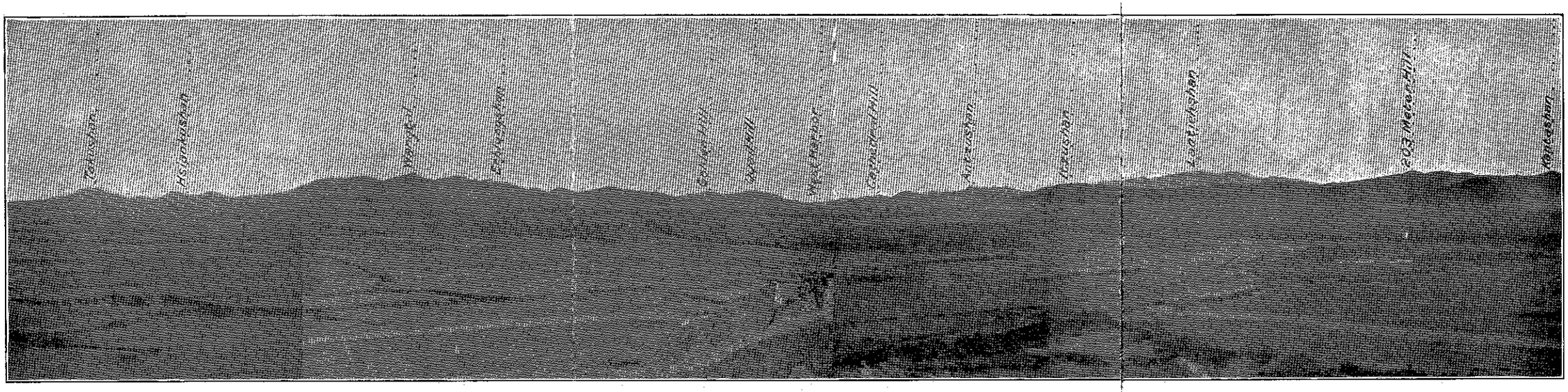
The Russian land defenses consist of two sectors, an eastern and a western, divided by the valley through which the railroad enters the town. The eastern sector encircles the old town at an average distance of about 2 miles and comprises a line of detached masonry and earth forts and batteries, with connecting trenches. The right flank of the line rests on the sea, on low ground, and connects with the seacoast defenses. The left flank of the eastern sector is returned along the flank of the valley and terminates on Quail Hill, which enfilades the valley. Generally the forts and advanced batteries occupy the spurs which jut out from the

irregular hill mass at an average elevation of 250 to 300 feet. In rear of the line of forts and advanced batteries the ground continues to rise, attaining a maximum elevation of 192 meters before dropping away quite sharply to the floor of the valley in which the old town lies.

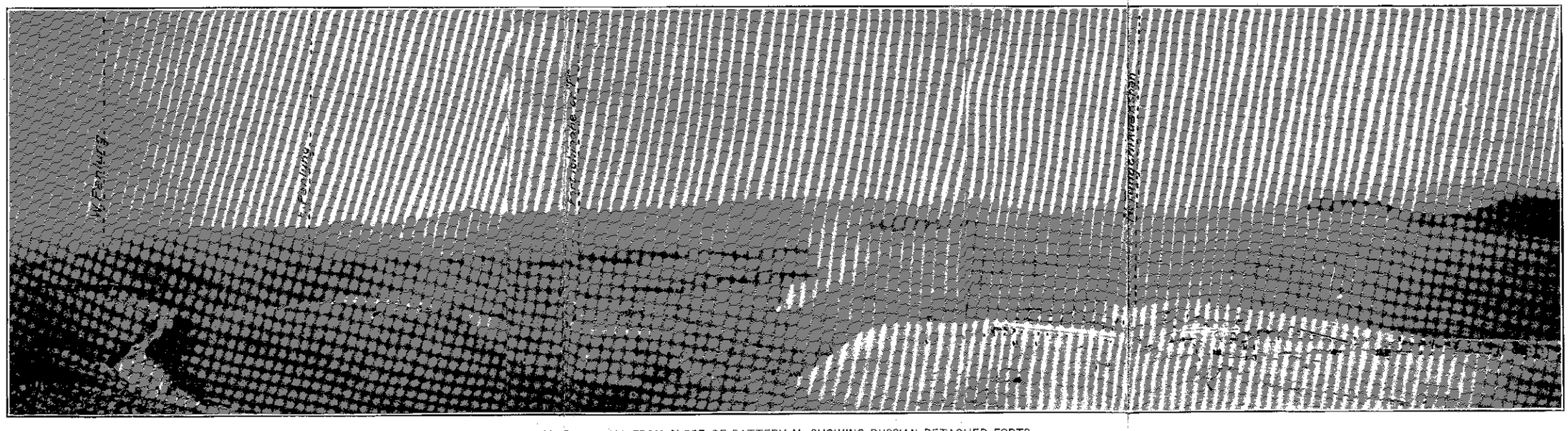
The western sector consists of two lines of works, an inner line of forts and batteries having its right flank on Cathedral Hill and running thence along the flank of the valley via Forts Antzushan, the Taiyangkou forts and Fort Kokoshi, or Hsitaiyangkou, to the sea at the western end of the Tiger's Tail peninsula. This line encircles the new town at a distance of about a mile. The outer line of the western sector starts from the inner line at Hsiaoantzushan and runs thence through Itzushan, Long Ridge, Namakayama, and terminates on 203-Meter Hill. With the exception of Itzushan, there are no permanent works on the outer line.

Fronting the ridge upon which lies the eastern sector of defenses and generally parallel thereto at a distance of 2½ miles runs a ridge of heights attaining a maximum elevation of about 800 feet at Artillery Hill and Hoshan. Between the two ridges lies a rolling, cultivated valley, with the large village of Shuishihying on the main road from Port Arthur to Chinchou. This valley runs across the Liaotung Peninsula from sea to sea, the western end terminating on Louisa Bay. In the eastern end of the valley lies the two detached hills, Hsiaokushan and Takushan. A divide runs across the floor of the valley at Kantashan, the drainage being east and west from this point. Hill slopes and valleys are much cut up and intersected by numerous dry water courses or nullahs. The Japanese lines of investment were located on the outer ridge of heights and crossed the valley at Kantashan, running thence through 174 Meter Hill and returning to Louisa Bay.

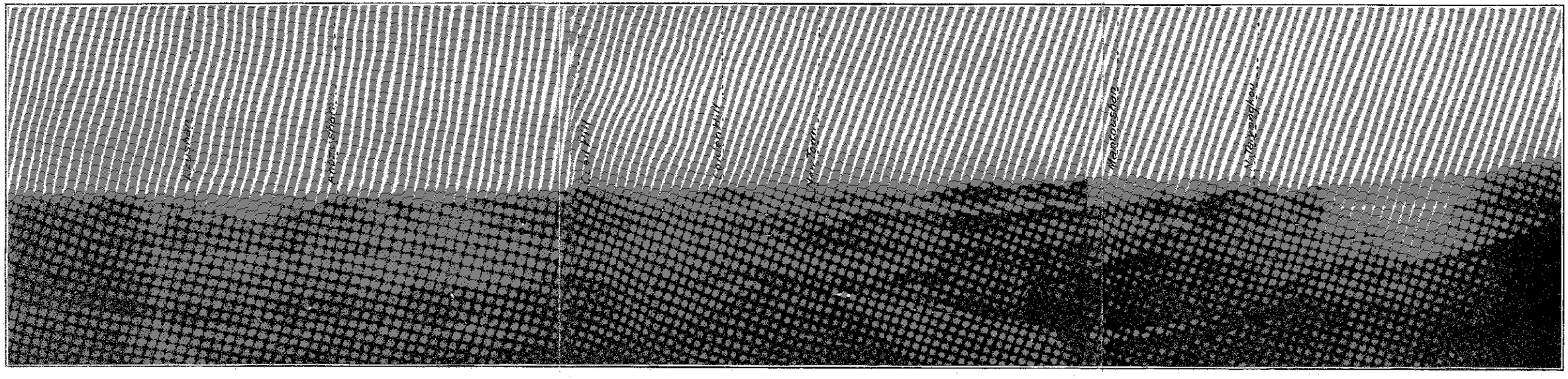
The topography of the defense lines is admirably adapted to the purpose. The lines of detached forts and batteries occupy a series of knolls and heights in close defensive relation to one another, affording complete command over the ground in front, and sweeping the immediate slopes with front and cross fires. The heights in rear afford good positions for artillery and sweep the intervals in the line of forts. The highest peaks afford excellent points for observation.



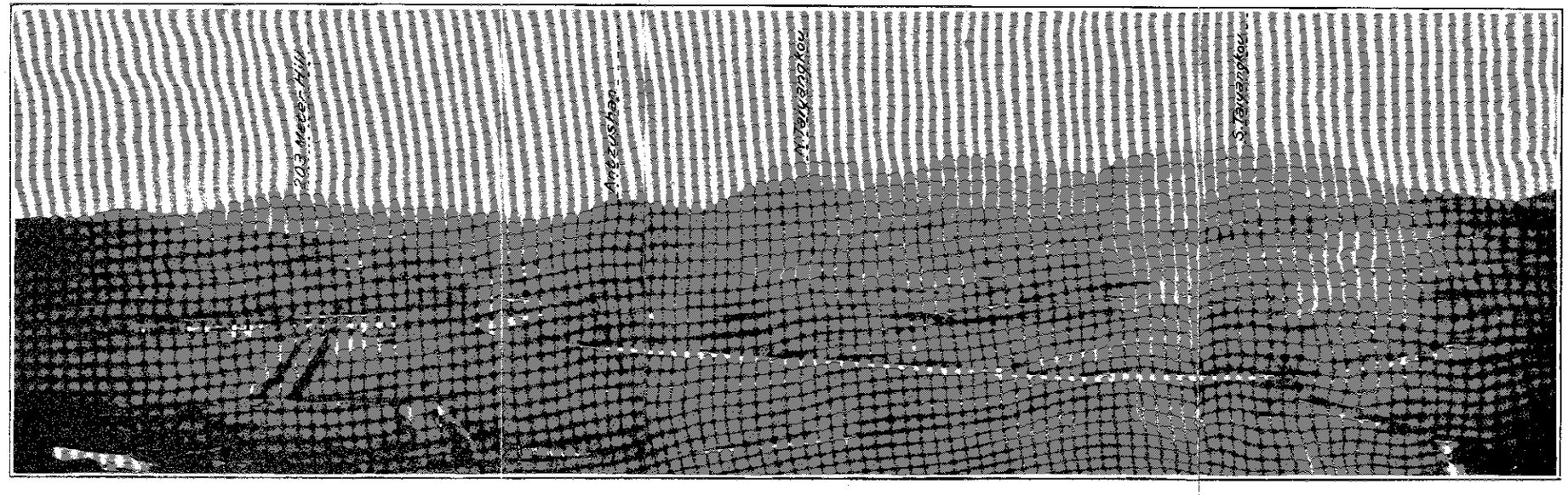
43. PANORAMA FROM ATTACHÉS' HILL.



44. PANORAMA FROM SLOPE OF BATTERY M, SHOWING RUSSIAN DETACHED FORTS.



45. PANORAMA FROM 203 METER HILL, LOOKING FROM EAST TO SOUTH.



46. PANORAMA FROM FORT HSITAIYANGKOU, LOOKING NORTH TO NORTHEAST.

In the western sector of defense the advanced hills and ridges afford excellent defensive positions which were utilized by the Russians (Long Ridge, Namakayama, 203 Meter Hill, 174 Meter Hill, Kantashan). In the eastern sector of defense the old Chinese wall, which runs immediately in rear of the line of detached forts and batteries, serves as a continuous enceinte from which the flanks of the forts and the ravines between them can be swept with fire. The reverse slopes of the inner ridges afford good cover for reserves and supplies. The principal disadvantage of the topography, so far as concerns the defense, are the numerous nullahs which intersect the valley and run up the slopes close to the forts, enabling troops to approach quite closely under cover. The proximity of the parallel ridge fronting the Russian lines was also a disadvantage in that it afforded an excellent position for the Japanese siege artillery, cover for troops and supplies, and good points for observation.

THE JAPANESE PLAN.

The Japanese plan contemplated an attempt to capture the fortress by open assaults. This local conception owed its origin to three probable causes, as follows:

1. The Japanese, as followers of the German school, were no doubt influenced by a certain class of writers who have advanced the theory that a fortress consisting of a line of detached forts could be taken by assault with ultimate economy in time, life, and money.

2. The success of the Japanese in the China-Japan war of 1894-5, in which Port Arthur was taken by open assault, together with their recent successes against the Russians. Incidentally it may be mentioned that both General Nogi and his chief of staff had participated in the capture of Port Arthur in 1894.

3. The desire to save as much time as possible in disposing of the Russian Port Arthur fleet and in freeing General Nogi's army for use in the field operations in the north.

But whatever the governing cause, the Japanese decided upon an open assault, selecting the front of the Panlungshan forts for their attempt. As a preliminary to the general assault it was necessary to capture the advanced Russian

positions at Hsiaokushan, Takushan, and Kantashan, which would otherwise bring reverse fires upon the assaulting columns.

Takushan and Hsiaokushan were assaulted and captured between August 7 and 9. Kantashan was captured by the First Division on August 15, with the assistance of one Kobi brigade, the artillery brigade, and three batteries of field howitzers. With the capture of Takushan the rail head was advanced to Changling station (about 7 miles north of Shuishihying), which became the main provision depot. Ammunition and siege material were carried by rail as far as Kuochiatun, whence they were distributed by field tramways. A line of naval guns, six 12 cm. (4.7 inches) and fourteen 12-pounders, was set up west from Naval Hill. Besides the naval guns and field mountain guns the Japanese also possessed some 15 and 12 cm. field howitzers and possibly other siege guns, but their number at this stage of the siege was not ascertainable. The fire of the naval guns was directed from an observatory on Naval Hill, using hyposcope and plotting chart.

For the general assault which was now to follow the First Division was posted on the right, the Ninth in the center, and the Eleventh on the left. Under cover of the nullahs and growing corn, which covered the fields in the valley, the Japanese pushed forward their advanced troops to the foot of the slopes leading to the forts selected for attack. The assault was inauguarated August 19 by an attack of three battalions of the First Division against Fort Kuropatkin. A part of the work was captured during the night of August 19–20, but on the following day at 3 p. m. the Russians drove out the Japanese garrison of some 200. On the extreme right flank 174 Meter Hill was captured on the 26th.

The Ninth Division, to which had been assigned the assault on the Panlungshan forts, commenced its attack at 4 a. m. August 21. From the cover of the nullahs, which closely approach the foot of the slopes, a series of assaults was delivered against the East Panlung during the 21st. All these assaults failed. During the night of August 21–22 the assaults were continued, but without success. Meanwhile companies and battalions were being wiped out, and the situation was becoming desperate. On the 22d the question of aban-

doning the assaults was under consideration, but General Ichinohe, commanding the Sixth Brigade, determined to make one more attempt, and mustering a storming column—chiefly survivors from previous assaults, many of them wounded—in the shelter of the nullah, moved against the work and carried the same. By noon the greater part of the work was in the hands of the Japanese. Meanwhile two reserve companies, which were coming up to support the attack, found themselves under an annoying flanking fire from West Panlung and, on the initiative of the senior captain, made an assault and captured this work.

In conversation with Major Sukiyama, the sole surviving officer of the Ninth Battalion of Engineers, I gathered the following details regarding the capture of East Panlung:

Major Sukiyama, then a company commander, took part in the assault with his company, of whom only 6 survived. The wire entanglements were cut in three places by the engineers, but the Russians trained their machine guns on the cuts and checked all attempts to get through. Engineers were then sent forward with mines (10 kilos of high explosive in bamboo) to destroy the machine-gun caesmates. These men crawled under the wire entanglement, avoiding the cuts, and reached the outer slopes of the parapet, only to find the machine-gun port too small for the insertion of the mines. A smaller mine of 1 kilo was then brought up and fired in the port, enlarging it, after which the larger mine was placed and fired. A bombproof was likewise destroyed by mines after two trials, the fuse failing at the first attempt and having to be relighted. By reference to Plate XXXVII it will be observed that the nullahs on either side of East Panlung approach this work quite closely. The main portion of the assaulting columns used the eastern nullah and deployed from it at a point less than 200 yards from the parapet. Just below the entanglement there is a bit of dead ground, where the Japanese troops could secure some shelter lying down. The Russians made a counter attack from East Panlung on the 21st, but were driven back, the fighting being hand to hand, according to eyewitnesses. After the occupation of East Panlung the Japanese engineers made a lodgment overlooking the crest. This lodgment proved very useful in resisting a desperate counter attack which the Russians

delivered from the Chinese wall during the night of August 22–23. This attack was repulsed with heavy losses to the Russians, who thereafter abandoned any serious attempts at the recovery of the Panlung forts.

The main credit for the capture of these works is due to the Seventh Regiment, whose 3 battalions lost from 30 to 90 per cent of their strength. Only four officers in the whole regiment remained unwounded. General Baron Oshima, commanding the Ninth Division, informed me that Corporal Hatta of the engineers was the first man to enter the East Panlung, and I later had the pleasure of meeting this brave man, who was one of the few survivors of his battalion.

On the night of August 23–24 the Japanese delivered an assault against the Chinese wall, Wangtai, and Ridge H with one brigade from the Eleventh Division. The Chinese wall was carried and the assaulting column mounted part way up the slopes of both heights, but the concentrated fire from the front, flanks, and even rear effectually checked the advance. The positions reached by the Japanese in this attempt were plainly marked by their dead, who remained unburied until after the capitulation of the fortress. The slopes of the Panlungs, the ground between them and the Chinese wall, and the slopes of Wangtai and Ridge H were literally sprinkled with skeletons in khaki uniforms, many of whose skulls, following the lines of least resistance, had rolled down the slopes and gathered here and there in clusters of four and five. A slight study of the ground will serve to show the desperate character of the assault made at a time before the Russian artillery had been touched or the morale of the defenders shaken. With the exception of the nullahs, the ground in the immediate vicinity of the forts is bare and smooth, and scarcely a spot exists that is not under fire from some point. Under such conditions it would hardly be expected that an open assault could succeed, and yet the positions reached by the Japanese troops show that the attempt came near being successful, sufficiently so, at least, to justify the Japanese leaders in their undertaking and to relieve them from criticisms for having attempted an impossible feat. Had the Japanese possessed a larger force

and been able to attack on a broader front, it is by no means certain that an open assault would not have succeeded.

At this period of the siege the Russian garrison numbered not far from 50,000 effectives, whereas the Japanese combatants numbered but 60,000, a preponderance too insignificant to warrant any hope of a successful issue in an open assault. In any event, the attempt to capture a permanently fortified line by open assault had been given a fair trial, and if any troops might hope to succeed it certainly was the Japanese. Their failure is no discredit to their prowess, but goes to prove that the engineers' art can not be disregarded in modern warfare, and that fortifications must still be reckoned with and that they will play their part in the future.

The Panlungshan forts were simple earthen redoubts, armed with field and machine guns, without flank defense, but having casemates and bombproofs. Difficult as was their capture by open asault, their retention by the Japanese was even more wonderful and speaks volumes for the tenacity and endurance of their troops. The unshaken Russian artillery poured a concentrated fire into these forts from all sides, while from the Chinese wall and adjoining forts came a short-range infantry fire. On Ridge H, less than 400 yards away, was a 15-cm. (6-inch) siege battery, whose heavy shells landed with telling effect. For a week after their capture the Japanese are stated to have suffered an average of 100 casualties daily. By the end of that time they had succeeded in making themselves secure and in completing their communications to the rear; so severe was the strain that the firing line in the captured works was relieved every thirty minutes. On the 24th the Japanese had placed four machine guns in each of the Panlung forts for use against possible counter attacks.

The failure of the assault against Wangtai and Ridge H satisfied General Nogi of the impossibility of carrying the fortress by open assault and marks the termination of one phase of the siege. Regular siege methods were now determined upon and approaches opened against East and North Tungchikuanshan forts, Fort Kuropatkin, and the Shuishihying redoubts. Additional siege artillery was also brought up and mounted and a systematic siege commenced.

PRINCIPAL EVENTS OF THE SIEGE.

Having been an actual eyewitness of but a small part of the siege, I am indebted for many of the following notes to statements made from time to time by various Japanese officers and to other attachés serving with General Nogi's army. Only the main events will be related.

August 25, 1904.—The First Division gained a foothold on the extreme eastern knoll of Namakayama Ridge. The captured position was much exposed, but the Japanese troops held their ground.

August 25–31.—Desultory long-range cannonade. The Russian counter attack against the Panlungshan forts the night of the 28th-29th is repulsed.

September 7.—The 12-cm. (4.7-inch) naval guns have fired from 900 to 2,000 rounds each with little erosion, using smokeless powder.

September 10.—On this date the Japanese artillery had been augmented to a total of 362 guns of all patterns, as follows: One hundred and eight field and mountain guns, divisional; 72 field guns, artillery brigade; 2 15-cm. (6-inch) naval guns; 10 12-cm. (4.7-inch) naval guns; 18 12-pounder naval guns; 28 15-cm. (6-inch) and 12-cm. (4.7-inch) field howitzers, horsed; 124 siege guns (12-cm. bronze and 10.5-cm. steel) and mortars (15-cm. bronze and 9-cm. steel).

September 13.—Ninth Division, which lost heavily in the August assault recruited to full strength.

September 19.—The First Division delivered an assault against Namakayama Ridge and 203 Meter Hill. The whole of the former was captured and held. At the latter one company of the First Brigade succeeded in reaching one corner of the ditch, but could not enter, as it was swept by machine-gun fire. After holding its position for two days this company had to fall back as a result of field-artillery fire which the Russians brought to bear from the low ground adjoining Pigeon Bay and which swept the slopes in flank.

September 20.—The First Division assaulted and captured the Shuishihying redoubts, thereby compelling the Russians to evacuate their pumping plant, thus cutting the main water supply to Port Arthur. The assault was made after sapping from an advanced parallel about 100 yards from the

nearest redoubt. The Ninth Division assaulted and captured Fort Kuropatkin. This assault was made from an advanced parallel about 80 yards from the work.

The capture of the Shuishihying redoubts and Fort Kuropatkin now compelled the Russians to fall back behind the railway and enabled the Japanese to push forward their lines, using the railway embankment as a parallel.

September 21–30—Desultory firing by naval guns against the Russian ships.—The capture of Namakayama rendered possible a partial view of the Russian fleet which had taken shelter under Quail Hill. They claim to have set one ship on fire on the 28th. Additional saps were opened against G forts, Erhlungshan, Sungshushan, and 203 Meter Hill. The Russians made a number of minor attacks against the Erhlungshan sap heads.

October 1.—The first 28-cm. (11.2 inches) howitzer commenced firing, using common shell.

October 4.—No firing this day, owing to high wind.

October 5–10.—Two 28-cm. howitzers opened fire on the ships October 5, the Russians replying vigorously. The night of October 7–8 the Russians captured the Japanese saphead in front of G fort, but the Japanese recaptured same on the 9th. The Russians shell the 12-cm. naval battery from Golden Hill and Tiger's Tail.

October 12.—The division crossed the railway and captured the lower advanced trench in front of Sungshushan.

October 16.—Under cover of a terrific bombardment extending from 3 to 4.30 p. m., the Ninth Division assaulted the lower advanced trench in front of Erhlungshan and G fort. For an hour and a half the fire of 36 mountain guns, 6 28-cm. howitzers, 34 12-cm. guns, 4 10.5-cm. Krupp siege guns, 4 12-cm. howitzers, and 2 12-pounders was poured into Fort G, Erhlungshan, and Sungshushan. At G one company of infantry rushed over 100 yards of open space and occupied the parapet with little loss. The lower advanced trench in front of Erhlungshan was also taken with little resistance, the defenders here as well as at G having either been killed or driven out by the terrific bombardment. The aggregate Japanese casualties in this affair were reported to be 150. During the night the Russians made a weak and unsuccessful attempt to dislodge the Japanese from Fort G.

October 17.—Colonel Satow, chief of staff to the commander of the siege artillery, stated that the following additional siege armament has been brought up during the preceding month: Twelve 28-cm. howitzers, 2 15-cm. naval guns, and 4 15-cm. howitzers.

The total artillery armament on this date before Port Arthur comprised 245 siege and 180 field and mountain guns. The 28-cm. were, however, not yet all mounted.

Colonel Satow further stated that it was proposed to use black powder for some of the less exposed siege places, to avoid the erosion produced by smokeless powder. No high explosive shells have yet been fired from the 28-cm., but they were stated to be on their way up.

A number of hits were reported from Namakayama as having been made on the ships with the 28-cm., as follows: Bayan, 5; Retvizan, 6; Poltava, 4; Peresviet, 17.

October 18–24.—Comparatively little firing during this period. The forts from North Tungchikuanshan to Sungshushan were bombarded in a desultory fashion by the 28-cm. howitzers.

October 25.—The artillery brigade was pushed forward in front of Kantashan, the right wing to within 1,200 meters from Sungshushan and the left wing to within 1,800 meters from Erhlungshan. From these short ranges excellent practice was made against the Russian defense. The guns were sheltered in nullahs and skillfully disposed for concealment.

October 26–31.—This period marks another general assault and attempt to capture the fortress, although the flank defense of the forts had not yet been destroyed. For a week previously the forts had been bombarded more or less by the 28-cm. howitzers, and possibly the Japanese held the view that the Russians would be so shaken by the exceptionally heavy ordnance as to render a successful assault possible.

The front attack extended from East Tungchikuanshan to Sungshushan, inclusive. The First Division was ordered to attack Sungshushan with its left brigade, holding the right brigade in reserve; the Ninth Division was to attack Erhlungshan and Fort P; the Eleventh Division was to attack East and North Tungchikuanshan and O with its right brigade, holding the left brigade in reserve. The infantry as-

sault was to commence at 5 p. m. by an attack of the First and Ninth Divisions against the upper trench of Sungshushan and the glacis trench of Erhlungshan, respectively. The assault was to be supported by the artillery brigade and every available siege piece. Under cover of the bombardment all saps were to be pushed forward as fast as possible. Such were the general features of the orders prescribed for the assault.

At 11 a. m. on the 26th there was a desultory firing from the naval guns, the Russians hardly replying. At 1 p. m. the 28-cm. howitzers on the Japanese left commenced to shell Southeast, East, and North Tungchikuanshan. At 3.30 p. m. the fire from the Japanese right increased considerably, Erhlungshan being heavily pounded by all the naval guns and the 28-cm. howitzers on the right flank in addition to several batteries of field howitzers. At 4.30 p. m. the fire on Erhlungshan was terrific, shrapnel and high explosive shell bursting all over the work. At 5 p. m., to the minute, a column of about 200 left the advanced parallel and rushed up in deep mass against the glacis trench of Erhlungshan, followed almost immediately by a second column of equal strength a little farther to the right. Both columns reached the trench with trifling loss and at once entered it. Two or three Japanese shell fell among them, notwithstanding that two flags were vigorously waved. Three more columns of about 200 each left the parallel in the next twenty minutes and established themselves under cover below the outer crest of the glacis. At 5.20 p. m. the Russians fired a large mine at the western angle of the trench, resulting in a tremendous explosion. Meanwhile three approaches were being constructed from the trench to the parallel. The Japanese made extensive use of their wooden bomb guns to fire grenades.

The upper trench in front of Sungshushan was rushed a few minutes before that of Erhlungshan by the First Division. At nightfall fighting was still going on. During the night the Russians made no less than four counter-attacks against the upper trench at Sungshushan, all of which were repulsed. The Japanese report their losses in the capture of the Sungshushan trench at 140 and at Erhlungshan at 300, most of the latter being caused after

the occupation of the trench by Russian indirect fire. The Japanese profited by the bombardment of the 26th to seize the whole of Fort G and to fully occupy the same.

On the 27th and 28th the Japanese bombarded intermittently with their naval guns and 28-cm. howitzers.

On the 29th of October the Russians counter-attacked the Sungshushan upper trench at 6 a. m., and at 9 a. m. drove the defenders back to where they were on the 26th, but between 1 and 2 p. m. the Japanese recaptured the trench.

On the 30th a heavy bombardment commenced from the siege artillery at 11 a. m. against Sungshushan, Erhlungshan, O, East and North Tungchikuanshan, and the works in rear. The practice was excellent. At 12.30 p. m. the field artillery commenced shrapnel fire, the Russians replying feebly. At 1 p. m. a simultaneous infantry assault was commenced on all points of attack. At Sungshushan three columns of 200, 200, and 100 successively charged from the upper trench through narrow openings in the wire entanglements. These columns left some 80 bodies on the ground. The columns were seen to descend into the ditch, carrying scaling ladders with them. At 3.20 p. m. what appeared to be a large mine exploded at the salient angle of Sungshushan, and at 4 p. m. an enormous explosion occurred apparently in the interior of the fort. Meanwhile a sharp musketry fire was going on between the Japanese in the upper trench and the Russians in Erhlungshan and Sungshushan. Nothing more could be seen of the columns which had entered the ditch. Occasionally a man attempted to return, but nearly all of these were shot down. A few men tried to mount the parapet, but all these were killed.

Erhlungshan was not attacked from direct front, but a small party assaulted the western face, and it is certain that some entered the ditch.

At 1.15 p. m. East and North Tungchikuanshan, Kobuyama, O, and P were simultaneously assaulted. The Japanese succeeded in establishing themselves close to Kobuyama and P, but were everywhere else repulsed. The Russian shrapnel and machine-gun fire were murderously effective.

Particularly deadly was the shrapnel fire from Southeast Tungchikuanshan, which flanked the slopes of East Tungchikuanshan.

On the 31st the Russians counter attacked twice from P and drove back the Japanese to their advanced parallel. On hearing this the brigade commander brought up reenforcements and not only recovered the Japanese position, but captured the whole of P, which was thereafter abandoned by the Russians. In honor of this gallant feat the work was renamed Fort Ichinohe, after the brigade commander. Another feeble assault was made on the 31st by a small column under cover of 28-cm. howitzers and shrapnel fire against North Tungchikuanshan, but without success.

The net results of the October assaults were the capture of P and G, the glacis trench of Erhlungshan, and the upper trench of Sungshushan. The possession of the last two trenches materially shortened the labor of sapping. It seems quite doubtful whether the Japanese leaders really expected any decisive results from these assaults, for they were made with small columns and rather half-heartedly. They appear to have been undertaken more with a view to testing the temper of the defenders and gaining ground, and with this view of the case the assaults were justified. The Japanese report their losses in the series of assaults at 2,021 all told.

November 1.—Mining operations were commenced against North Tungchikuanshan, Erhlungshan, and Sungshushan.

November 2.—Two enormous explosions occurred inside the old town of Port Arthur, caused by the blowing up of some magazines by the Japanese artillery fire.

November 4.—On this date the situation was about as follows: Saps were being pushed against 203 Meter Hill from the southwest; a trench was being opened between G and Erhlungshan as a preparation for assaulting the Chinese wall in front; saps were being pushed from East and West Panlungshan against the Chinese wall opposite; the mine shafts and galleries against North Tungchikuanshan, Erhlungshan and Sungshushan were making steady progress; on the extreme right wing the Japanese drove back the Russian outposts to Pigeon Bay. The Japanese also advanced some of their siege and field artillery, two 9-cm. mortars being

placed west of Shuishihying to fire on the road in rear of Erhlungshan, while eight batteries of the artillery brigade and six 12-pounder naval guns were placed in line astride of Shuishihying.

November 5–9.—Desultory firing by the siege artillery and steady mining and sapping. The fire of the Russian artillery has noticeably slackened and the quality of their ammunition deteriorated, most of their heavy shells failing to explode.

November 10.—A further advance of Japanese siege artillery, eight 12-cm. howitzers being pushed forward between Shuishihying and Palichuang and four 12-cm. naval guns being advanced to a position west of the field artillery observatory. The Russian war ships were regularly shelled by the 28-cm. howitzers and the Russian artillery in Sungshushan had been silenced. In the Eleventh Division the miners had broken into the counterscarp gallery at the salient and a struggle was in progress to dislodge the Russians from the gallery on the east flank of the fort.

November 13.—Three companies of engineer troops, one from Guards Division, one from Sixth Division, and one from Eighth Division, arrived from the north and were assigned one to each of the divisions of the besieging army. This was rendered necessary owing to the heavy losses in the engineer companies during sapping and mining.

November 14–16.—Sapping and mining continued. The Russians indulged in frequent counter attacks at night with small detachments without serious consequence to the Japanese. Most of the First Cavalry Regiment and three batteries of the Seventeenth Regiment of the artillery brigade departed for the north.

November 17.—Some mines exploded at Sungshushan, breaking in the counterscarp gallery.

November 18.—The First Brigade of First Division (First and Fifteenth regiments) is holding Namakayama and sapping against 203 Meter Hill. Russians attack sapheads nightly, but not in strength.

November 19.—The Russians made a determined counter attack at Erhlungshan, but were repulsed. Part of the Seventh Division arriving by route march. This division landed at Dalny on the 18th. There is no cavalry regiment

with the division, but each company has six mounted men attached. The divisional artillery consists of two batteries of field and two of mountain guns.

November 20.—Three mines fired at Erhlungshan, blowing in counterscarp and partially filling the ditch. The counterscarp gallery at the northeast angle of the ditch had been previously blown in by mines sunk in the glacis. The engineers also found and cut the lead wires to some Russian mines planted in the ditch, making the ditch safe. In addition to the three engineer companies from the north the First and Twelfth Kobi companies of sappers have joined the investing forces.

As illustrating the heavy casualties suffered by the Japanese it may be instanced on the authority of an adjutant of the Ninth Division that at this date only 1 battalion commander out of 12 in the division remained unwounded. The 4 regimental commanders, as well as the lieutenant-colonel commanding the engineer battalion, were all killed or wounded. In one infantry company there were but 2 soldiers who had survived the campaign. The chief of staff of the Third Army also stated that at this date the engineer battalion of the First Division had but 60 men of the original 600.

At 4 p. m. the Russians opened a heavy rifle and artillery fire which lasted about one hour. This was caused by a small reconnoitering party at Erhlungshan which drew the fire of the defenders and led the Russians to believe an assault was impending.

November 21–25.—Sapping and mining continued with systematic bombardment by the siege artillery.

November 26–December 5.—This period marks the third general assault of the fortress. By sapping and mining the three masonry forts on the front of attack, North Tungchikuanshan, Erhlungshan and Sungshushan, had had their glacis crowned and flank defenses destroyed and the Japanese leaders thought the time opportune to carry the fortress by storm, although the parapets of these forts had not yet been breached.

As usual, the assault was inaugurated by a heavy artillery fire against the forts to be attacked. At 12.50 p. m. a mine was exploded in the ditch of North Tungchikuanshan under

the northwest angle of the parapet, and this was the signal for the infantry assault which was made simultaneously from the advanced parallels. At Sungshushan and Erhlungshan the storming parties reached the works without very heavy loss. At the former work the Japanese were observed at 1.30 p. m. running back in considerable panic, being heavily pushed while doing so. At Erhlungshan the storming party remained in the work. By 2 p. m. artillery fire had almost ceased, but began again at 4 p. m., when a strong Japanese column entered Erhlungshan. The Japanese also captured part of the Chinese wall between G and West Panlungshan. North Tungchikuanshan was attacked by one battalion, the leading column consisting of one company. This attack suffered heavily from the flanking fire coming from Southeast Tungchikuanshan and also from Russian hand grenades. At Q the Japanese lost heavily, but reached the crest of the parapet and some men climbed over and engaged the Russians in grenade throwing and bayonet fighting. Of those who entered none returned. At North Tungchikuanshan a few men reached the parapet, but the majority took cover in the mine crater. A small party climbed up from the western side, but were stopped by the wire entanglement and had to retire with some loss. During the assault Antzushan and Itzushan were heavily shelled by the naval guns.

All the Japanese assaults were unsuccessful, they being unable to hold their ground in the face of the concentrated Russian fire coming from the interior works, the supporting works, and the retrenching lines and gorges of the forts attacked.

During the night of November 26–27 the Japanese launched a forlorn hope against the Sungshushan annexed batteries and trenches, seeking to turn the Russian lines of defense. This assault was made by a volunteer force from all four divisions, and is best told by a surviving officer of the First Division, whose name is withheld, as follows:

The force was regarded as a "Keshitai" (forlorn hope), and was composed of detachments from all the four divisions at Port Arthur, the number being approximately as follows:

First Division, 800 men; two battalions of 400 each from each brigade (each regiment furnished two companies of 100 men each); Ninth

Division, 400 men; Seventh Division, 1,200 men, all from one regiment; Eleventh Division, 200 men.

On the evening of the 25th all the officers of the various detachments assembled at Shuishihying and received General Nakamura's (commanding First Brigade and leader of the forlorn hope) instructions. They were to assemble in rear of the high ground at M (Pl. XI) by 5 a. m. on the 26th, and were to remain there all day during the general attack of the 26th. Plenty of cover existed in ravines, old trenches, etc. If the general attack should prove successful, the detachments would rejoin their respective commands. If, on the other hand, it proved a failure, the forlorn hope would march after nightfall on the 26th, assault the auxiliary work at G, and after its capture push on to the second Russian line at B B.

The force was assembled as ordered at 5 a. m. on the 26th. Between 6 and 6.30 p. m. it moved off in column of fours. It was necessary to be in position for the attack on G by 9 p. m., as the moon would rise about that time. The distance from M to G by the route followed was over 1½ miles.

All went well until a small bridge was crossed at N. Here a track led off southwest to F. Owing to the darkness the column had opened out considerably, and when the rear detachment, composed of men from the Seventh Division who were ignorant of the country, arrived at this bridge it left the proper road and followed this track as far as O. Here the commander perceived that he had mistaken the road and started across country to rejoin the main body, which he eventually did. Some 80 men, who had evidently straggled in rear, however, followed the track until they collided with 400 Russians stationed in F. Most of these 80 men were either killed or captured. A few succeeded in hiding until the night of the 27th–28th, when they found their way home.

Returning now to the main body, on reaching a spot marked × on sketch a short halt was made and the column closed up. The powerful searchlights on C, D, and E now swept the valley, and the presence of the Japanese force was discovered, resulting in a tremendous gun and rifle fire from C, D, E, F, G, and H. This fire, though extremely heavy, caused very few casualties. The Japanese did not reply to the Russian fire, but pushed on to close beneath G, where they formed up as follows:

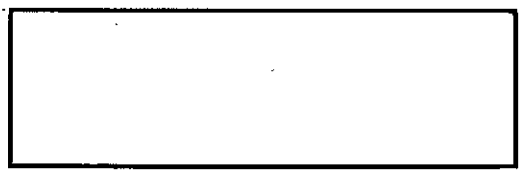
FIRST BATTALION, FIRST DIVISION.

1 Co. 1st Regt.	1 Co. 15th Regt.	1 Co. 1st Regt.	1 Co. 15th Regt.
4	3	2	1

SECOND BATTALION.

NINTH AND ELEVENTH DIVISIONS.

SEVENTH DIVISION.



The colonel of the First Division Regiment of two Battalions having been wounded at X, the command of this regiment devolved upon the commander of the First Battalion and the narrator assumed command of the First Battalion. No. 4 Company of the First Battalion attacked the enemy at G and succeeded in penetrating the lines. The Russians thereupon fired three mines, which caused heavy losses and compelled the Japanese to retire. Meanwhile large Russian reenforcements arrived and every subsequent assault was repulsed, while a terrific fire was poured in from front, rear, and both flanks by the aid of the searchlights.

The Japanese eventually retired between 2 and 3 a. m. and succeeded in reaching their lines with a loss of some 1,200 killed and wounded. Among the wounded was General Nakamura, the leader of the assaulting force. They suffered very little during retirement. The two companies of the First Battalion lost about 50 per cent of their strength, nearly one-half of the losses being in dead. The Russian hand grenades caused many casualties.

The narrator assigns four principal reasons for the failure of the enterprise:

1. The time (a few hours after a general assault) was injudiciously selected, as the Russians would be likely to be more alert than usual.

2. Too much noise and hurrahing in the Japanese ranks.

3. Undue opening out of units.

4. The employment of a mixed force from different divisions instead of a complete and distinct unit.

The criticisms made by the narrator, especially the one regarding the time selected for attack, are undoubtedly well taken.

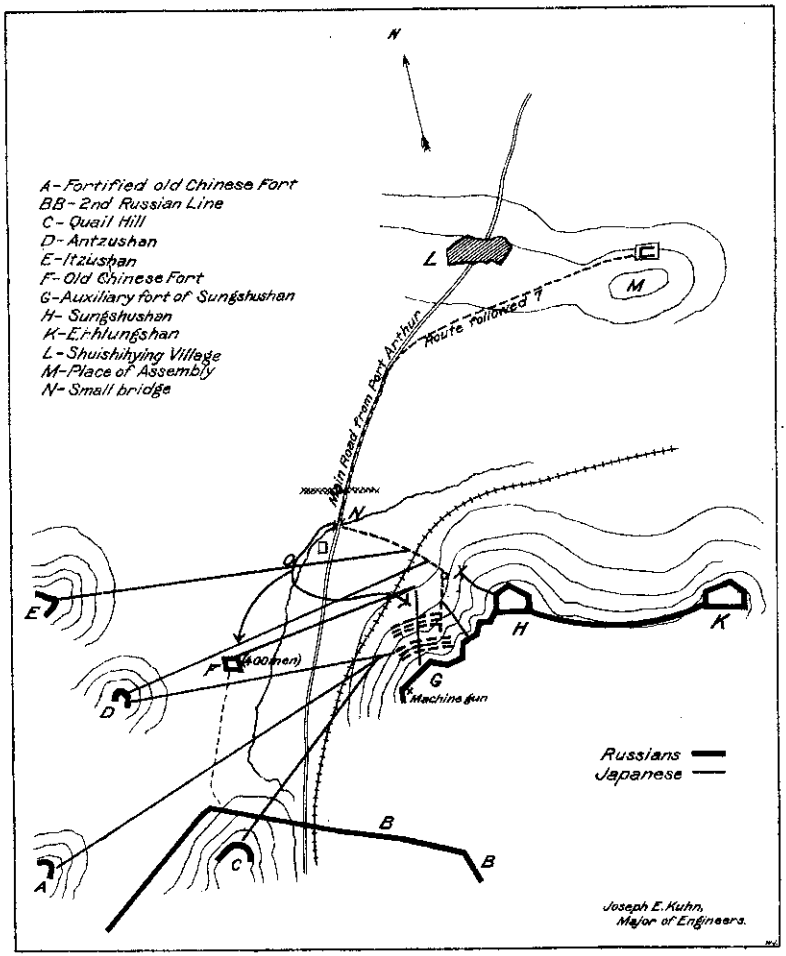

A - Fortified old Chinese Fort
BB - 2nd Russian Line
C - Quail Hill
D - Antzushan
E - Itzushan
F - Old Chinese Fort
G - Auxiliary fort of Sungshushan
H - Sungshushan
K - Erhlungshan
L - Shuishihying Village
M - Place of Assembly
N - Small bridge
N
L
M
Route followed
Main Road from Port Arthur
N
Q
E
F (400 men)
D
G
Machine gun
H
K
Russians
Japanese
B
B
C
A
Joseph E. Kuhn,
Major of Engineers.

PLATE XI

From the fact that the column lost its way it would appear that no staff arrangement had been made to prevent mistakes about the road.

Apart from all criticisms, however, the night attack on the Sungshushan annexed batteries and trenches deserves a place amongst the most desperate undertakings chronicled in military history. The slopes leading to the position are steep, smooth, and absolutely devoid of all cover and swept by front, flank, and reverse fire. The Japanese dead, to the number of 300 to 400, could be plainly seen on the slopes from its foot right up to the trenches, and here they lay until after the capitulation of the fortress. No doubt many wounded, who might have been saved, succumbed where they had fallen, as no assistance was possible.

The Japanses now abandoned for the time being their attack against the forts in the eastern sector of defense, and directed their energies to the capture of 203 Meter Hill, which they commenced attacking on the 28th at 8.30 a. m. Two battalions were sent against height 210, and one battalion against the height 203. At the same time three companies of the Thirty-sixth Kobi regiment fiercely assailed Akasakayama.

At 10.30 a. m. the Japanese were holding onto the top trenches, HH (Pl. XII), while the lower trenches, FF, were full of their reserves. About 11.30 a. m., the majority of the troops close to the heights 210 and 203 broke and fled down the valley in a compact mass pursued by shrapnel with which the Russians flanked the slopes from the low ground adjoining Pigeon Bay. The troops, however, rallied at the lower trenches and returned to their former positions. At Akasakayama the Japanese attack was entirely unsuccessful and their losses heavy. They, however, succeeded in constructing a sand-bag revetment, C, within 50 yards from the Russian trenches. At 7 p. m. the Russians made vigorous counter attacks and drove all the Japanese back to their lower trenches.

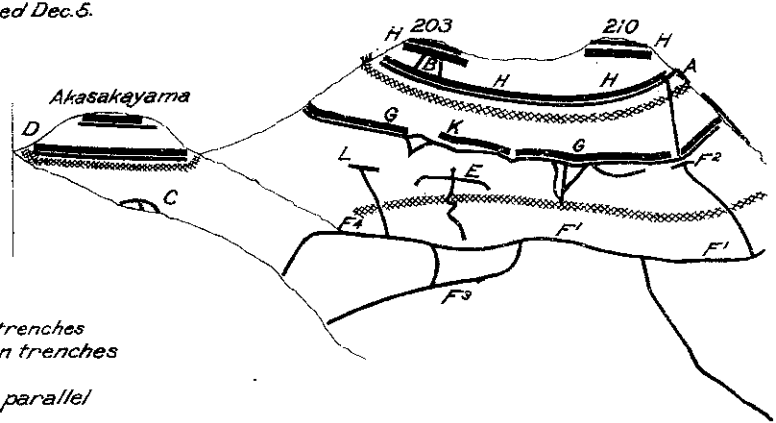
During the night of November 29–30 the Japanese again occupied heights 210 and 203 and also the Russian trenches in Akasakayama, but were unable to hold them. The fighting is reported to have been hand to hand and the losses severe on both sides.

At noon on November 30 some 50 Russians attempted to dislodge the Japanese from their sand-bag inclosure, C, on Akasakayama. Fierce hand-to-hand fighting resulted and the Russians were driven back with the loss of at least three-fourths their number. At 1.30 p. m. the Japanese infantry began to assemble in the lower trenches, FF, and by 2.15 p. m. three battalions had collected, of which one battalion was in reserve slightly in rear. These troops belonged to the newly arrived Seventh Division. At 2.30 p. m. an attack was commenced by two battalions from F^1 and F. After considerable delay at the wire entanglement the battalions eventually formed up under the foot of the hill and under cover on some dead ground in four lines of half battalions with 20 paces distance between the lines. The companies of each line were in close order in two ranks. This unwieldy mass advanced about 50 yards, when it was smitten on the left flank by rifle and machine-gun fire from the trenches. The whole column halted and, facing to the left, began a furious fusilade at the face of the hill. After five minutes or so of this a further advance was made as far as line HH, whence the leading half battalion pushed on up the slope toward 210. After about ten minutes it was driven back and carried with it nearly the whole remainder of the column, which went headlong down the hill until stopped by the reserve battalion at F^1. In a few minutes they rallied and reascended the hill, lying down in a dense crowd below H trench, which appears to have been partially evacuated by the Russians. At 4 p. m. a feeble demonstration was made against 203 height from the parallel L, which made no progress whatever. Night came on without any change in the situation. The Russian artillery took no part in this day's action, but the rifle and machine-gun fire was very heavy.

During the night of November 30–December 1 the Japanese again occupied the Russian trenches at Akasakayama, but were again driven out. An approach was also made up the southwest corner of 210 (A in sketch) and the head covered by a strong breastwork of sand bags. Two approaches were also made up the left side toward 203 (B in sketch). It is evident that the Russians must have evacu-

Sketch of 203 Meter Hill from 174 Meter Hill.

Legend.
A–Sandbag breastwork to cover head of approach made night Nov. 30–Dec. 1.
B–Approaches made Nov. 30–Dec. 1.
C–Japanese sandbag enclosure
D–Russian trenches
E–Japanese advanced parallel from which attacked Dec. 6.



F–Japanese trenches
G & H–Russian trenches
K–Quarry
L–Japanese parallel

Joseph E. Kuhn,
Major of Engineers.

PLATE XII

ated the lower trench, H, at this time, but were still holding on to the two summits.

December 2–4.—The situation remained unchanged. A partial armistice was agreed to on the 2d between 10 a. m. and 4 p. m. in front of the Eleventh Division to permit of the burial of the dead.

December 5.—The Japanese renewed their assault and by 11 a. m. were in possession of height 210, which was attacked from the sand-bag breastwork at A. The first attack on the height 203 was driven back and a portion of trench H, immediately below the height, reoccupied by a small party of Russians. Meanwhile the Japanese artillery kept playing on height 203 and the ridge between 203 and 210, but more particularly on the reverse slopes of the position. At Akasakayama the Russians continued to hold their ground. The Japanese had constructed an excellent advanced parallel, E, to enable troops to assemble for attack. By 1.30 p. m. this parallel and the approaches leading to it were filled with infantry with fixed bayonet. At 1.45 p. m. one company trickled over by two and threes, re-formed under cover at the foot of the hill and lay down at G trench.

In a few minutes this company advanced in extended order and worked its way up to height 203, seemingly with little loss. The few Russians in H trench had withdrawn before this advance. Reenforcements from E were constantly sent forward company by company, each re-formed under cover and then advanced to the summit. By 2.30 p. m. the whole crest line from height 203 to 210 was occupied by one battalion. The men could be seen throwing stones and grenades at the Russians on the other side of the hill. During all this time the reverse slopes of the hill were continuously swept by the fire of 36 field guns, 18 firing shrapnel at 3,300 yards, and 18 high explosive shell at 6,000 yards. Owing to the very effective fire of these guns, the Russians were unable to bring up reenforcements, though they twice attempted to do so. By 4.30 p. m. firing had practically ceased and the whole of the bitterly contested hill remained in the possession of the Japanese. With the capture of the 203 Meter position Akasakayama became untenable, as well as the whole of Long Ridge, and both were abandoned by the Russians.

An eyewitness to the two assaults of November 30 and December 5 draws a sharp contrast between the dense and unwieldy formation adopted in the first attack and the skillful method employed in the final assault. That the Japanese suffered needless losses from their formation on the 28th of November seems unquestionable.

The 203-Meter Hill position was important to the Japanese for the reason that from it an unobstructed view of the harbor and new town was possible. The crest line of the position is only 225 yards long, and it seems almost incomprehensible that the position should for so long have resisted the persistent and desperate assaults of the Japanese. Its strength lay in its steep slopes and in the covered trenches constructed by the Russians. The trenches were bombproof against field artillery, having a heavily framed roof of plate iron and timber balk covered with 3 to 4 feet of earth. Machine guns and rifles were fired through ports and loopholes, so that the defenders were practically unassailable. It was not until after the blinded construction of the trenches had been severely battered by the 28-cm. howitzers and heavy siege artillery that an infantry assault stood any chance of success. The commanding position of the defense also enabled grenades to be used most effectively, and they were employed with deadly results. Under the cover of the hill the Russians were able to bring up reenforcements to the firing line without loss, and this fact was mainly responsible for the failure of the earlier assaults. The effective fire of the Japanese artillery on the reverse slopes during the final assault prevented reenforcements from arriving and proved a large factor in the final success. The total Japanese losses in the series of assaults from November 26 to December 5 are admitted by the headquarters staff to have been 15,000, of which more than half occurred at 203-Meter Hill. General Oseko, commanding the Seventh Division, told me personally that his division had lost 6,000 men in the assaults, a fearful baptism of fire for troops who had landed only several weeks before. The numerous graves and monuments to the dead in the vicinity bear mute testimony to the fierceness of the struggle.

December 6.—The Japanese brought up two 12-cm. (4.7-

inch) naval guns in the neck between Akasakayama and 203-Meter Hill, with which they commenced bombarding the new town and ships.

December 7–18.—The work of mining the parapets of North Tungchikuanshan, Erhlungshan, and Sungshushan progressed steadily. From the observatory on 203-Meter Hill the fire of the 28-cm. howitzers was directed with good results against the ships, many hits being obtained. These ships were observed to settle on the bottom, one after the other, save only the *Sevastopol*, which steamed out of the harbor and took shelter under the highest ridge of Tiger's Tail Peninsula. This placed her out of the range of the 28-cm. howitzers, but the two 12-cm. naval guns at 203-Meter Hill fired at her indirectly and secured a number of hits, the fire being controlled from an observation station on the coast on the extreme left of the Eleventh Division.

The first two 12-cm. naval guns mounted at 203-Meter Hill were soon knocked out by the fire of the Russian guns in the southern sector of forts, chiefly the Taiyangkou forts, whose armament had suffered little damage from the bombardment up to this time. They were, however, replaced by two others mounted behind sand-bag parapets 30 feet thick, firing through narrow embrasures so directed as to make the guns safe from the fire of the forts. The Japanese also commenced the work of mounting two 28-cm. howitzers in the valley immediately behind 203-Meter Hill.

December 18.—The parapet of North Tungchikuanshan was blown up and the work assaulted at 10 a. m. After a somewhat protracted and uncertain struggle the work was fully occupied at 11.30 p. m. It cost the Japanese about 400 casualties and was the first permanent work to fall into their hands. For some time the energy of the defense had been perceptibly slackening, and it was beginning to be apparent that the end was not far distant. Through some deserters it was learned that General Kondratchenko, his chief engineer, Colonel Rashevski, and staff had been killed on December 3 by a 28-cm. shell which had landed in the uncovered casemate of North Tungchikuanshan, where the general and his staff had gathered to discuss ways and means of defense. The death of this officer proved a serious blow to

the Russians, as he was characterized by his energy and resourcefulness and had been largely responsible for all previous defensive measures.

December 19–27.—Mining and systematic bombardment continued.

December 28.—The parapet of Erhlungshan blown up at 10 a. m., five mines being simultaneously sprung. The explosion was tremendous and completely hid the fort from view for a few moments. When the smoke had cleared sufficiently the exterior slope at the salient of the fort was seen to be filled with a dense crowd of Japanese infantry, who closely hugged the ground. Simultaneously with the explosion every available piece of Japanese artillery broke forth in a fierce bombardment. The fire of the 28-cm. howitzers and heavy siege guns was directed mainly against the interior and supporting works, while the field artillery shelled Erhlungshan and Sungshushan. The air was so full of bursting shrapnel, high-explosive shells, and the dust created by them that at times the fort was almost lost to sight. The Russian artillery did not reply for a few moments, but gradually its volume of fire increased, and soon its shrapnel was searching the approaches and parallels in front of Erhlungshan, while its howitzers and heavy artillery fired at the most exposed of the Japanese siege batteries. Sheltered more or less in the mine crater, the Japanese troops clung to their position, making, apparently, no attempt to enter the fort itself. It appears that the Russians had occupied the heavy gun line which lies in the interior of the fort and with machine guns raked the front parapet and thus made it impossible for the Japanese infantry to leave their cover on the exterior slope. Meanwhile, the Japanese brought up three machine guns and with these replied to the Russian fire from the heavy gun line. Several mountain guns had also been brought up in the advanced parallels and saps and did good execution in keeping down the fire from Sungshushan. These mountain guns were set up in casemates made of sand bags, with overhead cover of steel rails, timber, and earth.

The bombardment kept up without diminution until about 1 p. m., when it slackened perceptibly on both sides. The Japanese bomb guns could be seen at work in the advanced

trenches, from where they threw grenades into the interior of the fort. This condition of affairs remained unchanged until about 4.15 p. m., when the Japanese infantry could be seen working along the flanks of the work on the outside of the parapet. By this movement they eventually turned the Russians behind the heavy gun line and secured possession of the front part of the work. The Russians retired to the gorge parapet, which had been arranged for fire to the front, and maintained themselves for several hours longer. By 7.30 p. m. the Japanese had fully mastered the position and the largest and strongest of the permanent works on the front of attack fell into their possession. The attack was made by the Eighteenth Brigade, Ninth Division, two battalions, one from each regiment, being in front line. A large number of field and machine guns were included in the spoils at Erhlungshan. The assault entailed a loss of about 1,000 men to the Japanese.

December 29–30.—The Russian outposts in the vicinity of Pigeon Bay pressed back by a steady advance of the right wing of the Seventh Division. Large conflagration observed in direction of Port Arthur the night of December 28–29.

December 31.—At 10 a. m. to the minute the Japanese fired their mines under the parapet of Sungshushan. A tremendous cloud of smoke and dust temporarily obscured the fort. The explosion was the signal for the general bombardment which followed instantly, nearly all the Japanese guns firing simultaneously, so that the first discharge almost resembled a volley. The fire of the guns was most systematic, each battery having its designated target, the whole being controlled by the chief of the siege artillery from his observatory on Artillery Hill. When the smoke of the explosion had cleared away sufficiently a large-sized crater filled with Japanese infantry could be seen at the salient of the fort. Individuals and parties of two and three could be seen disappearing over the tip of the crater into the interior of the work. Seven minutes after the first explosion a second one occurred in the interior of the fort. When the smoke cleared away the Japanese infantry were still seen filling the crater and sending men over. The Russian artillery did not open for thirty minutes after the first explosion, when the guns in Antzushan, Itzushan, and

the mortars on Golden Hill commenced firing. The Japanese field guns vigorously shelled the Sungshushan annexed batteries, and their shrapnel raked the parapets continuously. The Japanese artillery fired in full force until about 11 p. m., at which time a small white flag was hoisted in the interior of the fort.

Subsequent developments showed that what happened was as follows: When the Japanese fired their mine the gallery which runs from the gorge to the counterscarp gallery at the salient was demolished. The flame and gases of the explosion rushed along this communicating gallery and reached the Russian magazine, which connects with it, carrying fire into the latter and causing the second explosion. This buried about half of the defenders and cut off their retreat from the parade to the gorge. Overwhelmed by the explosion and escape cut off, the survivors of the garrison had hoisted the white flag and surrendered. The whole affair was over in an hour and cost the Japanese only 133 casualties. The entire Russian garrison of 300 was either killed or captured, 3 officers and 156 men being taken prisoners. The Russian artillery kept on firing, but rather feebly, until about 2.45 p. m., using mortars and howitzers from Golden Hill and from west of Cathedral Hill. The heavy shells from these guns landed on the slopes in front of Erhlungshan and Sungshushan, creating spectacular explosions but doing no damage. After the capture of the fort the Japanese slackened their artillery fire gradually, and practically ceased firing by 3 p. m. With the fall of Sungshushan the entire line of detached forts from this point to North Tungchikuanshan had fallen into the possession of the Japanese. Three field pieces and two machine guns were among the trophies taken in Sungshushan. A noteworthy feature of the assaults on Erhlungshan and Sungshushan was the fact that they were not heralded by a preliminary bombardment, as was the case in the earlier assaults. On the latter occasions the firing of the mines was the signal for both assault and bombardment, and the Russians had no time to adopt special defensive measures.

January 1, 1905.—More or less firing heard during the early morning hours, continuing until noon. Although no

attack had been scheduled for this day, the prolonged firing led certain of the attachés to investigate from the nearest view point, when it was discovered that the Japanese had penetrated the Chinese wall and were assaulting the inner heights. Pushing on into the valley it soon became apparent that ridges Ro and H were already occupied by the Japanese who could be seen behind the sand-bag parapets firing at the Russians, who had fallen back to their inner lines. An attack on the Wangtai fort was in progress at 1.30 p. m., at which time its northern slopes were filled with Japanese infantry, while the Japanese artillery was vigorously shelling the summit. The entire Chinese wall from Erhlungshan to North Tungchikuanshan was also in possession of the Japanese.

It appears that a reconnoissance made at the instance of General Ichinohe, commanding the Sixth Brigade, Ninth Division, developed that the Chinese wall was lightly held. He attacked immediately from the Panlungshan forts and carried the wall in his front as well as ridges Ro and H, which were fully occupied by 7.30 a. m.

At 2 p. m. about one battalion of Japanese troops were hugging the lower half of the slopes of Wangtai on the north face, while a detachment of 50 was about three-fourths of the way up the slope on the northeast side. The troops were irregularly grouped over the face of the hill and lying down for cover. The Russian artillery was almost silent, only a few guns to the east of Wangtai answering the Japanese artillery, which was vigorously shelling the summit of the hill over the head of the infantry. Excellent practice was made, and so far as could be observed the Japanese troops suffered no casualties from their own artillery fire, although the foremost of them lay only about 100 feet below the summit.

At 5 p. m. the Japanese artillery ceased firing on Wangtai and turned its attention to the neighboring works, chiefly those to the east. The infantry, which had meanwhile been reenforced by about two companies from the Chinese wall, commenced to advance up the slope, not in any regular formation, but by groups of about one-half zug each. The leading group on the northeast slope soon crossed the Russian trench below the summit, showing that the latter must have

been evacuated, and continued on to the little redoubt which crowns the top of the hill. No Russian fire could be detected coming from the work. A leading group of about 25 men soon reached the top parapet, and 1 man was observed to look over cautiously into the redoubt. In a few moments this group commenced throwing into the fort hand grenades, which went off with loud reports, raising considerable smoke and dust. After about five minutes of grenade throwing some 10 Japanese jumped over the parapet into the redoubt, but in a few minutes several returned hastily. Almost immediately a tremendous explosion, resembling a mine, occurred inside the redoubt. The Russians had evidently fired their magazine. Immediately after the explosion a few Russian shells burst over the redoubt, and after a few minutes the Japanese on the outside of the parapet again commenced to enter the redoubt. Presently the Japanese flag was waved from the summit to indicate that the position had been taken. For some time after there was considerable artillery fire, the Russians shelling Wangtai and the Japanese firing against the Russian batteries. During the attack on Wangtai the Japanese machine guns on Ridge H fired heavily against the Russian interior lines.

The capture of Wangtai was made conjointly by troops of the Ninth and Eleventh Divisions, and the Japanese suffered little loss both here and in the capture of the Chinese wall and Ridge H and Ro, their aggregate casualties being about 300. Wangtai is an important point, as from it a good view is had of the old town and east harbor.

On the evening of the 1st a parlementaire bearing a white flag was seen to approach Shuishihying and to deliver a letter to the Japanese. This letter was from General Stoessel and proposed a discussion of terms for surrender.

January 2.—During the night of January 1–2 repeated heavy explosions were heard in the direction of the fortress and occasionally the rapid file fire of infantry. The Russians were mining their ships and blowing up East Tungchikuanshan. Under cover of the darkness and profiting by their successes of the previous day, the Eleventh Division occupied batteries R, M, N, O fort, and East Tungchikuanshan, the latter having been first blown up by the Russians on evacuation. At 10 a. m. a truce was declared for the purpose

of discussing terms of capitulation, and thereafter firing ceased, the first time in five months. By nightfall it was known that terms had been agreed upon, the news of which first reached the attachés through the joyful and noisy banzais of the victorious Japanese soldiers, whose usual reticence and imperturbability gave way to demonstration over their well-earned victory, purchased at such fearful sacrifices.

TERMS OF CAPITULATION.

ARTICLE I. The military and naval forces of Russia in the fortress and harbor of Port Arthur, as well as the volunteers and the officials, shall all become prisoners.

ART. II. The forts and fortifications of Port Arthur, the war ships and other craft, including torpedo craft, the arms, ammunition, the horses, all and every material for warlike use, shall be handed over as they are to the Japanese army.

ART. III. When the above two articles are agreed to, the following steps shall be taken by way of guaranty, namely, by noon on the 3d instant all garrisons shall be withdrawn from all fortifications at Itzushan, Ilsiaoantzushan, Taantzushan, and all the highlands on the southeast of these, and the said fortifications and forts shall be handed over to the Japanese army.

ART. IV. Should it be recognized that the Russian military or naval forces destroy or take any other steps to alter the condition of the things enumerated in Article II, and actually existing at the time of this agreement's signature, these negotiations shall be broken off and the Japanese army shall be free to adopt measures at its discretion.

ART. V. The officers of the Russian military and naval forces shall compile and hand to the Japanese army maps showing the arrangements of the defenses, the position of mines and torpedoes or other dangerous objects, as well as lists of the organization of the naval and military forces in Port Arthur, nominal rolls of the military and naval officers, their ranks or grades, similar rolls relating to the war ships, lists of ships of all descriptions and their crews, and tables of the noncombatants, male and female, their nationalities and their occupations.

ART. VI. The arms (including those in the hands of the forces), the ammunition and all material for war uses, except private property, shall be all left in their present positions. Rules relating to the handing over and receipt of those objects shall be arranged by commissions from the Russian and the Japanese armies.

ART. VII. The Japanese army, as an honor to the brave defense made by the Russian army, will allow the officers of the Russian military and naval forces and the officials attached to the said forces to retain their swords, together with all privately owned articles di-

rectly necessary for their daily existence. Further, with regard to the said officers, officials, and volunteers, such of them as solemnly pledge themselves in writing not to bear arms again until the close of the present war and not to perform any act of whatsoever kind detrimental to the interest of Japan, shall be permitted to return to their country, and one soldier shall be allowed to accompany each officer of the army and navy. These soldiers shall be required to give a similar pledge.

ART. VIII. The disarmed noncommissioned officers and men of the army and navy, as well as the volunteers, wearing their uniforms, carrying their tents and all privately owned necessaries of daily life, shall, under the command of their respective officers, assemble at places indicated by the Japanese army. The details of this arrangement will be shown by the commissioners of the Japanese army.

ART. IX. The officials of the sanitary and paymaster's departments of the Russian military and naval forces in Port Arthur shall remain and continue to discharge their duties under the control of the Japanese sanitary and paymaster's departments so long as the Japanese army deems it necessary for ministering and affording sustenance to the sick, the wounded, and the prisoners.

ART. X. Detailed regulations with reference to the management of the noncombatants, the administration of the town, the performance of financial duties, the transfer of documents relating to these matters, and with reference to the carrying out of the agreement in other respects shall be entered in an appendix to this agreement. Such appendix shall have the force of the agreement itself.

ART. XI. Each of the contracting parties shall receive one copy of this agreement, and it shall become operative from the time of signature.

EVENTS SUBSEQUENT TO CAPITUATION.

Immediately after the capitulation the works on the front of attack from East Tungchikuanshan to Sungshushan were thrown open for inspection, but permission to enter the town was withheld until the formal entry, which was planned to take place January 13, the only persons allowed to enter the town in the meantime being the medical corps of the Japanese and the various commissioners appointed for the purpose of inventorying and taking over prisoners and property. Several Japanese field hospitals were met on the 3d en route to Port Arthur to render assistance to the Russian sick and wounded, of whom there were 16,000 in hospital.

The Japanese at once commenced the work of disarming their siege batteries and removing the surplus ammunition. By the end of a week all the siege artillery save the 28-cm. howitzers had been parked in the vicinity of army head-

quarters and the artillery depot in close proximity to the railroad.

The work of clearing the field and of burying the dead was also commenced at once, and for a week after the capitulation funeral fires could be seen burning at a number of points. Many of the Japanese dead had lain since the August assaults where they had fallen on the slopes of the Panlungshan forts and inside the Chinese wall on the slopes of Wangtai and Ridge H. The weather was unseasonably warm and the stench at times fearful. Many dead Japanese and Russians also lay scattered about on the glacis of North Tungchikuanshan, Erhlungshan, and Sungshushan, while the ditches of these works were filled with mangled fragments of human remains, showing the fearful effects of grenades and high-explosive shells. At a number of points along the saps of Erhlungshan and Sungshushan dead Russians were found buried in the parapets.

On the 6th of January the work of mustering the Russian prisoners had been completed, and the first detachment of some 4,000 marched from their rendezvous at a village in front of the Seventh Division to the Changling railroad station, where they entrained for Japan. Their route took them past Tsochiatien, where the attachés were quartered, and afforded an opportunity for observing them. Much was said and written regarding the straits to which the garrison had been reduced at the time of capitulation. Certainly the appearance of those who marched out as prisoners belied these stories, for both men and officers looked to be in good condition, both as regards their physical appearance and clothing. The officers looked especially dapper and well fed and showed no traces of privation or suffering. The evacuation of the prisoners was effected with great dispatch, the last contingent marching out on the 11th.

On the authority of the headquarters staff of the Third Army the number of Russian prisoners sent to Japan numbered 878 officers and 23,491 rank and file. Besides these there were 441 officers who accepted parole, and these were allowed to take with them 229 men in the capacity of servants and orderlies, making the total number of those who marched out 25,040, of whom some 4,000 were officers and seamen from the Russian fleet.

The following Russian officers of high rank refused parole: Lieutenant-General Smirnov, chief of fortifications; Lieutenant-General Fock, commanding Fourth Division; Major-General Nikishin, Major-General Beli, Major-General Goshattonski, Major-General Ilmann.

The following higher officers accepted parole: General Stoessel, governor of Port Arthur; Major-General Reiss, chief of staff; Major-General Nadane; Major-General Kostenko; Admiral Ukhtomski; Admiral Gregorovich; Admiral Rostenski; Chief Engineer Ryndenbeck, ranking as admiral.

The number of prisoners who marched out was a matter of considerable surprise to everyone, no less to the Japanese, who had several times reported the number of effectives at the end of the siege to be not more than 7,000. In conversation with General Idichi, General Nogi's chief of staff, on January 3, he stated, in reply to my question, that the number of Russian effectives at the time of surrender was under 5,000. Some time in February, when General Idichi was serving as governor of Port Arthur, I took occasion to bring this matter to his attention and was informed that the number of prisoners mustered proved a surprise. His statement of January 3 was based on the statement made to him by General Reiss while discussing the capitulation at Shuishihying. As a matter of fact, there is evidence to show that the Russian leaders had lost all control of the direction of affairs and were themselves ignorant of the strength of their own forces. Questioned as to this subject, a highly intelligent manager of a large business house in Port Arthur informed me later that the military authorities had for some weeks prior to the capitulation given out the information that their force of effectives did not exceed 7,000 or 8,000. It seems incomprehensible that the Russians were ignorant of their own numbers or that their military organization had so deteriorated that no returns of the troops were rendered. Either this must have been the case or else the Russian leaders were seeking to justify their capitulation. It was quite easy to understand how, without stated returns, it would be possible to lose track of the strength of the defenders, who were scattered along a defensive front of some 16 miles, living in dugouts and bombproofs in the hills.

On the 13th of January General Nogi made his formal entry into the captured city. This took the form of a review and well merits a brief reference. The troops designated to march in the review assembled along the highway into Port Arthur between Shuishihying and Quail Hill, at which latter the head of the column rested. Each regiment of infantry furnished a company of 200 and each division a section of cavalry, a battery of artillery, sections from the engineers, train, and sanitary detachments. At 10.30 a. m. the column moved off headed by the only band in the army, and followed by General Nogi and staff, to which the attachés were attached for the occasion. The route of march lay along the north slope of Quail Hill, through the old town, along the harbor front, into the new town, where General Nogi and staff halted in front of a park while the troops passed in review, first those of the First Division, next the Seventh, then the Ninth and Eleventh, followed by the Naval Brigade and the two Kobi brigades. The troops wore their brown winter overcoats, which proved rather warm and heavy for the mild and sunny days. In the old town the various Chinese dignitaries and officials were drawn up in line, bowing and waving Japanese flags as the column passed by. The marching and appearance of the troops were good considering the hard fieldwork they had been undergoing for five months and that many of them were old reserves and young conscripts. The march past occupied more than two hours, after which General Nogi and staff, with his division and brigade commanders and the attachés, repaired to the house formerly occupied by Lieutenant-General Smirnov and partook of a luncheon, thus terminating a most interesting day.

The Russian population in evidence at the time of the entrance was much larger than anticipated. They all looked well fed and dressed, and included a number of women and children. None showed the slightest signs of distress, and large numbers were interested spectators of the review.

Quite a number of the Russian civil population was encountered coming out of Port Arthur, many in carriages and wagons, carrying their personal effects. Among them were a number of women and children. Nearly every building of any size, both in the old and new town, floated the

Red Cross flag, and large numbers of patients could be seen peering from doors and windows at the unwonted spectacle of a triumphant army entering their town. Along the water front, at the foot of Quail Hill, lay the remains of the once magnificent Russian fleet, the ships tilted at all angles, some with decks awash and the muzzles of their turret guns under water, their upper works riddled and torn by shot and shell, a pitiful picture of wreck and ruin.

From outward appearances the buildings did not appear to have suffered extensively. Only along the water front of the old town a number of buildings were seen that were badly wrecked or destroyed by fire. This was no doubt caused by the 28-cm. shells while firing at the ships. At other points it required a rather close inspection to reveal shot marks, although most buildings of importance had been struck a number of times. In connection with the subject of the bombardment of the town it should be mentioned that under date of December 14 General Stoessel addressed a letter to General Nogi charging that the Japanese were firing upon buildings distinctly marked by the Red Cross flag, and on the 16th sent General Balashov, chief of the Russian Red Cross in Port Arthur, as a parlementaire to further discuss this subject at Shuishihying. The Russians charged that the Japanese were directing their fire intentionally against the hospital buildings. The Japanese denied this charge and stated that if hospitals were occasionally struck it was because of their inability to control the deviation of their heavy ordnance, which was becoming somewhat irregular due to erosion. Considerable correspondence passed on the subject, being terminated on the 22d by the Japanese, who agreed that they would under no circumstances fire upon a hospital building intentionally unless they learned that such building was being put to improper use.

That hospital buildings were frequently struck is beyond question, but that they were fired at intentionally by the Japanese is far from being proved. In the first place, it should be remembered that the Russian hospitals were scattered pretty generally through the new and old towns, in close proximity to barracks, storehouses, and administration buildings, which were legitimate targets for the Japanese artil-

lery. Under such circumstances it can hardly be wondered at that hospitals were frequently struck. Speaking of this matter, a merchant admitted that the Russians were at fault for not having segregated their hospitals in some definite quarters. Regarding the effect of the Japanese bombardment upon the civil population, it appears from the best information obtainable that about 250 casualties occurred. The bulk of the population continued to reside in the city until the end of the siege, save only a few women and children who were removed to Chinese villages at Laotiehshan after the occupation of 203-Meter Hill and the establishment of the Japanese siege batteries at this point. Up to this time the new town had suffered but little from the bombardment of the land batteries.

On the 14th of January the Japanese conducted a general memorial service, which was most simple and impressive. On a low knoll to the northeast of Shuishihying an altar or shrine, consisting of a plain unpainted pine shaft or post about 10 inches square, set in a pedestal of sand bags, had been erected. Before this shaft was a rough board table covered with unbleached cotton cloth containing offerings of fish, rice, and cakes. An approach some 10 feet wide and 20 feet long, flanked on each side by heavy shell picked up in the vicinity, completed the arrangements. Representative units from all the organizations of the Japanese army were drawn up in an immense hollow square around the shrine. At 10.30 a. m. General Nogi and his chief of staff reverently approached the shrine, and, after executing a military salute, General Nogi picked up a roll of writing from the table and in a clear, distinct voice read out what I presumed to be an invocation to the spirits of the soldiers who had fallen in the siege. While the reading was in progress a line of priests on either side of the approach chanted a prayer or ritual in unison. After completing his address General Nogi again saluted and then retired. At this moment a shifting cloud of damp and chilly fog which had hung about the hills since morning lifted, and the sun broke forth from a clear sky. Following General Nogi his division and brigade commanders and then the attachés singly and in turn approached the shrine and saluted. The troops, without arms, were then

marched up by detachments under their noncommissioned officers and halted before the shrine, the senior noncommissioned officer advancing and saluting, after which he marched off his detachment, which was promptly followed by another. The entire ceremony was most affecting and impressive. After the termination of the service the officers of the army, to the number of some 1,800, assembled in an inclosure on the outskirts of Shuishihying and devoted the remainder of the day to feasting and merrymaking.

In the first weeks following the surrender the Japanese troops busied themselves in erecting monuments to their dead, and soon many of these simple affairs could be seen at many points on the hill tops or points where fierce fighting had occurred. Each division erected a divisional monument, some of which were rather elaborate. Besides the divisional monuments, there were many regimental and battery monuments marking the graves of the dead or the scene of conflicts.

The movement of the troops of General Nogi's army to the north commenced about the middle of January, after which time battalions and regiments in full marching order could be seen daily moving off to join the armies on the Shaho. By the end of the month practically the entire army had moved off, with all its trains and artillery, leaving only some fortress artillery and one Kobi brigade as a garrison at Port Arthur. During the middle of February the Kobi brigade also departed for the north.

On January 24 the headquarters left for Liaoyang, followed on the 30th by three attachés. Special permission was accorded to Capt. Sir Alexander Bannerman, R. E., and myself to remain at Port Arthur until February 15, subsequently extended to March 1, to enable us to continue our work of studying the Russian works of defense, which we prosecuted unremittingly. We were assigned quarters in the new town in a small house, which had evidently been used as official quarters by Russians, and moved in from Tsochiatien on January 31. Armed with a permit from General Idichi, who had been appointed governor of Port Arthur, we were enabled to visit all the Russian forts and trenches, including the seacoast forts.

DESCRIPTION OF THE RUSSIAN DEFENSES.

In what follows it is proposed to describe in some detail the principal features of the Russian defenses, commencing with the right flank of the land defenses, as shown on Plate XXXVII, and following the line until the circuit is completed.

The right flank of the Russian land line rested on the sea at a point more than 2½ miles east from the harbor entrance. From the sea a strong trench runs along rising ground to a low knoll upon which is located the southeast redoubt (Pl. XIII). This trench is revetted with sand bags and stone and provided with splinterproof overhead cover of the type generally employed by the Russians. In front of this trench lies a single line of wire entanglement. This work is an excellent specimen of a field redoubt, built wholly of timber and earth. Its artillery armament consists of four 47-mm. rapid-fire guns on naval mounts in blinded emplacements. The work is amply provided with bombproofs, quarters, and magazines. The construction of the work is sufficiently explained by the drawings. It was not attacked and was quite intact.

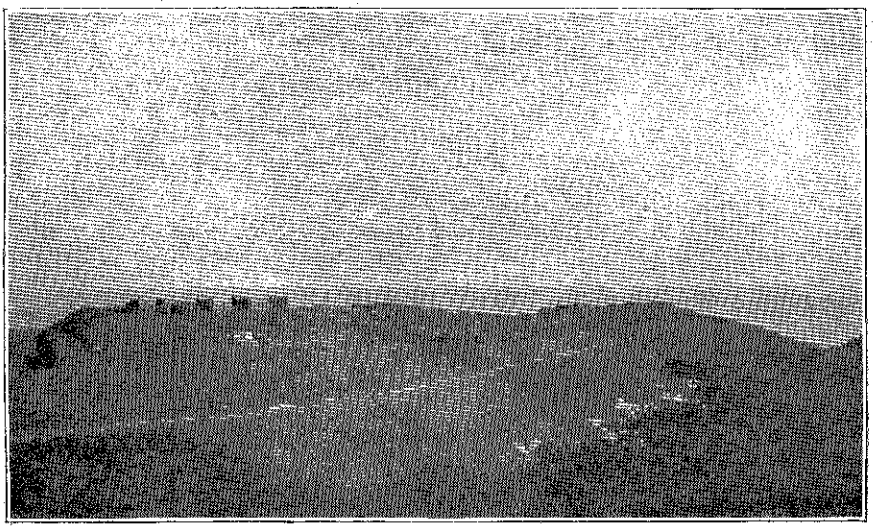
From the southeast redoubt a trench runs northwest to connect with the Paiyinshan old fort, as shown. The wire entanglement in front of this trench is doubled and at 12 are two 47-mm. rapid-fire naval guns. To avoid confusion and repetition it may be here stated that Plate XXXVII affords a complete and accurate representation of the several lines of trenches and batteries, both inner and outer. By reference to the corresponding numbers on the armament sheet appended to Plate XXXVII, the equipment of the different batteries may readily be obtained.

The Paiyinshan old fort (Pl. XIV) is a wide, shallow fort, with a frontage of about 850 feet. The work contains a masonry battery for four 15-cm. siege guns mounted on center-pintle garrison carriages at the left end of the fort, while two 5-barreled revolving cannon are mounted on the front parapet at the right end. The front and flank ditches are swept by two counterscarp galleries at the salients. These galleries could not be entered owing to Russian mines in the ditches not yet removed at the time of inspection. The gorge ditch is flanked by an open timber

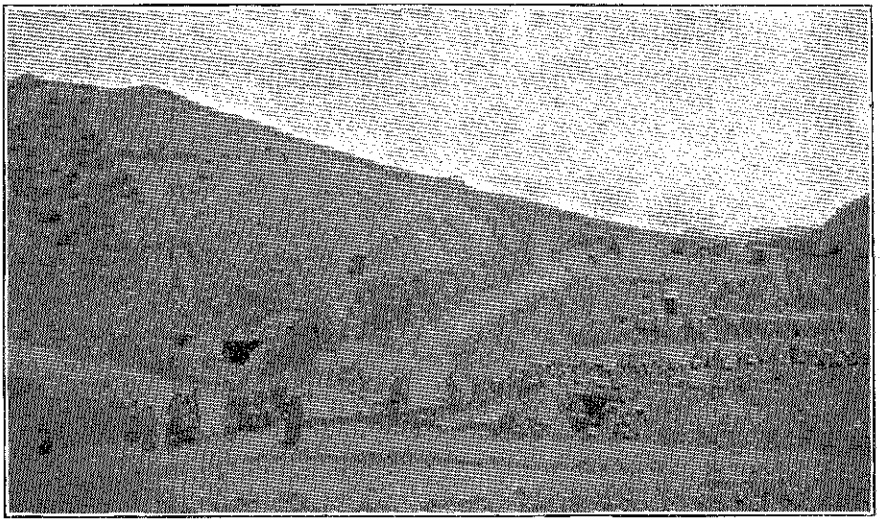
caponier entered by a descending gallery from the terreplein. The masonry quarters are located about the middle of the front of the fort on a series of levels to suit the natural configuration of the ground. The entrances to the quarters are protected against splinters by concrete porte-cochères. The parapets on the gorge and flanks are revetted with empty cement barrels, while those of the front have stone and sand-bag revetments. The ditches of the work are cut from the natural rock, and are of varying depths from 12 to 25 feet. The thickness of the infantry parapet at the top is very small, not over 3 feet. The magazine on the right side is of concrete, with floor about 3 feet below the terreplein. Except for a temporary sand-bag mass on the left side the magazine was uncovered. The magazine on the left side is merely sunk in the rock and covered over so as to render it bombproof. The fort contains two electric plants, one in the magazine on the right and the other sunk close to the parapet of the left flank. The former consists of a direct-coupled unit and horizontal boiler and the latter of a very small belt unit, the boiler and engine coming from a portable outfit. The fort is entered from the gorge by a wooden bridge across the ditch and ramp up the exterior slope of the parapet. This fort was beyond the sphere of the Japanese operations, and bore no evidences of having been bombarded.

On the hill next to the left is a group of trenches which were designated as the Paiyinshan new fort, although there is no fort. These trenches are all very strong, with overhead splinter-proof cover. The line of wire entanglement runs continuously along the entire front, doubled and tripled in places, as shown in the plate. Back of the Paiyinshan forts on higher ground are trenches and batteries constituting a second line of defense. Among the batteries is one containing two 15-cm. naval guns, numbered 15 on Plate XXXVII.

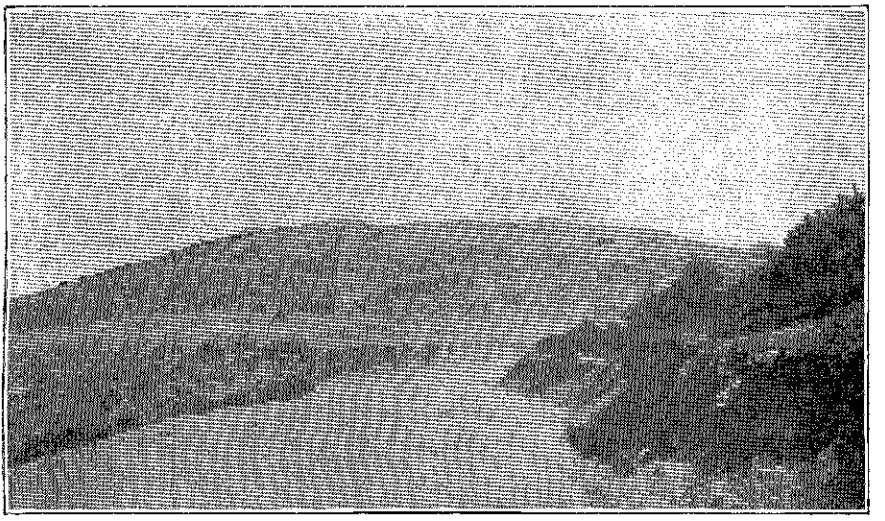
Next to the left from the Paiyinshan new fort comes the Paiyinshan north fort (Pl. XV), or rather battery, which is of concrete, for six 15-cm. siege guns, on front pintle garrison carriage, of which but three guns were in position. One emplacement contained a damaged carriage, and a burst gun lay in rear of the battery. Close behind the battery there had been an electric plant housed in a wooden structure



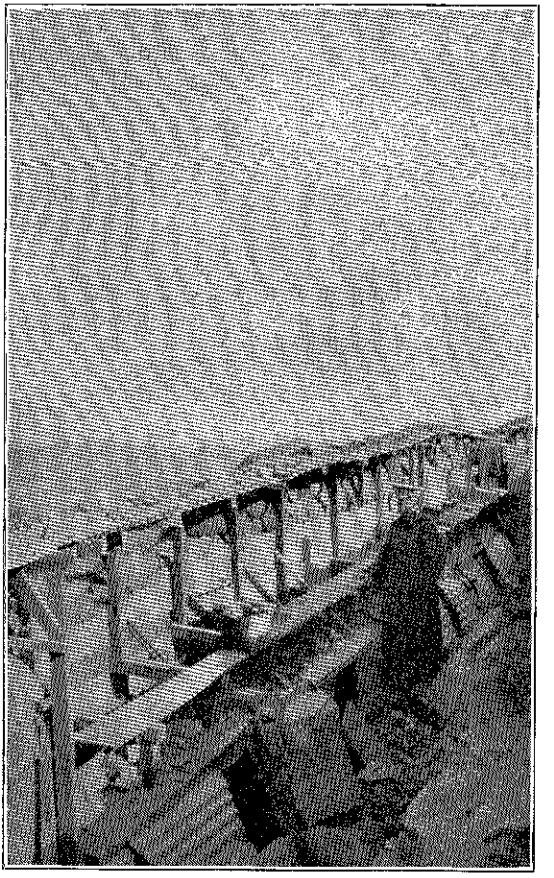
47. PAIYINSHAN, OLD FORT, VIEWED FROM REAR.



48. TUNGCHIKUANSHAN (COCKSCOMB HEIGHT), SOUTHEAST FORT, VIEWED FROM INSIDE CHINESE WALL, SHOWING WALL, RUSSIAN BOMBPROOFS, AND CHINESE PACK TRAIN.



49. TUNGCHIKUANSHAN, SOUTHEAST FORT, VIEWED FROM REAR.



50. ADVANCED TRENCH, EAST TUNGCHIKUANSHAN FORT.

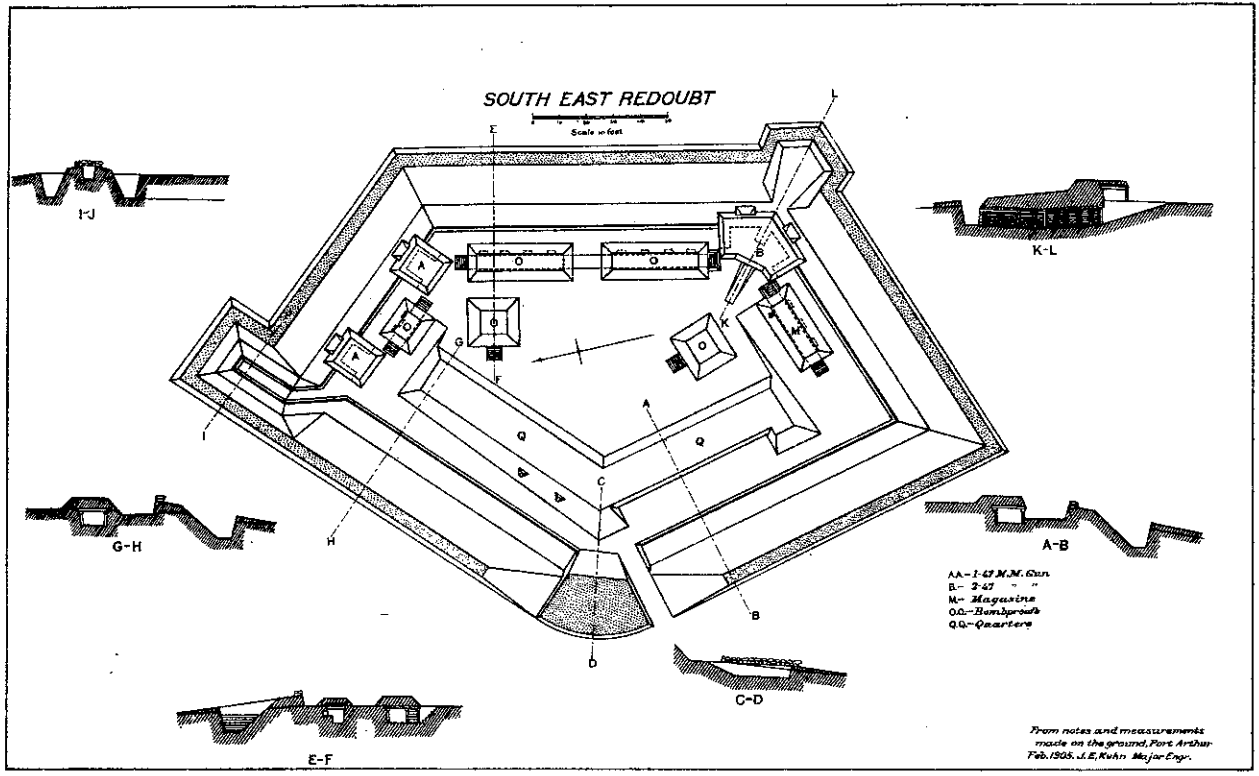

SOUTH EAST REDOUBT
Scale in feet
I-J
K-L
G-H
A-B
E-F
C-D
AA.- 1-47 M.M. Gun
B.- 2-47 " "
M.- Magazine
O.O.- Bombproofs
Q.Q.- Quarters
From notes and measurements made on the ground, Port Arthur Feb. 1905. J.E. Kuhn Major Engr.

PLATE XIII

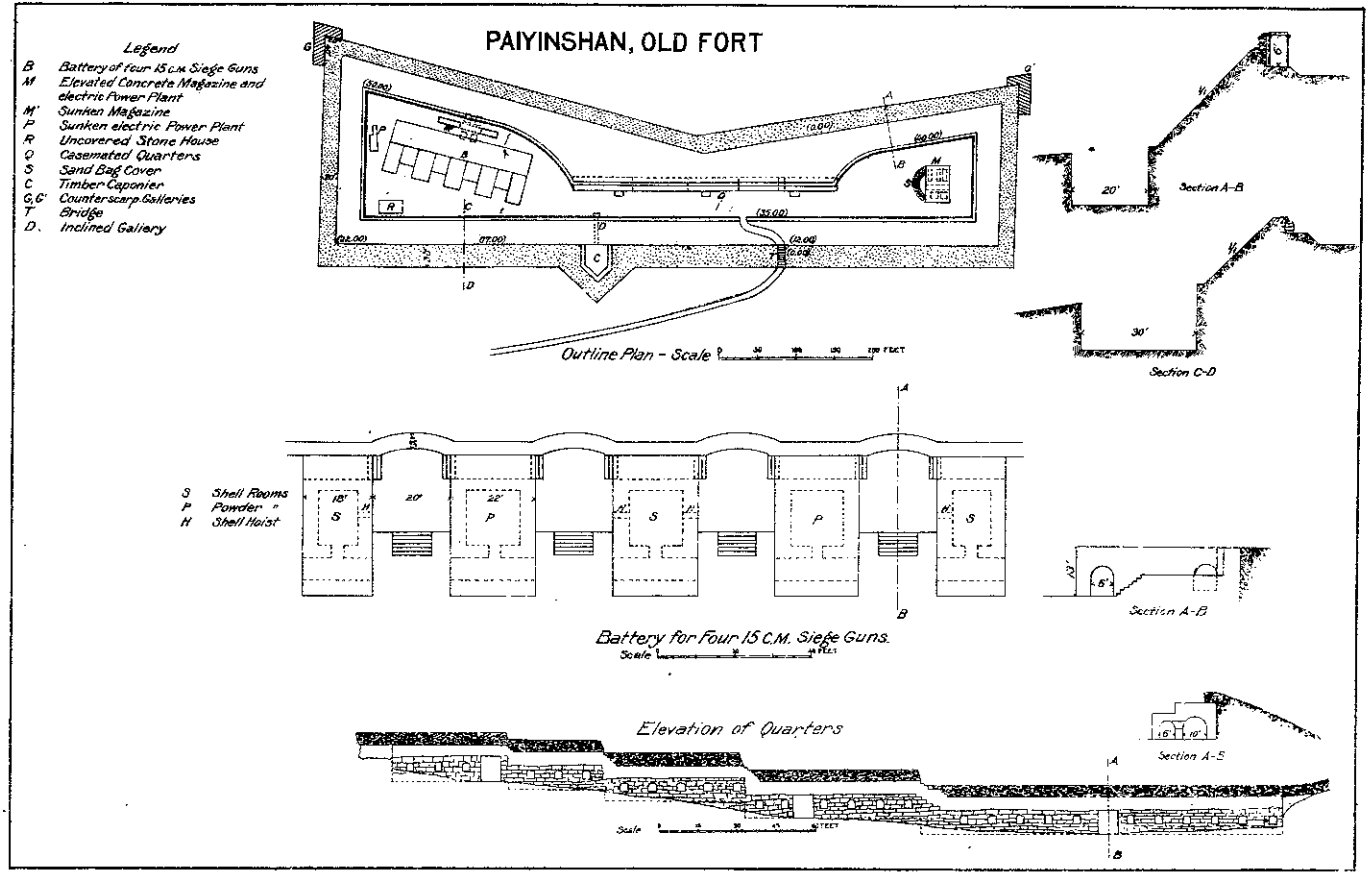

PAIYINSHAN, OLD FORT
Legend
B Battery of four 15 C.M. Siege Guns
M Elevated Concrete Magazine and electric Power Plant
M' Sunken Magazine
P Sunken electric Power Plant
R Uncovered Stone House
Q Casemated Quarters
S Sand Bag Cover
C Timber Caponier
G,G' Counterscarp Galleries
T Bridge
D Inclined Gallery
Outline Plan - Scale
Section A-B
Section C-D
S Shell Rooms
P Powder "
H Shell Hoist
Battery for Four 15 C.M. Siege Guns.
Scale
Section A-B
Elevation of Quarters
Section A-B
Scale

PLATE XIV

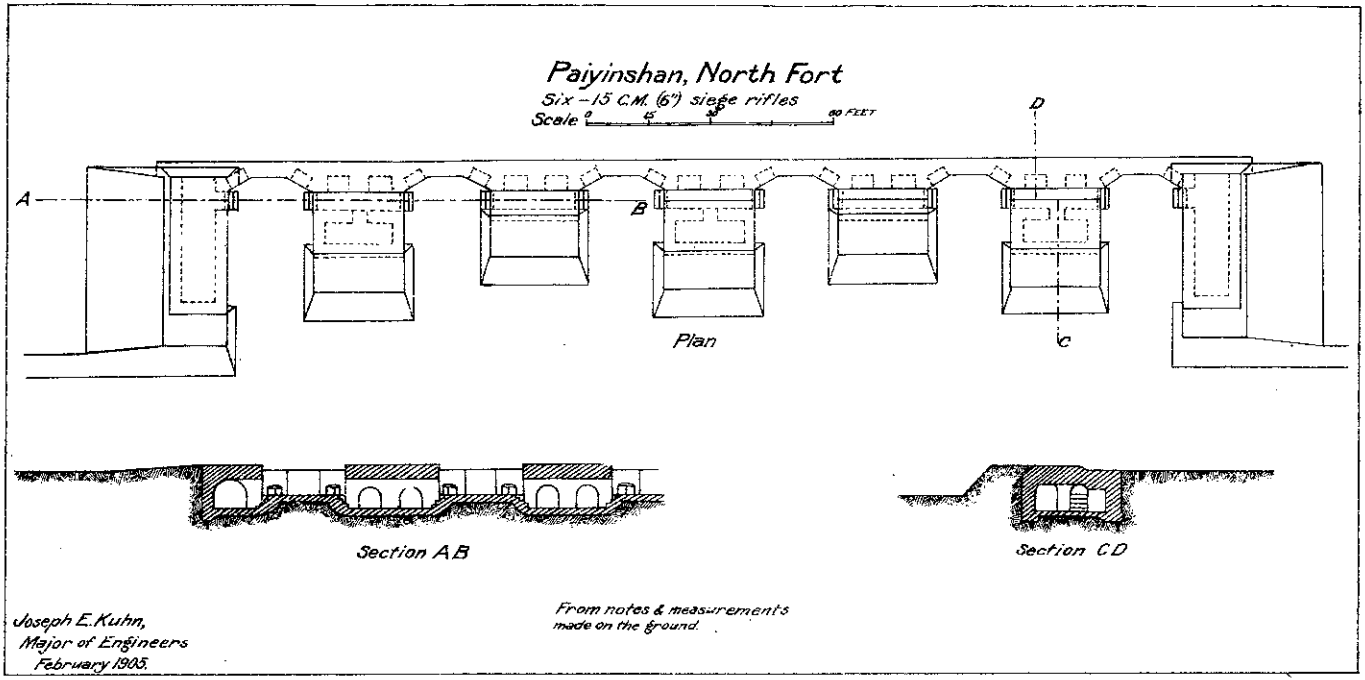

Paiyinshan, North Fort
Six – 15 C.M. (6") siege rifles
Scale 0 40 FEET
A
B
C
D
Plan
Section AB
Section CD
Joseph E. Kuhn,
Major of Engineers
February 1905.
From notes & measurements
made on the ground.

PLATE XV

which had been set on fire and destroyed. Outside the concrete battery and to the left were a 15-cm. and a 10.5-cm. siege rifle on wheeled mounts. The Paiyinshan north battery had come in for a fair share of the Japanese bombardment. Although the ground was more or less torn up and the concrete pitted and broken on corners and edges, none of the magazines or passages had been injured. As noted above, some of the armament had been placed hors de combat.

Behind the Paiyinshan north fort begins the Chinese wall, which runs continuously from this point to beyond Sungshushan.

Beyond the forts and works of the Paiyinshan district come those of the Tungchikuanshan district, sometimes called the Cockscomb forts. The first of these is known as Southeast Tungchikuanshan. This is merely an open battery with earth parapet revetted with stone or sand bags, occupying a considerable elevation, from which an effective flanking fire can be brought to bear on the remaining Tungchikuanshan forts farther west. This battery was an important factor in checking the Japanese assaults on these forts, and although the battery was severly bombarded throughout the siege and much of the armament knocked out, the Russians kept on mounting guns.

On the reverse slope of the hill were a number of excellent bombproofs strongly built and well sheltered, as shown in the photograph herewith.

Next on the left comes the strong concrete battery known as East Tungchikuanshan. This work appears to have had a rectangular trace and to have mounted either four or five 15-cm. siege guns on garrison mountings. The battery and armament had been totally destroyed by the Russians, who fired the work during the night of January 1–2. The battery was surrounded by the old Chinese wall which had been held by an infantry line. The main infantry defense, however, was made from a strong trench outside of and lower down from the Chinese wall. This trench was of great depth, as shown by photographic view. The trench was traversed with sand bags and plate iron set on edge between the sand bags, and was provided with overhead splinterproof cover. Beneath the banquette and in

the reverse slope were "cubby" holes in which the guards of the trenches slept. This trench was assaulted by the Japanese twice, once in October and again in November, on the latter occasion from an advanced parallel only 35 yards from the trench. The trench was carried in November but could not be held, owing to the flanking fire from southeast Tungchikuanshan, and on both occasions the Japanese suffered heavily. Hundreds of Japanese corpses lay between the trench and the advanced parallel, bearing mute but convincing evidence of the fierce fighting at this point. Both battery and trenches had been heavily pounded by Japanese artillery and the ground was all torn up by the shells.

Between east and west Tungchikuanshan is a small knoll, called by the Japanese Kobuyama, upon which the Russians had built a circular trench. This was assaulted in November, but without success. It fell into the possession of the Japanese with the fall of North Tungchikuanshan December 18. In rear of this knoll a branch of the Chinese wall runs down to North Tungchikuanshan, running forward around a knoll which was designated as Battery Q. The Chinese wall had been modified and strengthened so as to afford splinter and bombproof cover and a number of guns mounted along it. This constituted Battery Q.

Battery Q was assaulted both in October and November. On the latter occasion a party of Japanese reached the parapet and engaged the Russians hand to hand and were all annihilated.

On the left of Battery Q comes North Tungchikuanshan, a masonry fort with polygonal trace (Pl. XVI). The trace of the work is an irregular five-sided figure, a face, two flanks, and a broken gorge. A place of arms is built in rear of one of the gorge faces, while under the other gorge face are the casemated quarters. The ditches are flanked by counterscarp galleries at the front and right flank. These galleries are reached from the gorge by a gallery under the ditch. The ditches are cut from the natural rock with slopes of 3 : 2 for the counterscarp and somewhat less for the scarp. At intervals along the face and flanks there are splinter proofs, 12 feet long, 4 feet wide, and 5 feet high with their floor some 3 feet below the terreplein.

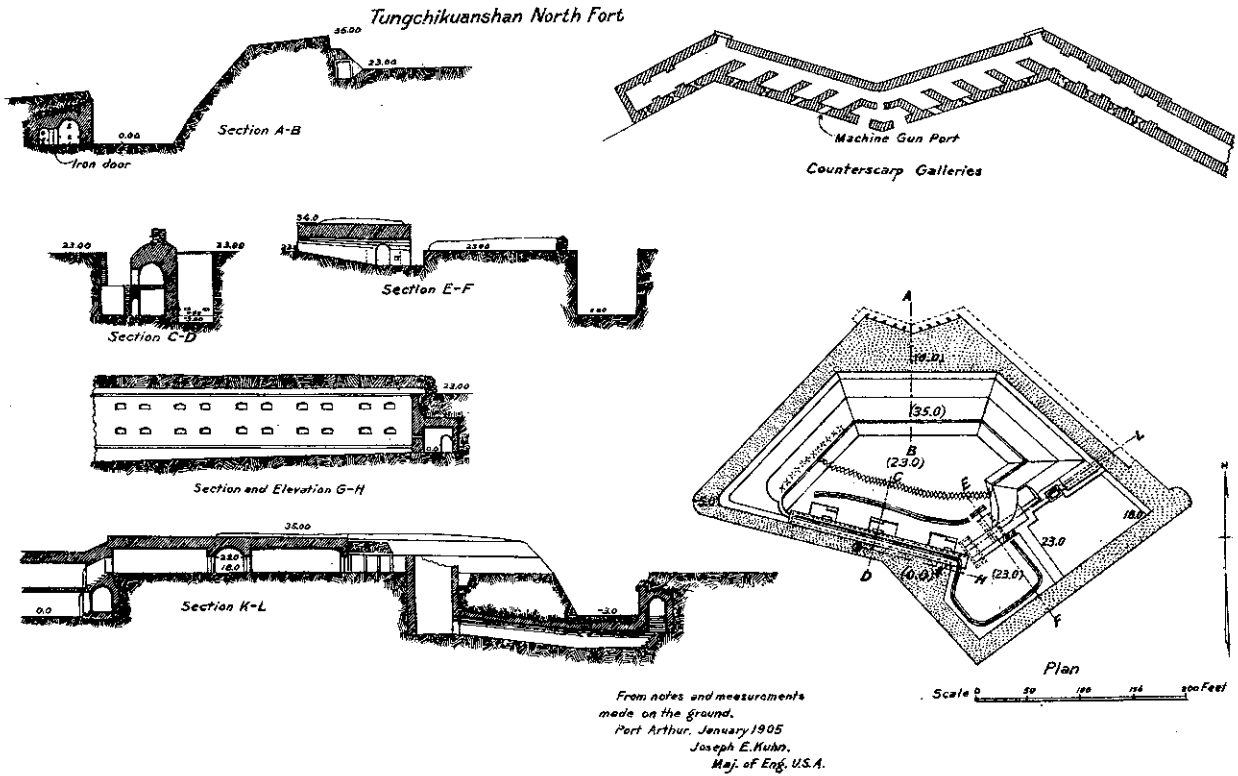

Tungchikuanshan North Fort
Section A-B
Iron door
Machine Gun Port
Counterscarp Galleries
Section C-D
Section E-F
Section and Elevation G-H
Section K-L
Plan
Scale
From notes and measurements made on the ground.
Port Arthur. January 1905
Joseph E. Kuhn.
Maj. of Eng. U.S.A.

PLATE XVI

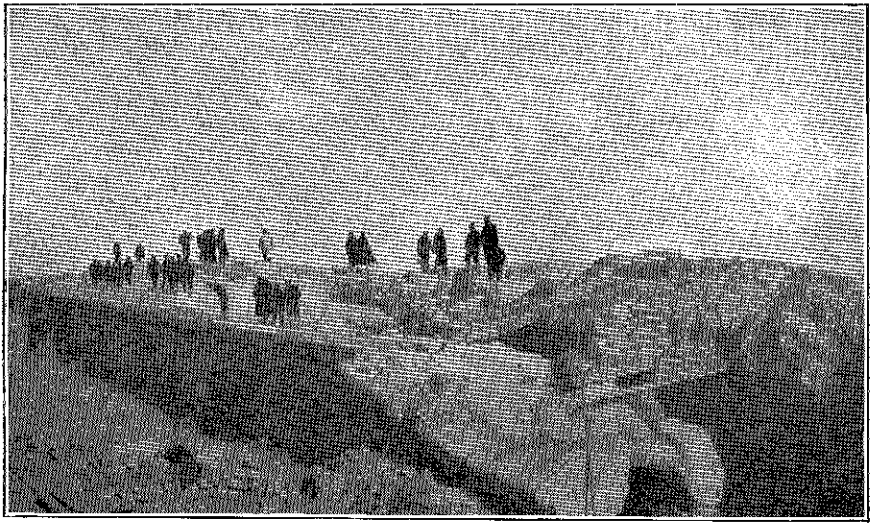
The work was in an unfinished state, the casemated quarters at the gorge being wholly uncovered, except for a sand-bag parapet laid on the crown of the arch. These quarters are two tiers high. Three large pits had been excavated in the terreplein adjoining the casemated quarters, as shown in section CD. These were evidently intended for magazines and storerooms. The west gorge ditch is flanked by a chamber under the place of arms, having communication with the casemated quarters. The gorge ditch is 25 feet deep at the counterscarp at the deepest place. On the east flank the counterscarp is but 10 feet high. The work has a covered way and infantry parapet on top of the counterscarp. The sand-bag parapet on top of the casemated quarters was continued around the perimeter of the place of arms, as shown. The interior of the work had also been retrenched by a sand-bag parapet near the gorge, with wire entanglements in front. A wire entanglement had also been constructed on the superior slope of the west flank. In the west gorge ditch there was a high, strong iron fence, made of pinch bars, barring the passage. Along the scarp of the east flank was found that obsolete obstacle known in text-books as a fraise, or horizontal palisade. The arrangement of the counterscarp galleries will be understood from the enlarged plan. At each end of the face counterscarp galleries are starting points for countermines.

When the Japanese saps had reached the northwest corner of the ditch a mine shaft was sunk in the glacis and a gallery started toward the counterscarp. The Russians meanwhile started a countermine at this point, their gallery being a few feet lower than that of the Japanese. When the Japanese gallery reached the countermine the latter was fired, breaking into the Japanese gallery. The Japanese then took possession of the Russian countermine gallery and entered the counterscarp gallery at the salient. The Russians in the meantime had withdrawn to the farther end of the counterscarp gallery along the east face, where they had erected a sand-bag parapet, from which they could fire along this gallery. To dislodge them the Japanese constructed a sand-bag parapet at the front end of the gallery by tossing in sand-bags, which were first built up by a single sapper, who started the parapet lying down on his back. After the parapet had

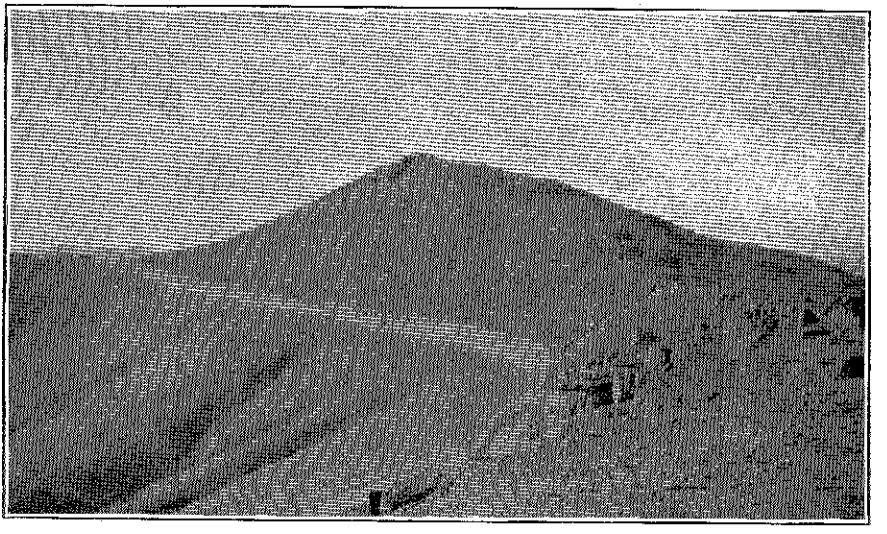
been finished a mountain gun was dragged up and mounted behind this parapet. Its heavy shell speedily drove out the Russians from their end and they retreated, after mining their end of the gallery so as to cut off the communication into the fort under the ditch. The photograph herewith will make this clear. The Japanese then broke into the ditch at the northeast corner and sapped across to the foot of the face scarp. A mine gallery was run under the northwest corner of the parapet and sprung on November 26. This mine was the signal for the general assault of November. The assault proved a failure, and fresh galleries were driven and two larger mines placed. These were fired December 18 and the work successfully assaulted. It was in this fort that General Kondratchenko and staff were killed on December 3. It was also the first permanent work to fall into the hands of the Japanese. Among the spoils captured were five 8.7-cm. field guns, two 47-mm. rapid-fire guns, two 24-mm. rapid-fire guns, and four machine guns.

On the left of North Tungchikuanshan is a projecting knoll which is crowned by the Chinese wall and connected therewith by two branches. This was designated as Battery P at first, but changed to Fort Ichinohe after its capture on October 31 by the Sixth Brigade. The work had two tiers of Russian trenches on the front. The original trace of the work was somewhat difficult to follow owing to the subsequent Japanese works. Its approximate outline is shown on Plate XXXVII. The Japanese threw a deep parallel across the work, behind which were mounted mountain and machine guns and one 15-cm. mortar. The latter was used to breach the masonry gorge of North Tungchikuanshan, of which an oblique view could be had from P. The only Russian armament remaining in the fort at time of inspection was one 3-inch field gun. The main Chinese wall is about 80 yards from the gorge of the work, and the two connecting branches are about the same distance apart where they join the wall. The Japanese had carried saps a short distance along both branches toward the wall.

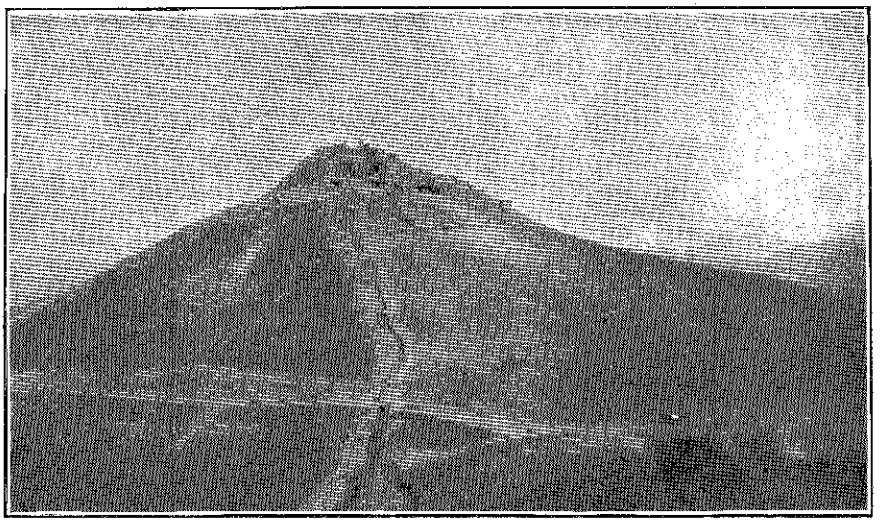
Inside the Chinese wall in rear of East Tungchikuanshan, on the crest of a ridge, was a battery of two 15-cm. naval guns called Battery R. Both of the guns had been disabled by Japanese artillery fire. On the ridge behind Q, inside the



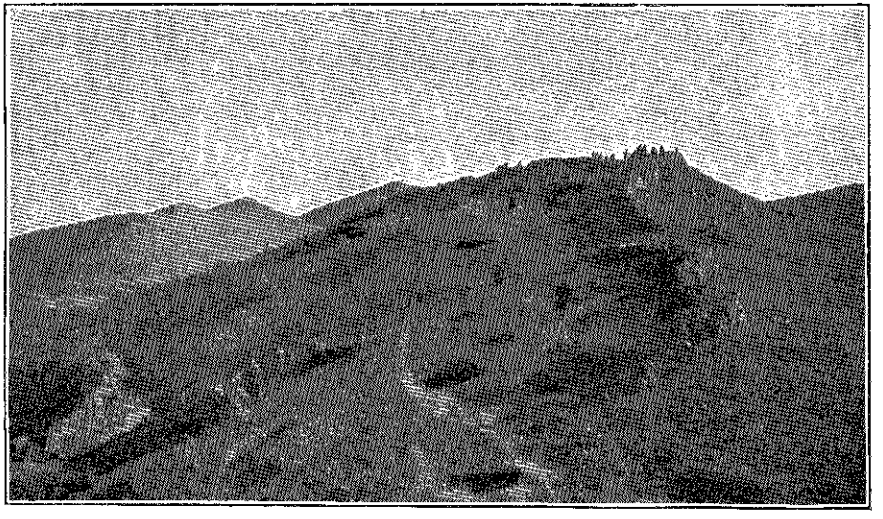
51. COUNTERSCARP GALLERY, NORTH TUNGCHIKUANSHAN FORT.



52. WANGTAI FORT, LOOKING WEST FROM BATTERY M.



53. WANGTAI FORT, FROM SOUTH.



54. "RO"-"H"-"WANGTAI," FROM REAR OF ERHLUNGSHAN, LOOKING EAST.

Chinese wall, were two batteries designated M and N. In rear of Fort P is the high conical peak called Wangtai, upon whose summits the Russians had a battery of two 15-cm. naval guns, both disabled. These guns were most conspicuous and could be seen from any point of the Japanese lines of investment with the naked eye.

On the left of Fort P comes East Panlungshan fort, which was captured by assault on August 22, 1904. The lines of the work are shown on Plate XXXVII. It was a simple earthwork having a strong trench with covered defenses, armed with machine guns and artillery. Of the latter there remained at the time of inspection four naval 12-pounders and two 3-inch field guns, although there may have been more that were buried by the Japanese works. The Japanese experienced great difficulty in holding on to the Panlungshan forts after their capture, as the fire of the Russian heavy artillery, especially the 15-cm. guns in Battery H, only a few hundred yards distant, frequently destroyed their works. The nullah to the northeast played an important part in the assauls of August, enabling the Japanese to bring their troops up quite close under cover. East Panlungshan is connected to the main Chinese wall by two branches about 20 yards apart. The Japanese made an approach along the west branch and threw up a short parallel between the two branches not 40 feet from the detached traverse constructed by the Russians to cover the entrance through the Chinese wall. The Japanese had run two galleries under the branches toward the Chinese wall with the evident intention of breaching the same. The west mine was tamped with the lead wires projecting and appeared to be ready for firing. The condition of the east mine could not be ascertained as the entrance was obstructed. The gallery is started with frames and sheeting and continued with cases using planks 18 inches wide. The inside dimensions were 3 feet 3 inches high by 2 feet 9 inches wide.

On the knoll west from East Panlungshan is the West Panlungshan, a work of the same general character as the former. It is connected to the main Chinese wall by a single branch, as shown on Plate XXXVII.

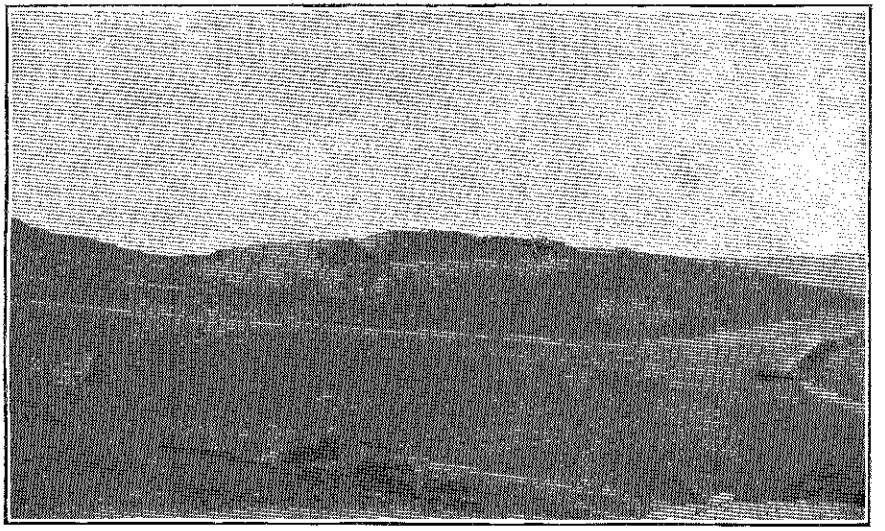
Back of the Panlungshan forts inside the Chinese wall is a ridge, which contained Batteries H and Ro. The former

contained four emplacements for 15-cm. siege guns on wheeled mounts. Only one disabled gun was in the battery, but the wrecks of three guns and four carriages were found behind the work. Ro Battery contained two vacant emplacements for field guns with one overturned gun in rear.

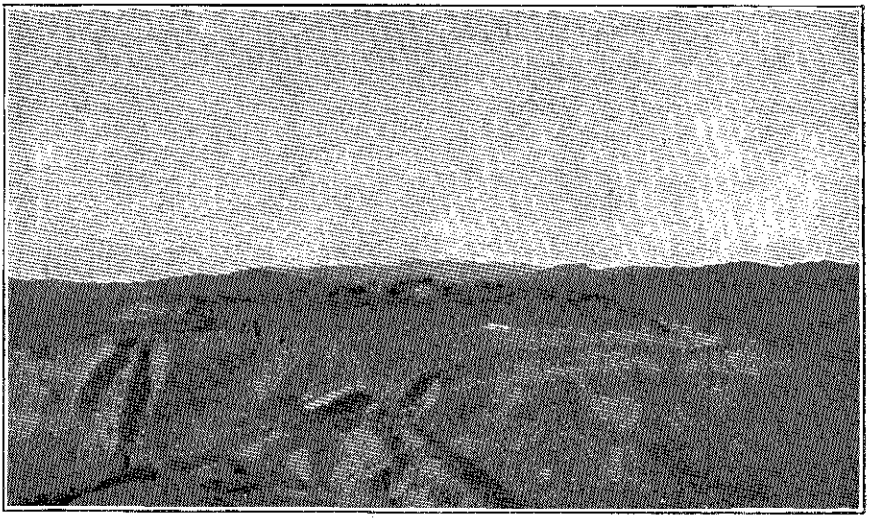
Between H and Ro Batteries, just behind the neck joining the two, was a battery of four 23-cm. howitzers, which was designated as the "Puffing Billy" Battery on account of the curious whining noise made by the shells. This battery was about the only one on the front line that the Russians located with any considerations for concealment. For months the Japanese had been searching for this battery in the ravine in rear, the floor and slopes of which were literally covered with shell fragments and the ground all torn up by shell craters. The guns were located in pits 30 feet diameter and 10 feet deep, separated by 10-foot traverses. Timber magazines were built under the parapet, which, as well as the traverses, were revetted with sand bags. The platforms were of concrete, with a layer of timbers under the bedplate. In the closing days of the siege the Japanese found this battery and eventually put all the guns hors de combat. The last gun appears to have been knocked out only on December 31 or January 1, for on entering the battery on January 3 the mangled remains of the gun crew were lying about the gun. They had evidently been caught by a shell in the act of hoisting a projectile, which was lying on the loading platform of the carriage. While skillfully located the guns themselves were of little value, the platforms being poorly built and the firing very inaccurate.

Next west from West Panlungshan lies G fort, an earthwork like the Panlungshan forts and P. This was captured by assault on October 26 after a partial approach by sapping. The work is connected with the Chinese wall in rear by a zigzag of six branches, which were partially filled by the Russians after evacuating G so as to prevent the Japanese using them as approaches. No Russian armament was found in G after the capitulation.

The next work in order was Fort Erhlungshan, the largest and strongest of the permanent works on the front of attack (Pl. XVII). The work is an irregular pentagon in trace,



55. ERHLUNGSHAN (TWO-DRAGON), VIEWED FROM WEST PANLUNGSHAN.



56. ERHLUNGSHAN, FROM REAR.

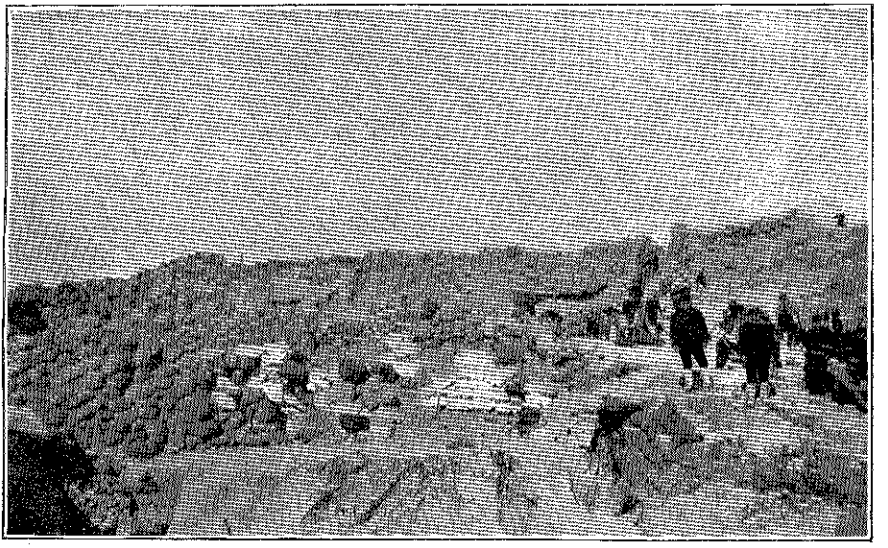
having a face, two flanks, and a salient gorge, with a place of arms at the latter. As in the other works, the ditches are cut in the living rock without revetments, save at a few places along the counterscarp, where a dry rubble wall had been built to increase the depth. The material excavated from the ditch had been deposited in the glacis, which is of irregular width from 75 to 150 feet. The glacis has a steep and high exterior slope, which leaves a dead space under the parapet, which is, however, covered by the fire from the adjoining works. The Russians had constructed a strong trench around the outer edge of the glacis, with ample overhead cover. This had been pretty well effaced by subsequent operations, but portions were still in evidence. Well down the slope near the railway line the Russians also had an advanced trench, which later served the Japanese as a parallel. The ditches of the fort are both wide and deep, being cut 25 feet into the ground on the flanks. The ditch at the face is some 5 feet higher than on the flanks, to cover the gallery leading to the counterscarp galleries. The gorge ditch is nearly 10 feet higher than the flank ditches and connects with them by steep slopes. Both gorge ditches are barred by strong high iron fences. The ditches are thoroughly flanked by two counterscarp galleries at the salient and by two casemates under the place of arms at the gorge. Access to the front counterscarp galleries from the parade is from a concrete T-head and descending gallery, passing across the ditch. Under the two gorge faces are the casemated quarters, which are reached by a gallery rising to the parade and terminating in a T-head behind the heavy gun line. The latter extends between the two flanks and provides emplacements for four 15-cm. siege guns on wheeled mounts. The battery is of concrete, with magazines and bombproofs under the traverses. The gun crest is higher than any part of the work and fires over the front parapet, which is some 10 feet lower. The west gorge casemates have 6 ports and 3 oblique loopholes, while the east gorge casemates have 7 ports and 4 oblique loopholes. The ports are closed by one-half inch hinged steel plates, having 9 by 2 inch loopholes. At the rear ends of the two flank ditches are concrete drains to carry off the drainage. The Russians had constructed a sand-bag

parapet around the perimeter of the place of arms, as well as on the glacis at the gorge, as shown on the plate.

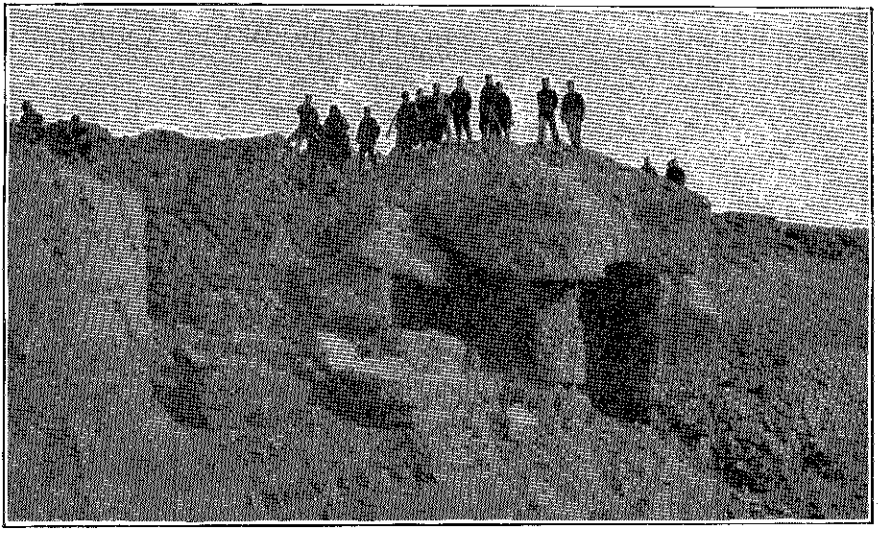
The front glacis was simply honeycombed by the Japanese saps which covered the entire available area. These saps were of great depth, at least 7 feet, and quite narrow.

After the Japanese had carried the glacis trench they sunk a mine on the back of the counterscarp gallery at the northeast salient and blew in the roof of the same. A large mine was then lowered into the chamber, blowing out the entire front of the chambers, as shown in the photograph herewith. They also sank two mines behind the counterscarp of the face, blowing in the same and partially filling the ditches. Five galleries and a like number of mines were then placed under the front parapet, which was successfully blown up on December 28, and the work captured. The Russians fought most obstinately defending the fort, first from the heavy gun line, then the gorge, and finally from the sand-bag parapet on the gorge glacis. A final remnant of the Russian garrison is stated to have shut themselves in the east gorge casemates and to have refused to surrender until they were smoked out by inflammables thrown through the loopholes and ports. Some 30 field and machine guns were found in the fort at the time of its capture.

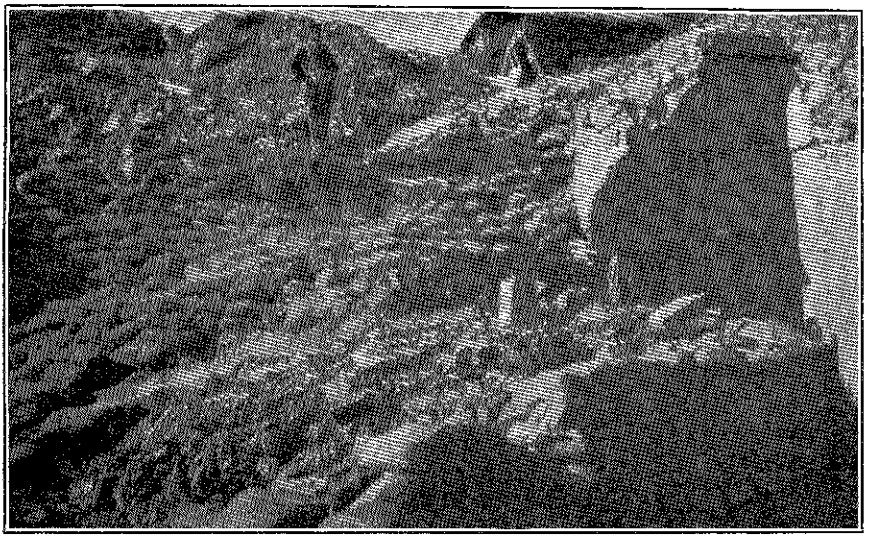
On the left of Erhlungshan is Sungshushan (Pl. XVIII), the last of the permanent works on the portion of the front subjected to attack by regular siege works. Like the other works along the front of attack, the trace of the work is adapted to the configuration of the ground, resulting practically in a triangle with vertex slightly blunted. The ditches are cut in the natural rocky soil without masonry revetment, save at a few points where the height and steepness of the counterscarp have been increased by a dry rubble wall. The ditches, while not so wide or deep as those of Erhlungshan, are still very formidable. The gorge ditch is some 10 feet higher than those of the flanks and is flanked by casemates located under a place of arms. The flank ditches are swept by counterscarp galleries at the salient. A masonry gallery extends from the gorge ditch to the counterscarp galleries at the face as shown in the plate. This gallery is reached from the parade by a T-head of concrete. In



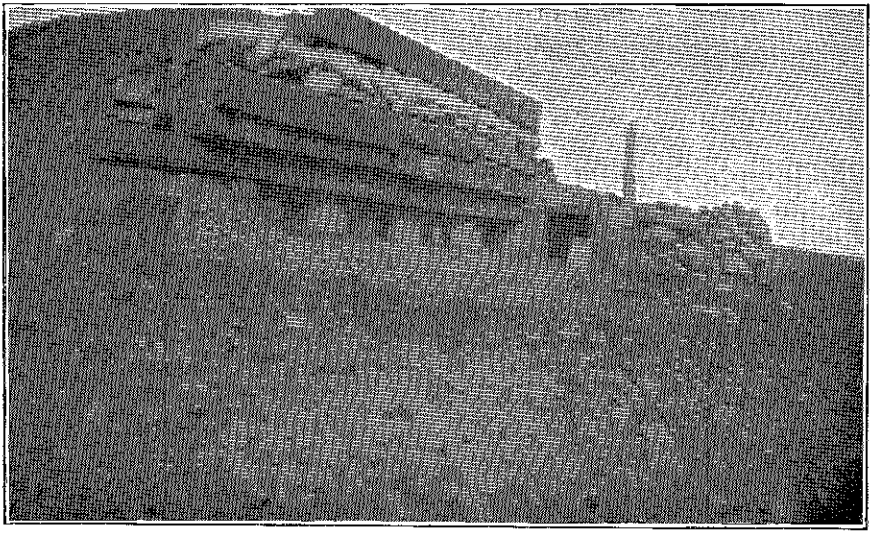
57. INTERIOR OF ERHLUNGSHAN, FROM HEAVY GUN LINE.



58. CAPONIER OF ERHLUNGSHAN, MINED BY JAPANESE.



59. EAST FACE CAPONIER, FORT SUNGSHUSHAN.



60. RUSSIAN BOMBPROOF, BACK OF FORT SUNGSHUSHAN.

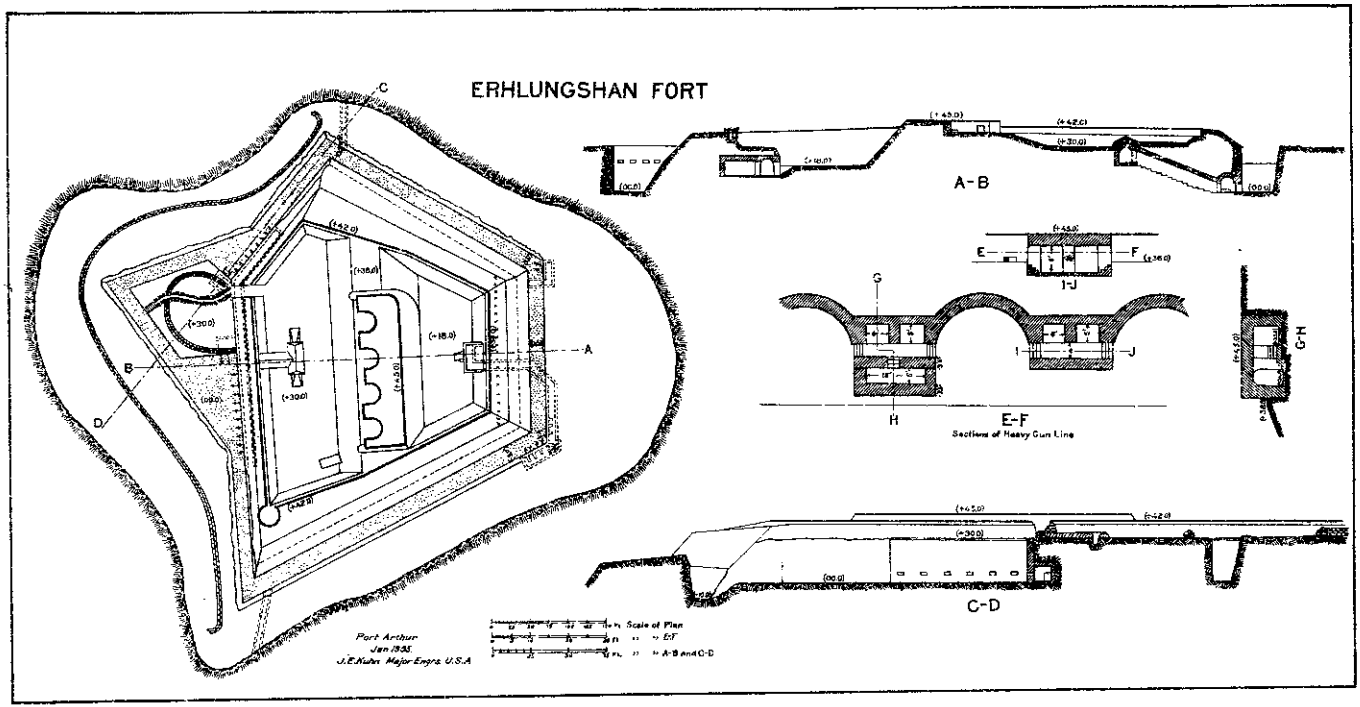

ERHLUNGSHAN FORT
A-B
E-F
Sections of Heavy Gun Line
C-D
Port Arthur
Jan 1905.
J.E.Kuhn Major Engrs U.S.A

PLATE XVII

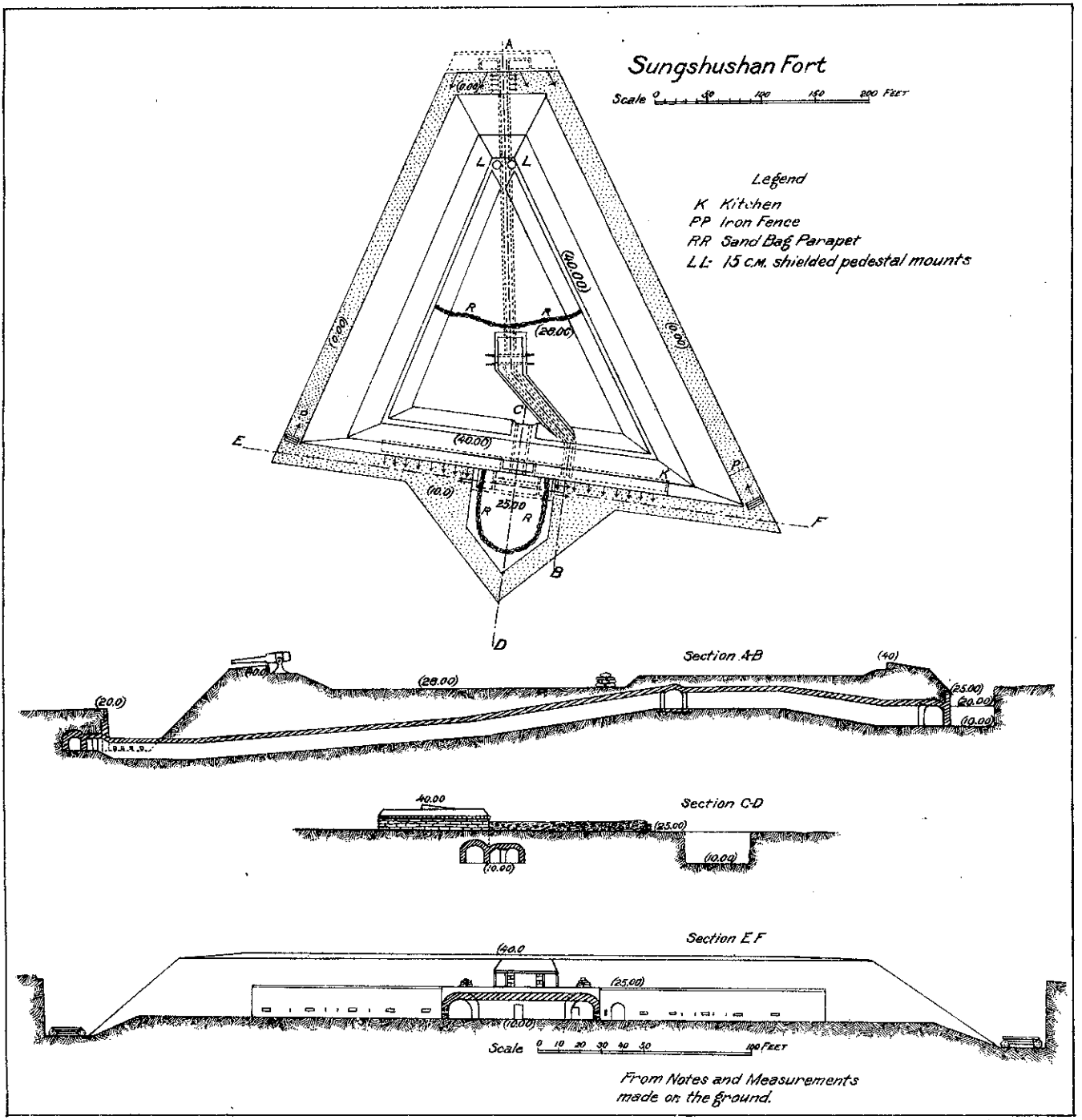

Sungshushan Fort
Scale 0 50 100 150 200 FEET
Legend
K Kitchen
PP Iron Fence
RR Sand Bag Parapet
LL 15 c.m. shielded pedestal mounts
A
B
C
D
E
F
L
L
R
R
K
P
P
(40.00)
(40.00)
(40.00)
(20.00)
(10.0)
25.00
Section A-B
(40)
(20.0)
(20.00)
(25.00)
(20.00)
(10.00)
Section C-D
40.00
(25.00)
(10.00)
(10.00)
Section E F
(40.0
(25.00)
(10.00)
Scale 0 10 20 30 40 50 100 FEET
From Notes and Measurements
made on the ground.

PLATE XVIII

the salient of the parapet the Russians had emplaced two 15-cm. shielded naval guns. These had been put hors de combat by the Japanese quite early in the artillery bombardment and were almost completely buried when the parapet was mined on December 31. The place of arms is connected with the parade by a tunnel under the gorge parapet. After the destruction of the counterscarp galleries the Russians threw up parapets at the rear ends of the flank ditches behind the iron fences, from which they flanked the ditches with infantry fire. On the slopes leading to the fort and some 250 yards in front the Russians had constructed a strong infantry trench, and still lower down near the railroad track was another trench which was carried across the nullah between Erhlungshan and Sungshushan to connect with the lower trench in front of the former fort.

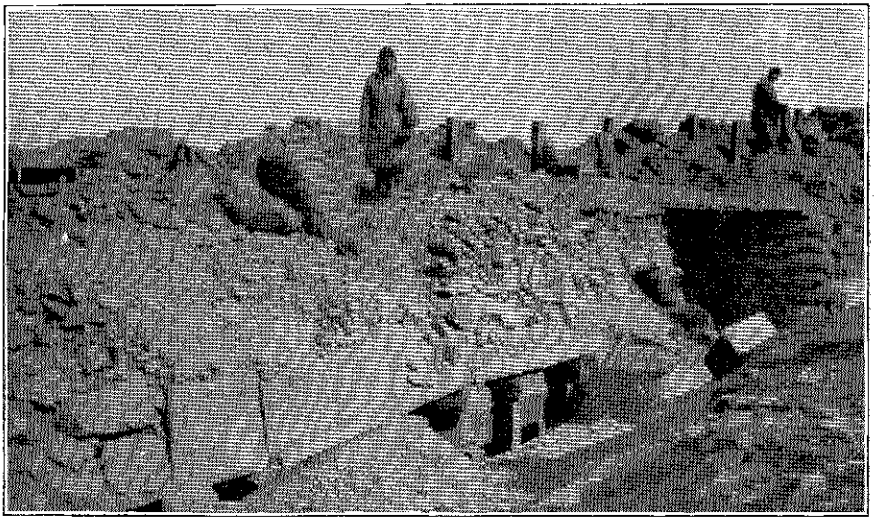
The principal events leading to the capture of Sungshushan are but a duplication of those in the case of Erhlungshan. When the fort was mined on December 31, the Russian magazine near the gorge was exploded some seven minutes later, due, no doubt, to the flame and gases of the Japanese mine coming by way of the communicating gallery extending under the parapet at the salient. The explosion of this magazine destroyed the exit of the garrison to the gorge ditch, and, after a brief struggle, the remnant surrendered. The place of arms suffered heavily from the Japanese artillery fire coming from the west. A 28-cm. shell had evidently blown out the east face of the place of arms and destroyed the flanking casemate. This face was rebuilt with sand bags.

All the forts on the front of attack had been heavily pounded for months by the Japanese artillery and their profiles knocked out of all shape. The parapets were simply irregular heaps of earth and rock spawls in which the Russians maintained some form of infantry parapet by digging and piling sand bags. The glacis and ground immediately surrounding the forts were all torn up, and where turf had once existed there remained only a mass of comminuted rock resembling quarry spoil. The ditches were partly filled by débris from the scarps and counterscarps brought down by the Japanese artillery fire and were literally charnel pits in which the dead, both Russians and Japanese, had been dumped to get them out of the way.

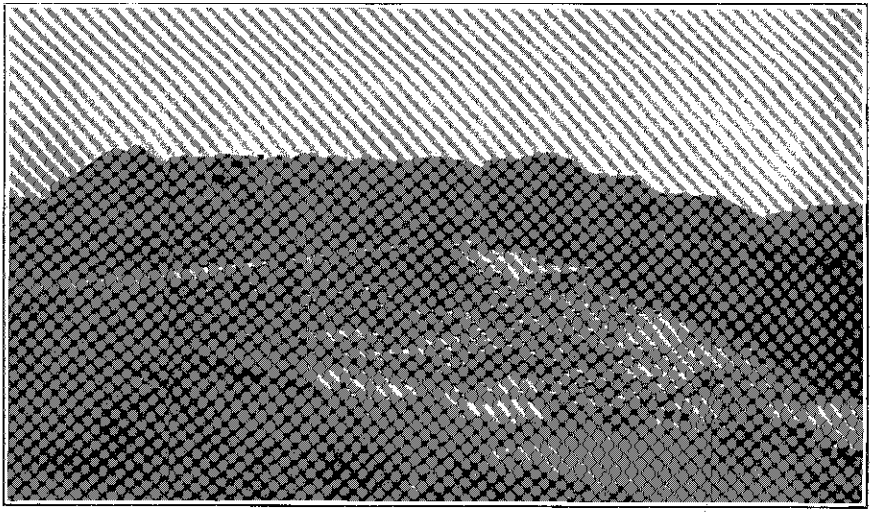
Starting from higher ground, behind Sungshushan, and following down the nose of the ridge to the railroad track are the batteries and trenches designated Sungshushan annexed battery (Pl. XIX). It was at this point that the Japanese directed the attack of the forlorn hope on the night of November 26–27. The artillery armament of the annexed battery will be found in the armament sheet. As these batteries were subjected to a severe and concentrated bombardment by the Japanese, much of their armament was knocked out, and the road in rear of the battery was a veritable graveyard of damaged ordnance. Guns in open emplacements were so regularly knocked out by the Japanese artillery that the Russians resorted to blinded constructions. In one of the field magazines of the annexed battery a Japanese 28-cm. shell had landed squarely on the roof and penetrated some 5 feet of earth and stones, 12 inches of timber, and a layer of steel rails, and was found lying unexploded inside.

The Russians maintained a searchlight station in the annexed battery, the location being indicated on Plate XXXVII. The remains of at least three projectors were found lying about. These projectors had evidently been taken from the ships after the abandonment of the fleet. The power plant was on the reverse slope in a heavy timber bombproof, which had been entirely wrecked. The plant consisted of a portable boiler and engine with a four-pole belt-driven dynamo. In the vicinity of the searchlight and between the wire entanglement and parapet there were fully 100 Japanese soldiers' caps, showing that hand-to-hand fighting must have occurred here in the night attack of November 26–27.

In front of Erhlungshan and Sungshushan, beyond the railway, the Russians had an advanced line of works in Fort Kuropatkin and the Shuishihying redoubts. These works occupy low eminences in the floor of the valley separating the main line of Russian works and the Japanese lines of investment. Fort Kuropatkin is an earth redoubt and is quite fully represented by the plan and sections on Plate XX. The Japanese approached quite close to the work by sapping before making their successful assault on September 20. In anticipation of mining operations, the Russians had started a listening gallery from one flank of the fort, as shown in the drawings.



61. CHINESE WALL AT "H," SHOWING RUSSIAN BOMBPROOFS UNDER PARAPET.



62. NORTH TAIYANGKOU FORT, FROM SOUTH.

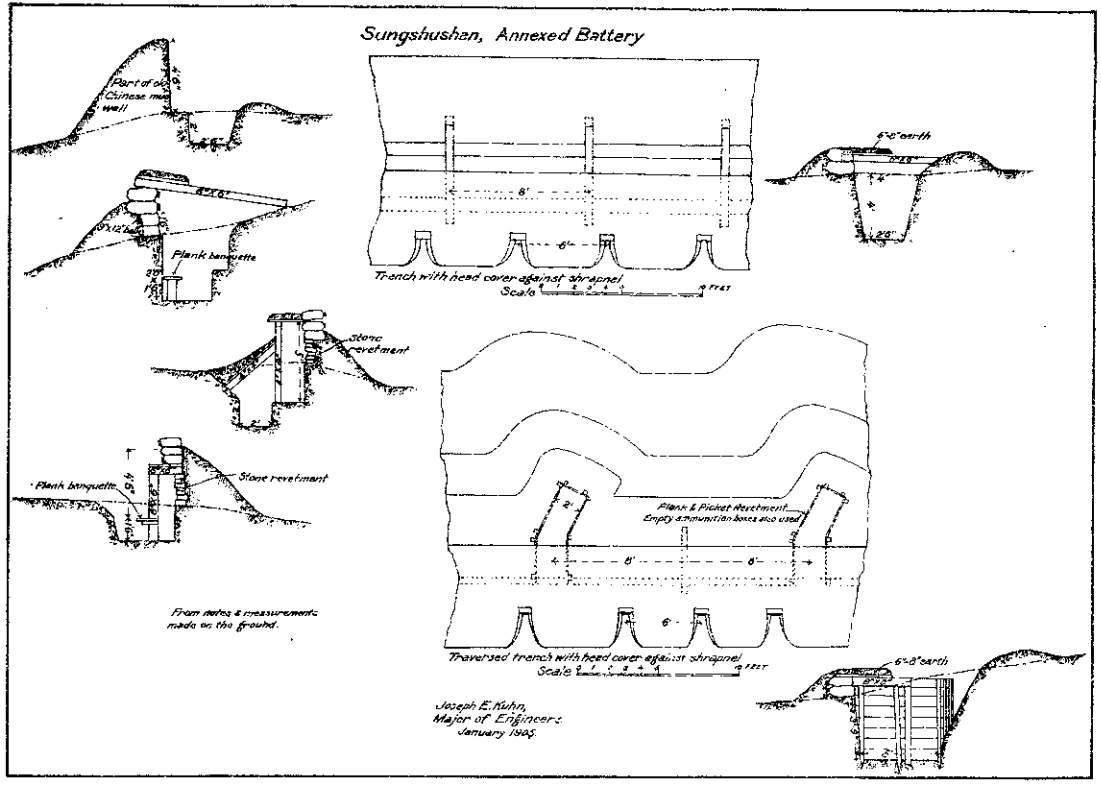

Sungshushan, Annexed Battery
Part of old Chinese mud wall
Plank banquette
Stone revetment
Plank banquette
Stone revetment
From notes & measurements made on the ground.
Trench with head cover against shrapnel
Scale
Traversed trench with head cover against shrapnel
Scale
Plank & Picket Revetment
Empty Ammunition boxes also used
6'-0" earth
6'-0" earth
Joseph E. Kuhn,
Major of Engineers.
January 1905.

PLATE XIX

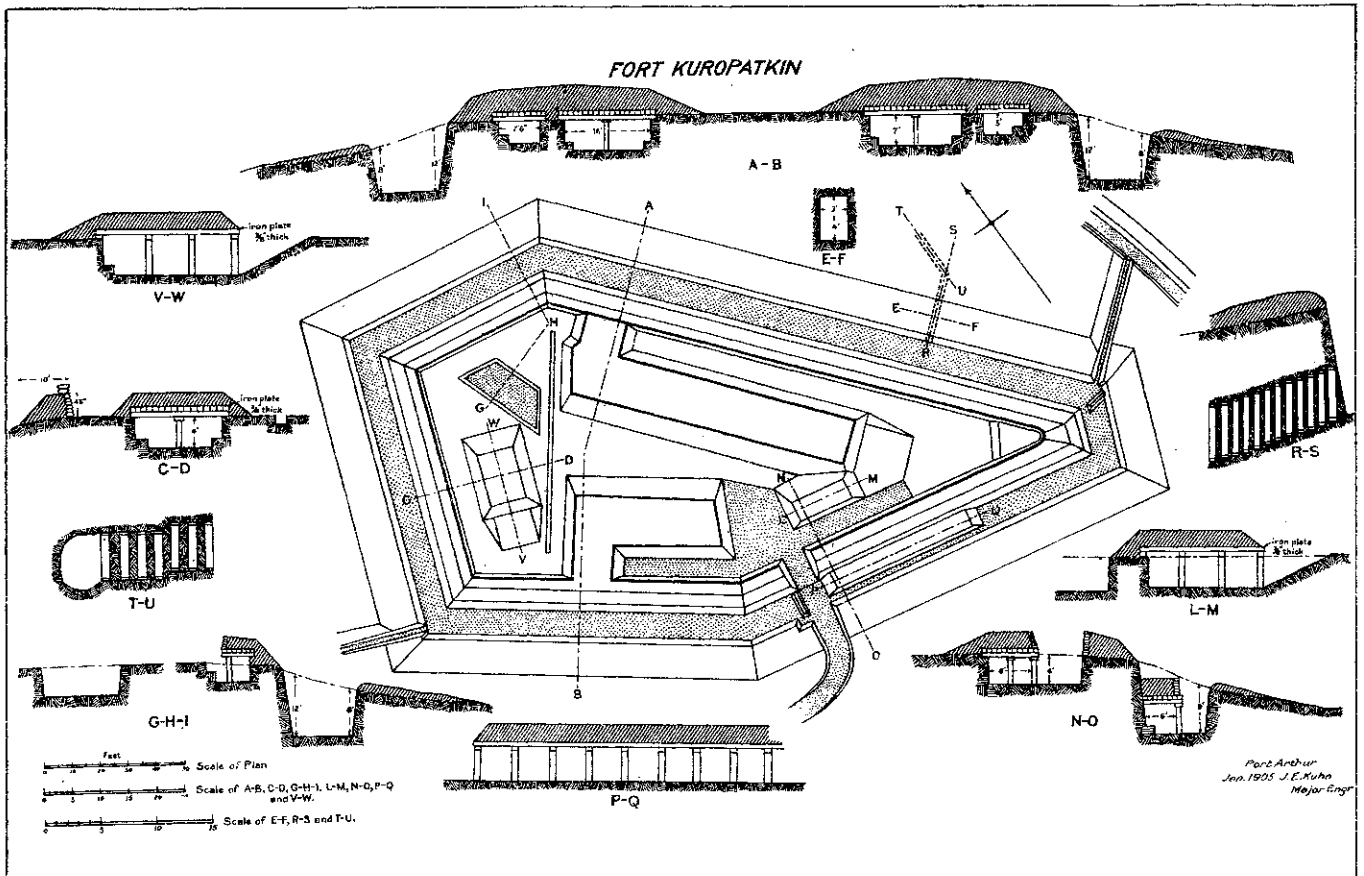

FORT KUROPATKIN
A-B
E-F
V-W
C-D
R-S
T-U
L-M
G-H-I
N-O
P-Q
Iron plate ⅜" thick
Scale of Plan
Scale of A-B, C-D, G-H-I, L-M, N-O, P-Q and V-W.
Scale of E-F, R-S and T-U.
Port Arthur
Jan. 1905 J. E. Kuhn
Major Engr

PLATE XX

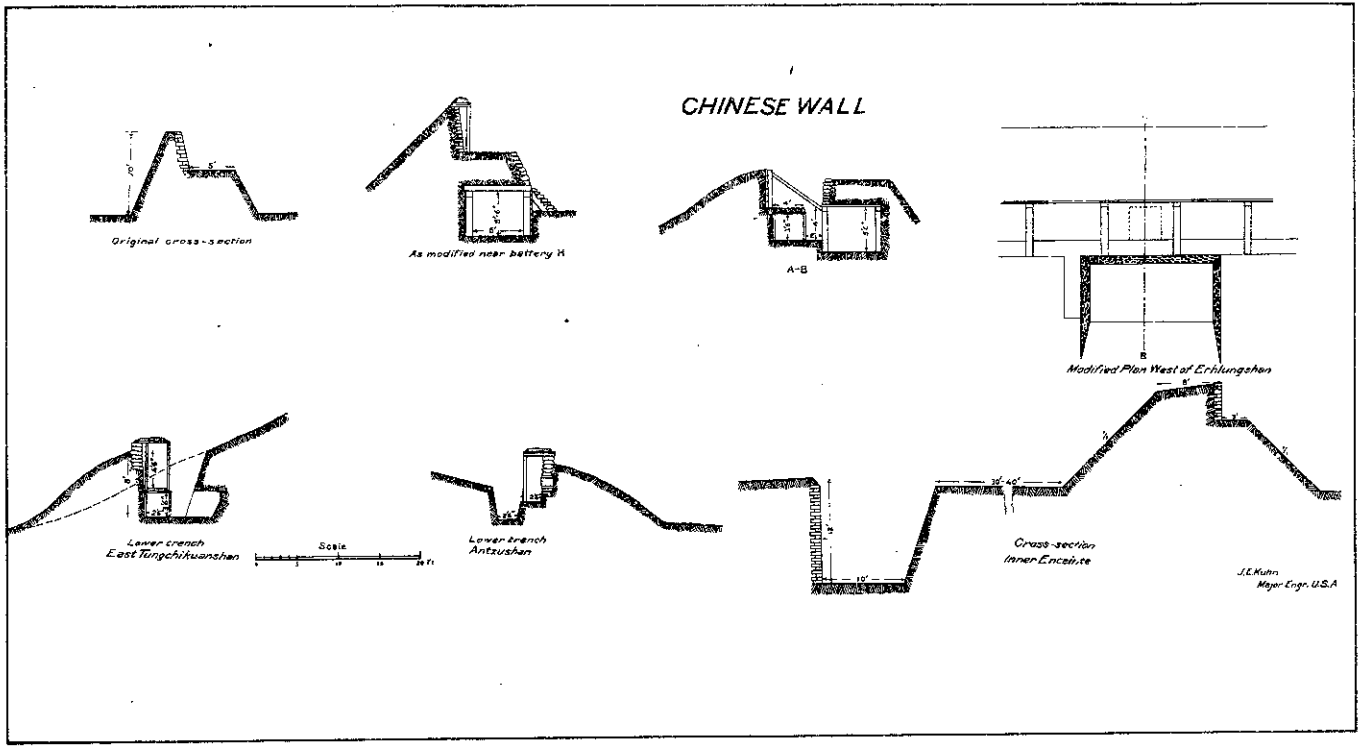

CHINESE WALL
Original cross-section
As modified near battery K
A-B
Modified Plan West of Erhlungshan
Lower trench
East Tungchikuanshan
Scale
Lower trench
Antzushan
Cross-section
Inner Enceinte
J.T. Kuhn
Major Engr. U.S.A

PLATE XXI

From Fort Kuropatkin a strong trench runs south toward Erhlungshan, terminating on a small knoll near the railway. This knoll was designated the railway redoubt; also the red redoubt. It was not held after the fall of Fort Kuropatkin.

The Shuishihying redoubts consist of four lunettes placed on an elevation south of the village of that name. These redoubts had a strong profile, with ample bombproof cover. A continuous trench connects Fort Kuropatkin and the redoubts, crossing the low ground between. The Shuishihying redoubts were carried by assault September 20, after a close approach by sapping, at the same time as Fort Kuropatkin, resulting in the Russians abandoning the whole of the position, which may be regarded as a sort of advanced work to Erhlungshan and Sungshushan.

The Chinese wall in rear of the line of detached forts on the front of attack was considerably modified and strengthened by the Russians during the progress of the siege. Plate XXI shows profiles of the unmodified wall and of the modifications at several points. The bombproofs under the banquette were practically continuous from Erhlungshan to North Tungchikuanshan, and an excellent idea of their construction is afforded by the plate and the photograph herewith.

In rear of East Panlungshan the wall makes a right-angled offset which can be enfiladed from the front. This the Russians traversed.

Generally speaking, the three permanent works on the front attacked by regular siege works were well planned as to trace but deficient as to bombproof cover and interior communications. The forts were not completed as regards details and the arrangements noted may have been of a temporary character.

The lay-out of the inner defenses in the eastern sector of defense is plainly shown on Plate XXXVII. These inner lines appear to have been planned with an idea to retrenching such parts of the outer lines as might be taken by the Japanese. For example, from Wangtai a line is carried to the Sungshushan battery retrenching forts Erhlungshan and Sungshushan. From Wangtai a line is also carried generally south to connect with the inner enceinte,

retrenching all the sector of works from the Panlungshan forts around the flank of the valley leading into Port Arthur.

All these inner works were constructed after the commencement of the siege and were of a temporary character. The armaments of the several batteries are given in the armament sheet, and a further detailed description of the inner works is unnecessary. A few words only touching the inner enceinte and the eastern sector of land defense will be dismissed. This inner enceinte extends unbroken from the west slope of Quail Hill and, with a cremaillére trace, extends entirely around the old town to a point on the seacoast at the old Chinese fort, No. 5. This enceinte is of monumental profile, as shown on Plate XXI. From the fact that this enceinte was in progress of construction along the slopes of Quail Hill it may be inferred that it dates from comparatively recent times. The line takes on a series of low eminences, upon which are redoubts, one of these with a star trace. From the several redoubts and indentations the entire line can be flanked. On the front of Quail Hill the Russians had occupied the enceinte with a strong battery, called the New Redoubt, No. 52, on Plate XXXVII, which contained emplacements for four siege guns, of which two were occupied by 10.5-cm. siege guns on wheeled mounts. This battery, with the battery of naval guns on the summit of Quail Hill, thoroughly enfiladed the valley of approach into Port Arthur. The inner enceinte is in excellent condition and represents a vast amount of labor. As an example of fortification construction it is beautiful to look upon, but what useful purpose it serves it is difficult to comprehend. An enemy in possession of the outer heights commands the entire line at short range and makes the line untenable. Possibly the enceinte was intended as a keep behind which the defenders could retire and take shelter sufficiently long to negotiate terms of surrender with a victorious army, and thus obviate a massacre.

The valley of approach into Port Arthur was crossed by no less than three distinct lines of defense. The outer one extended from the end of the Sungshushan annexed trenches under the railway to the old Chinese fort at the foot of the

Antzushan slopes and thence up these slopes on both sides of the Russian cemetery adjoining the Chinese fort. A triple line of wire entanglements lay in front of this trench, which was of strong profile, with overhead splinter-proof cover. In rear of this line was a second line connecting the inner enceinte at the foot of the north slope of Quail Hill with the trenches on the western side of the valley. In front of the second line were abattis, military pits, wire entanglements, and a broad row of sharpened stakes about 20 inches high, the latter extending clear across the valley. Both the first and second lines of trenches were carried across the stream on low bridges. Finally, the main bridge which crosses the valley from the foot of Quail Hill at the new redoubt had a bulwark of heavy timbers, some 20 inches square, on the exposed side, with loopholes, both to cover the passage across and to furnish a third line of defense for the valley. The foot of the slopes on both sides of the valley of approach were also defended by lines of fougasses, those on the eastern side being located at the foot of the slope of the railway embankment in front of the Sungshushan annexed battery, and those on the west side at a point where the second trench crosses the valley of approach.

Coming now to the western and southern sector of land defenses, these commenced on the flank of the valley of approach where the second line of defense crosses this valley and extended thence via the old Chinese fort on the plateau to the series of batteries constituting Hsiaoantzushan. The old Chinese fort contained four 12-pounder naval guns and emplacements for three more. Several wrecked guns and carriages were in evidence inside the fort. The batteries on the immediate right flank contained two 3-inch field guns in blinded casemates, two 15-cm. field howitzers, and three 10.5-cm. siege rifles. All these batteries had been heavily pounded by Japanese artillery fire.

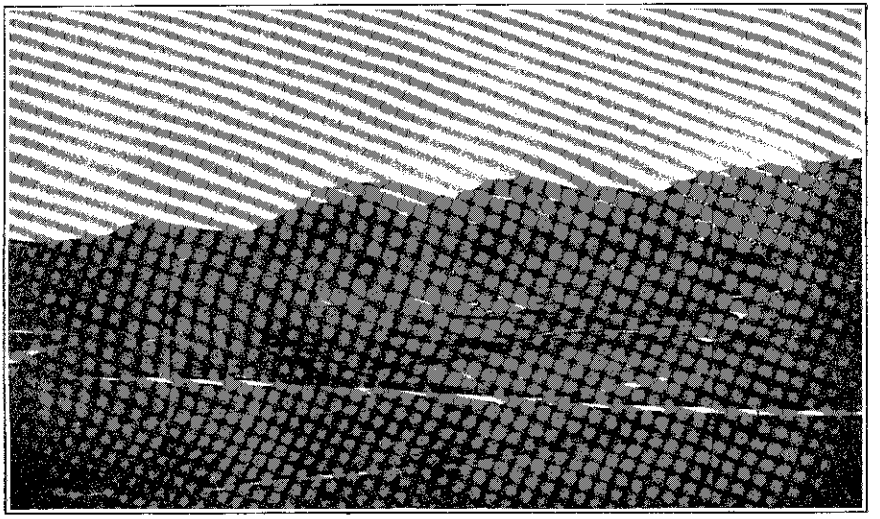
Hsiaoantzushan (Pl. XXII) was an aggregation of batteries of which the one on the right flank, No. 67 (Pl. XXXVII) was of concrete for four 15-cm. siege guns. One gun had been wrecked and the concrete of the battery much chipped and broken. The parapet wall of the left flank emplacement had been carried away by a shell which had evidently landed near the interior crest. On the right flank of the

concrete battery was a fine 12-cm. naval gun in an earth emplacement. The carriage of the gun had been damaged and the gun was hors de combat. The left flank battery of Hsiaoantzushan battery was an earth battery containing five 15-cm. siege guns on center-pintle garrison carriages and one 12-pounder naval. One of the 15-cm. siege guns had been wrecked by the Japanese fire. On the lower slopes of Hsiaoantzushan ran a strong infantry trench.

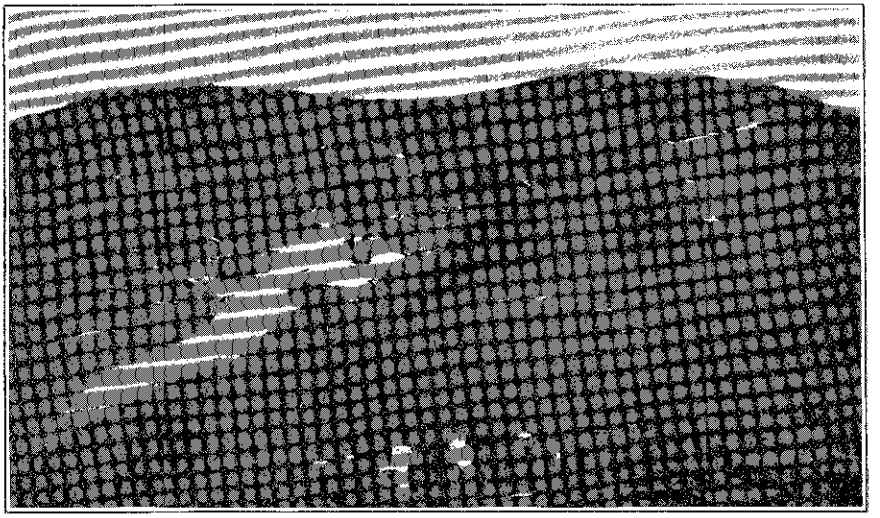
From Hsiaoantzushan the inner defensive line is continued to Taantzushan (Pl. XXIII) by a section of the old Chinese wall, behind which were mounted a number of naval guns of small caliber, as shown on the armament sheet. The work is a four-sided figure comprising a face, two flanks and a gorge, with ditches cut from the rock. The flank ditches are swept by counterscarp galleries at the face and the face ditch by a caponier at its middle. The casemated quarters are located under the gorge parapet, which contains the heavy gun line. The armament in place is indicated on the drawings. The fort appears to have been subjected to but little bombardment; at any rate, it suffered very little.

South and east of the Antzushan forts and batteries, on the ridge terminating at Cathedral Hill, is a line of batteries comprising various armaments, all of which are given on the armament sheet.

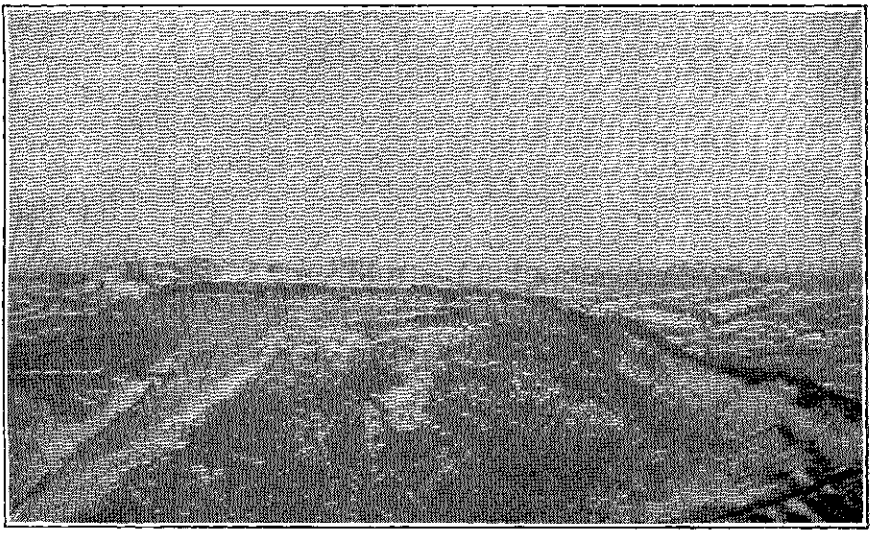
From Taantzushan the line of defense is carried southwest by several lines of trenches and batteries of a temporary character until the Taiyangkou Ridge is reached. The inner trenches and batteries lie quite close to the new town. On the north point of the Taiyangkou Ridge lies the unfinished north fort. This has very steep and abrupt slopes, covered with quarry spoil thrown out in the excavation of the ditches, forming a most formidable obstacle. A concrete plant, with inclined cableway from the foot of the slope to the top of the bluff, showed that work on the fort must have been in progress up to the time of and possibly during the siege. At the time of inspection North Taiyangkou Fort (Pl. XXIV) was nothing more than a vast quarry. A ditch had been cut out in the rock and beyond the ditch an infantry parapet built with timber bombproofs and blinded casemates for three 37-mm. rapid-fire naval guns. On a ledge inside



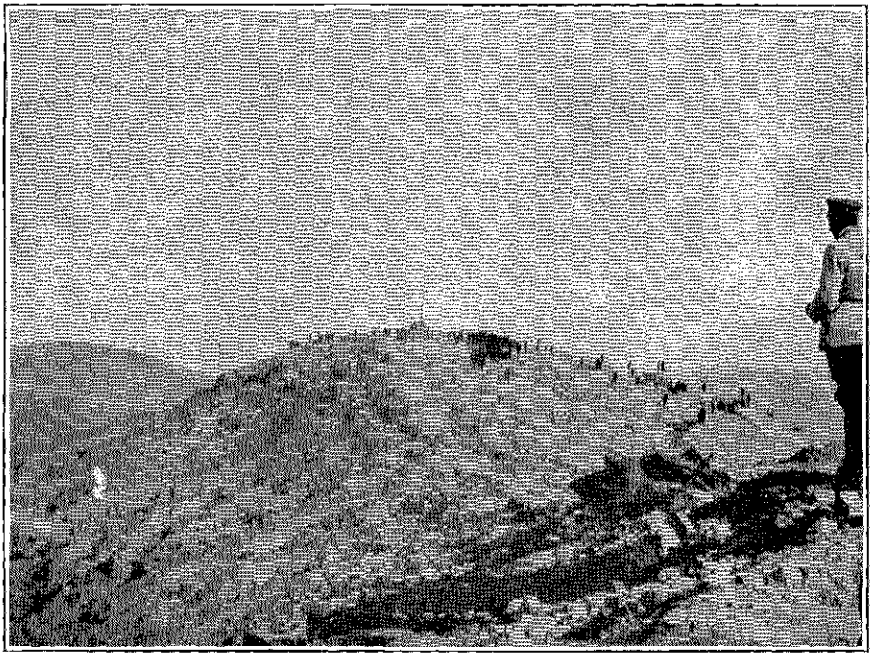
63. TAIYANGKOU FORTS, FROM HSITAIYANGKOU.



64. 203 METER HILL, FROM RUSSIAN SIDE.



65. FORT ITZUSHAN, FROM FORT ANTZUSHAN.



66. 203 METER HILL, LOOKING SOUTH ALONG RIDGE.

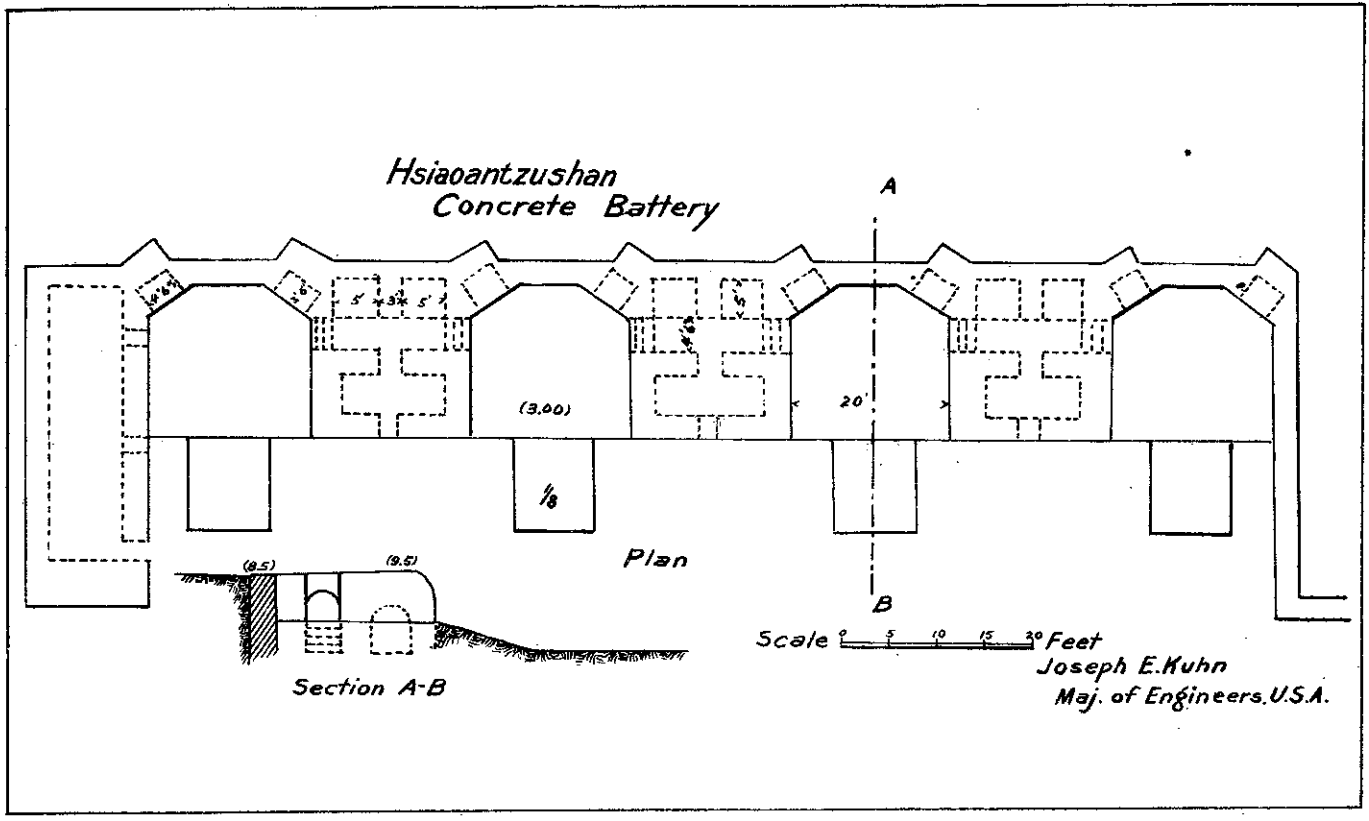

Hsiaoantzushan
Concrete Battery
A
B
(3.00)
20'
1/8
Plan
(9.5)
(9.5)
Section A-B
Scale 0 5 10 15 20 Feet
Joseph E. Kuhn
Maj. of Engineers, U.S.A.

PLATE XXII

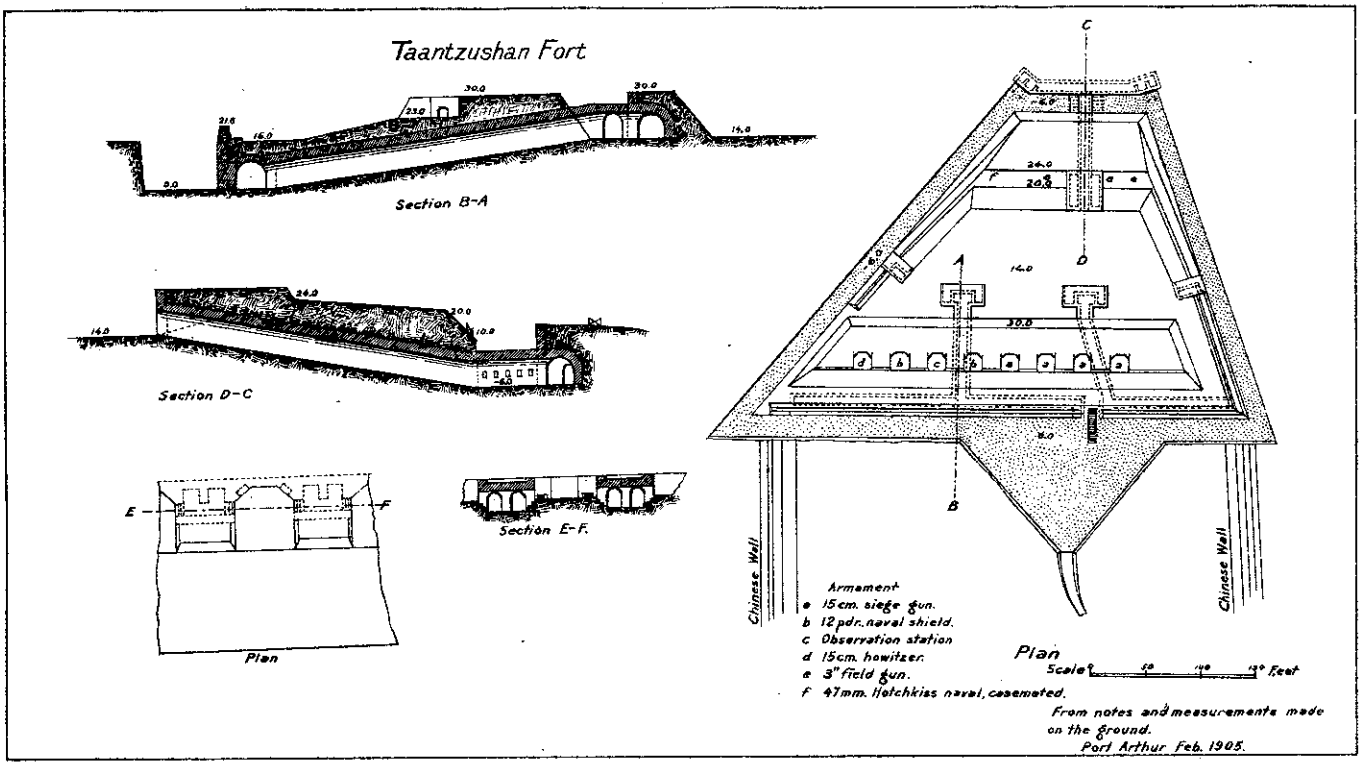

Taantzushan Fort
Section B-A
Section D-C
Section E-F
Plan
Armament
a 15cm. siege gun.
b 12pdr. naval shield.
c Observation station
d 15cm. howitzer.
e 3" field gun.
f 47mm. Hotchkiss naval, casemated.
Chinese Wall
Chinese Wall
Plan
Scale
From notes and measurements made on the ground.
Port Arthur Feb. 1905.

PLATE XXIII

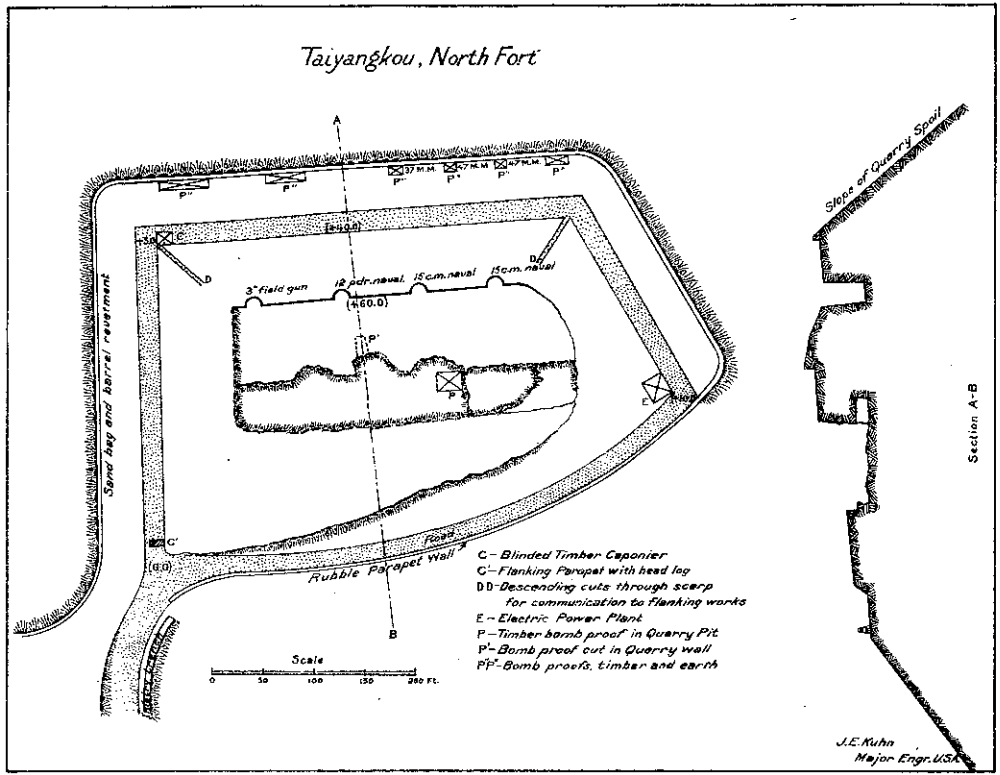

Taiyangkou, North Fort
Sand bag and barrel revetment
3" Field gun
12 pdr. naval
15 c.m. naval
15 c.m. naval
Rubble Parapet Wall
C – Blinded Timber Caponier
C' – Flanking Parapet with head log
DD – Descending cuts through scarp for communication to flanking works
E – Electric Power Plant
P – Timber bomb proof in Quarry Pit
P' – Bomb proof cut in Quarry wall
P P' – Bomb proofs, timber and earth
Scale
0 50 100 150 200 Ft.
Slope of Quarry Spoil
Section A-B
J.E. Kuhn
Major Engr. U.S.A.

PLATE XXIV

the ditch were one 3-inch field gun, one naval 12-pounder, and two 15-cm. naval guns, of which latter one had been wrecked. The fort also contained a searchlight and an electric power plant, destroyed by fire. The fort suffered heavily from the Japanese bombardment.

A strong infantry trench runs south along Taiyangkou Ridge, terminating at the south end in a concrete battery containing six 15-cm. siege rifles on front pintle garrison carriages. No. 4 gun had either been shot in two at the chase or burst while firing. On the left of the concrete battery was a 15-cm. long naval gun in an earth emplacement. The concrete battery has a lookout on the right flank and a lower advanced infantry trench. Photographic views of the Taiyangkou Ridge taken from Fort Hsitaiyangkou are submitted herewith.

From South Taiyangkou the line runs across the valley separating Taiyangkou ridge from the knoll upon which lies Fort Hsitaiyangkou (Pl. XXV). The latter is a strong polygonal work with a salient gorge and ditches flanked by scarp and counterscarp galleries. The amount of masonry construction in this fort exceeded that of any other fort in the Russian lines of defense. Besides the scarp and counterscarp galleries, there were four masonry bombproofs on the parade. All masonry work is of concrete. The armament in place consisted of naval 12-pounders and 10.5-cm. siege rifles, as noted on the drawings. It was noted that whitewashed stones in the foreground were employed to furnish ranges to the Russian gunners, range tables being posted up in the batteries. The rocky slope in front of the fort has been scarped at two places, leaving vertical rock faces 12 to 15 feet high. The knoll upon which the fort is located was surrounded by a continuous infantry trench joined to the gorge of the fort. Hsitaiyangkou is the last permanent work in the Russian land line. It appears to have been beyond the range of the Japanese guns and bears no evidences of bombardment. The fort contains a 36-inch searchlight station and oil-engine power plant.

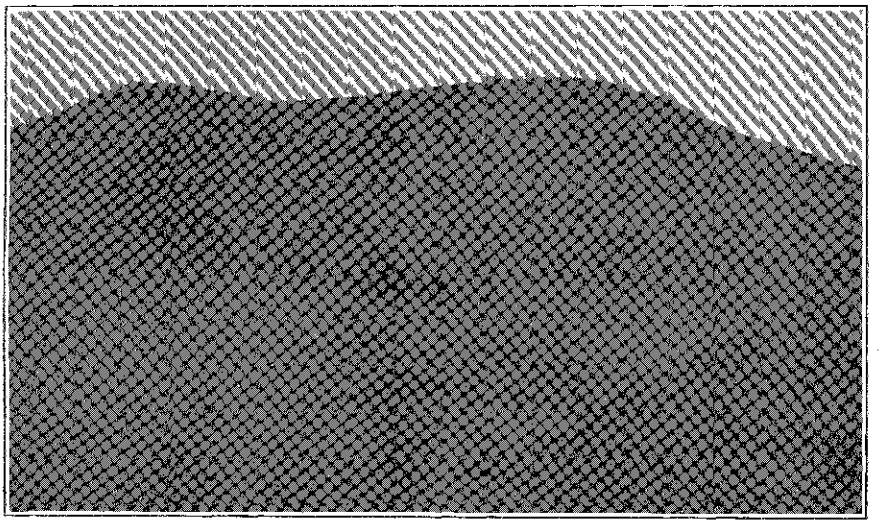
From Hsitaiyangkou the Russian land lines run south and southeast to the extremity of the Tiger's Tail Peninsula along a series of low knolls fronting the valley, beyond which lies the Laotiehshan promontory, which terminates the Liao-

tung Peninsula. These lines comprise redoubts, batteries, and trenches with overhead splinter proofs and bombproofs, and are sufficiently indicated on Plate XXXVII. As these works were beyond the sphere of the Japanese operations no detailed description is deemed necessary. Military pits were freely used on this part of the line, the character of the soil permitting of their construction.

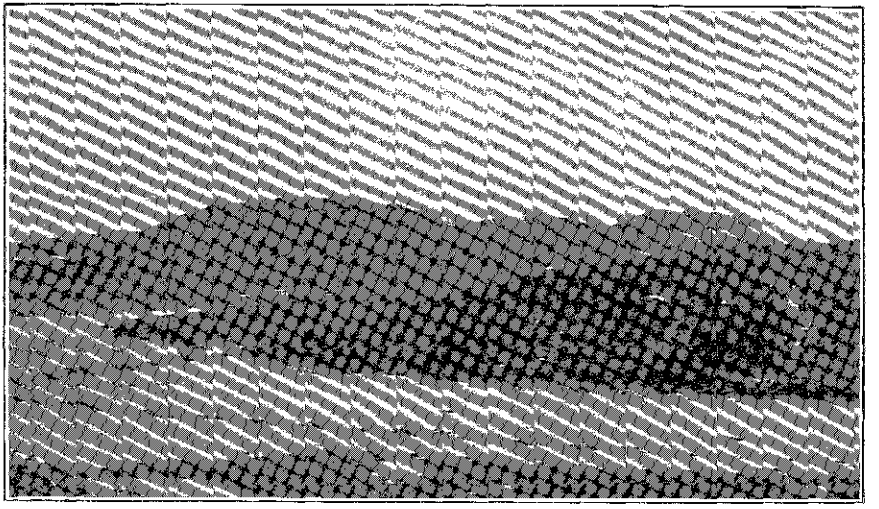
On Laotiehshan promontory, which attains a height of 1,000 feet, was at least one battery mounting two 15-cm. guns designed to fire on ships. Time did not admit of a visit to Laotiehshan, but the battery referred to as well as a signal station were visible from the southern hills about Port Arthur.

Beyond the inner line of defense in the western sector lies an outer line which leaves the inner line at Hsiaoantzushan and runs via Fort Itzushan along Long Ridge, Akasakayama, and terminates on 203-Meter Hill. Of the several works Fort Itzushan (Pl. XXVI) is the only permanent work. It will be seen that the fort is an irregular polygon with trace adapted to the outline of the hill on which the work is situated. Except at the northeast and northwest salients there are no ditches, owing to the configuration of the ground The entrances to the fort from these ditches are barred by iron gates. The armament suffered heavily from the Japanese bombardment and much had been put hors de combat. The fort has an electric power plant in a wooden building behind the gorge wall.

The trenches in Long Ridge, Akasakayama, and 203-Meter Hill are shown on Plate XXXVII. Except at 203-Meter Hill these are of ordinary type and call for no comment. The upper trench of 203-Meter Hill was of exceptional strength, being practically a continuous casemate covered with plate iron, heavy timbers, and earth. The infantry fired through horizontal slits and the machine guns through ports in the front wall of this casemated trench. The extreme steepness of the upper slopes of the ridge gave the Russians a tremendous advantage in the grenade warfare which was freely practiced. The Russians had planted earth mines liberally on all the approaches to the slopes, while torpedo war heads and paint cans filled with high explosives and rolled down the slopes added to the difficulties of the attack.



67. 203 METER HILL, FROM JAPANESE SIDE.



68. MANTOUSHAN, LOOKING SOUTH.

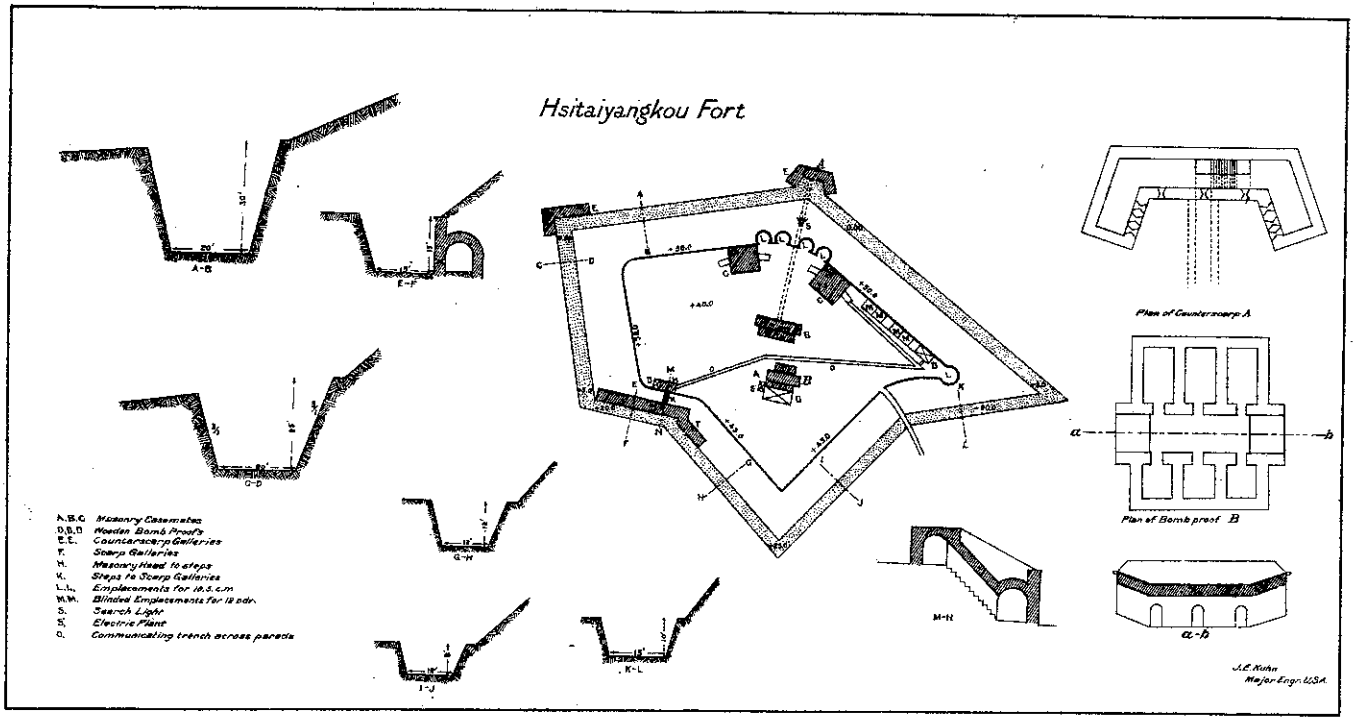

Hsitaiyangkou Fort
A-B
F-F
G-D
G-H
I-J
K-L
M-N
A, B, C. Masonry Casemates
D, D, D. Wooden Bomb Proofs
E, E. Counterscarp Galleries
F. Scarp Galleries
H. Masonry Head to steps
K. Steps to Scarp Galleries
L, L. Emplacements for 18 c.m
M, M. Blinded Emplacements for 18 cdn.
S. Search Light
S. Electric Plant
D. Communicating trench across parade
Plan of Counterscarp A
Plan of Bomb proof B
a-b
J.E. Kuhn
Major Engr. U.S.A.

PLATE XXV

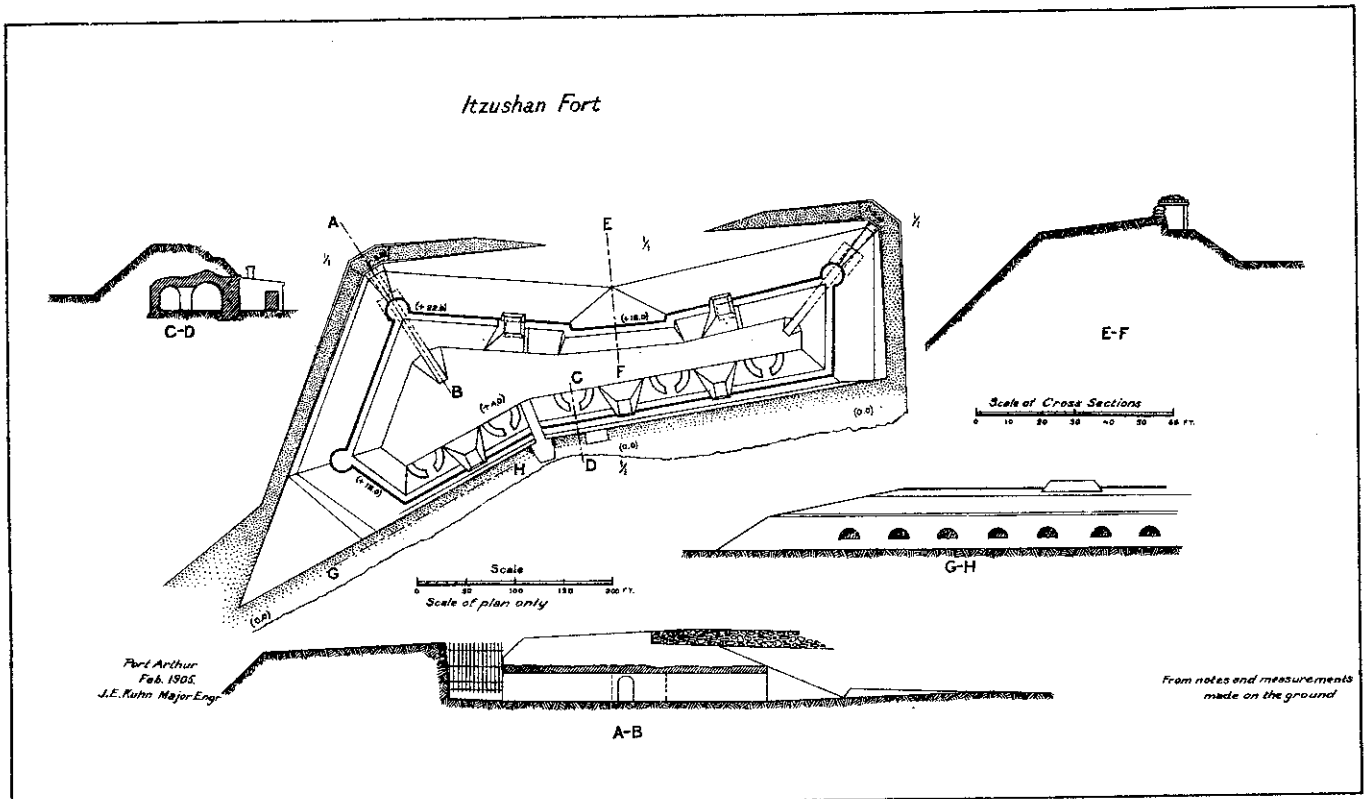

Itzushan Fort
C-D
A
E
B
C
F
H
D
G
Scale
Scale of plan only
E-F
Scale of Cross Sections
G-H
A-B
Port Arthur
Feb. 1905.
J.E. Kuhn Major Engr
From notes and measurements
made on the ground

PLATE XXVI

The Japanese at one time believed that the summit of the hill had been tunneled from front to rear to bring up reserves under cover, but no evidences of such construction could be found. It was not until the blinded trench above referred to had been literally shot to pieces with artillery that the Japanese succeeded in taking the position. Speaking of the final assault, a Russian merchant in Port Arthur confirmed the report of the effective Japanese artillery fire which swept the reverse slopes on that occasion and prevented the bringing up of reenforcements. He further stated that the Russians made several attempts to bring up reserves, even using convalescent and hospital attendants, but the attempts failed.

The appearance of 203-Meter Hill is shown by the photographs herewith.

SEACOAST DEFENSES.

The seacoast batteries covered a front of over 5 miles, with about an equal frontage on either side of the harbor entrance. Commencing on the right flank of the Tiger's Tail line, battery No. 102 (Pl. XXVII) is for five 15-cm. (6-inch) guns on pedestal mounts.

Next on the left is a battery for eight 23-cm. howitzers, of which four were mounted in line in the right half of the battery with no traverses to separate the guns. The left half of the battery is without armament. The two halves are separated by a 16-foot traverse, and each half has a frontage of 130 feet. The guns fire over a 10-foot parapet revetted with stone in the lower portion and with sand bags in the upper. On each flank of the battery is a small timber and earth observation station sunk into the parapet. The gun platforms are of timber and the racers out of all level. On the reverse slope behind the right flank is a magazine, old style, sunk into the slope, with an air passage all around the magazine chamber. The roof is covered by 2 feet of timber and 4 feet of earth. The entire battery is of an obsolete type, both as regards armament and construction, and is valueless in a modern fortification.

A somewhat similar battery is No. 104, mounting four 23-cm. howitzers on F. P. carriages, the battery being in

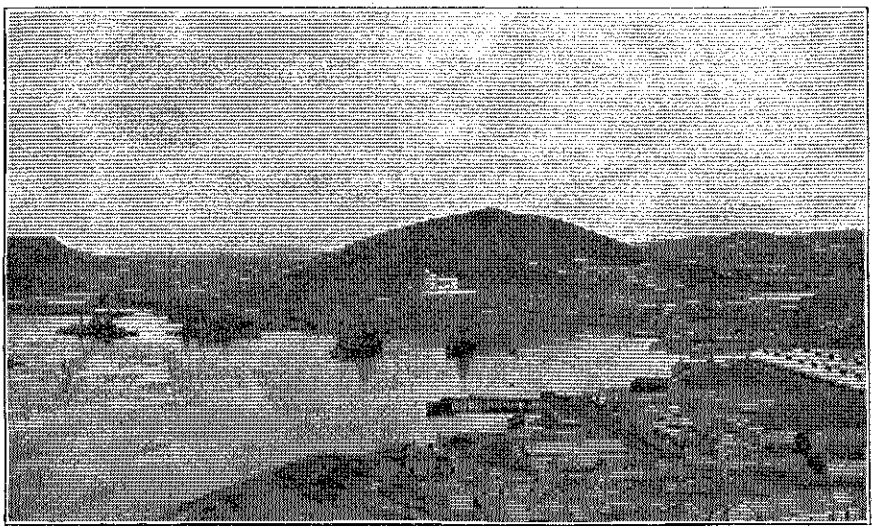
two halves, with a dividing traverse, observation station, and magazine, the same as No. 103. The guns fire over an 8-foot bank, and their platforms were in wretched condition. The guns were provided with shields $1\frac{3}{4}$ inches thick, 12 feet wide, and 3 feet 6 inches high.

Batteries Nos. 105 and 106 were for eight 23-cm. howitzers and four 28-cm. howitzers, respectively, occupying the highest ridge of the Tigers Tail, called Mantoushan by the Chinese. These batteries were of identical concrete construction, part plan and sections being shown on Pl. XXVII, which sufficiently explains the construction. The battery presents a fine example of concrete work and makes a handsome appearance. The value of the 23-cm. howitzers as a coast-defense gun would, however, scarcely seem to warrant such expensive emplacements. The traverses are crowned about 1 foot at the ridge and covered with a half-inch layer of asphalt. The tops of the traverses are reached from the gun pits by vertical iron ladders. One of the 28-cm. howitzers was dismounted, having a cracked trunnion band.

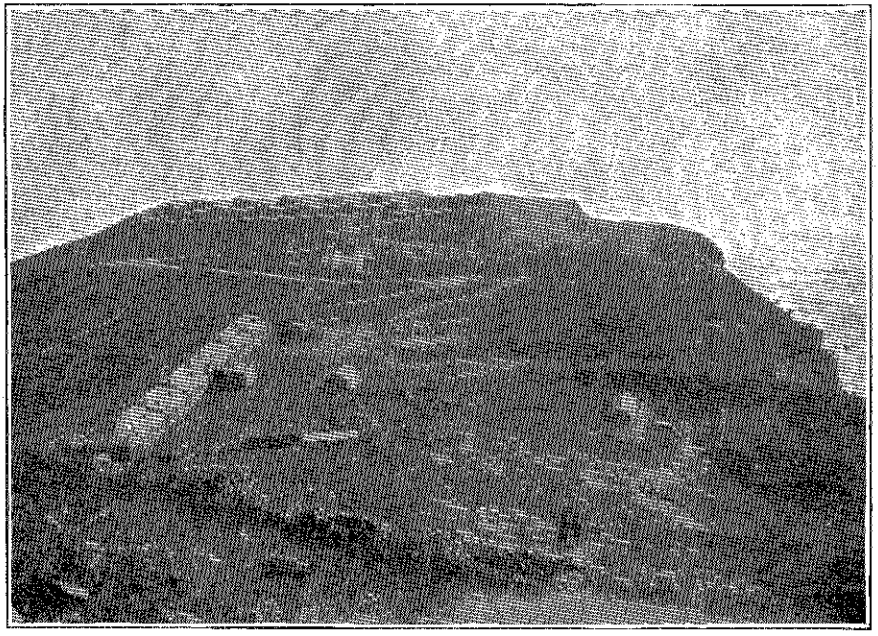
Battery No. 107 is for five 15-cm. guns and is identical in all respects to battery No. 102. The muzzle of the guns barely projects beyond the interior crest, and the concrete of the superior slope was considerably eroded by the blast. These guns appear to have fired considerably seaward, probably at the ships of the several blockading expeditions attempted by Admiral Togo. The guns of this battery were also observed to fire landwards during the siege, their mounts permitting an all-around traverse.

Farther to the left, behind a low ridge back from the water's edge, is battery No. 108, for seven 15-cm. siege rifles, mounted on C. P. garrison carriages. The battery is of earth, with 14-foot traverses between the gun pits, which are 22 feet wide. The guns fire over a 6-foot revetted parapet. Only three guns were mounted at the time of inspection. The battery is a crude specimen of work in a modern system of fortifications.

To the left front of the last battery, near the water's edge, are three 12-pounder naval mounts (one with shield) in open emplacements of earth and sand bags. The battery is well



69. QUAIL HILL, FROM GOLDEN HILL.



70. ELECTRIC BATTERY.

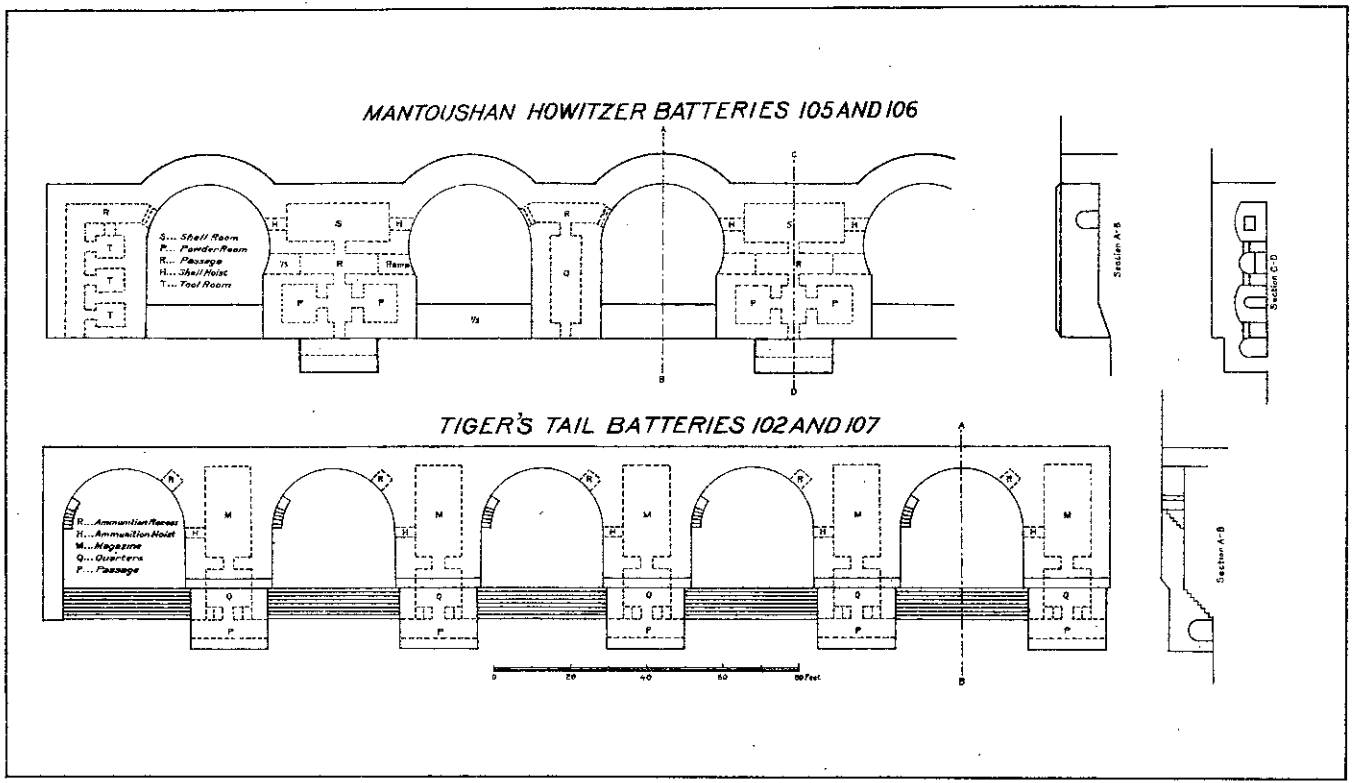

MANTOUSHAN HOWITZER BATTERIES 105 AND 106
S... Shell Room
P... Powder Room
R... Passage
H... Shell Hoist
T... Tool Room
Ramp
Section A-B
Section C-D
TIGER'S TAIL BATTERIES 102 AND 107
R... Ammunition Recess
H... Ammunition Hoist
M... Magazine
Q... Quarters
P... Passage
0
20
40
60
80 Feet
Section A-B

PLATE XXVII

placed for defense against a raid by torpedo boats and was evidently placed for this purpose. On a steep little knoll immediately behind the battery is a bombproof lookout station, apparently a signal station for ships. Three searchlight stations and two power plants were located as shown on Plate XXXVII. The power plant behind battery No. 103 consists of a portable boiler and engine with a six-pole belt-driven dynamo, all of Russian manufacture. The plant behind battery No. 107 comprises portable boiler and engine of English manufacture with a belt-driven Siemens-Halske dynamo.

Passing now to the east side of the harbor entrance we come first to the Golden Hill mortar battery (No. 1), which occupies the summit of the hill which flanks the harbor entrance on the east. The battery provides emplacements for six 28-cm. howitzers and two rapid-fire guns on the left flank, the latter being vacant. The construction and general features of the battery are shown on Plate XXVIII. Howitzer No. 1 had been put hors de combat by a 12-cm. shell fired from 203-Meter Hill naval battery, but the remaining armament was uninjured. The shell rooms of the battery were provided with ceiling trolley ways made of two angle bars, thus ⌊ ⌋. The shell is transported to the shell opening leading to the floor of the pit and lowered onto a shell truck, which conveys the shell to the gun, where it is hoisted to the breech by block and tackle. This battery had suffered some damage from the Japanese naval battery on 203-Meter Hill, to which its rear is directly exposed at a range of 7,000 yards. The concrete of the battery was chipped and dented at a number of places, but no walls pierced. As a partial protection against this reverse fire, sand-bag traverses had been piled up at the rear of several of the gun pits. Thirteen unexploded Japanese 28-cm. shells were found lying in a pile on the ground in rear of the battery. These were apparently shells that had been fired at the cruiser *Bayan*, which lay close up to the slope of the hill in the east harbor. A careful inspection failed to reveal any hits on the battery by 28-cm. mortars.

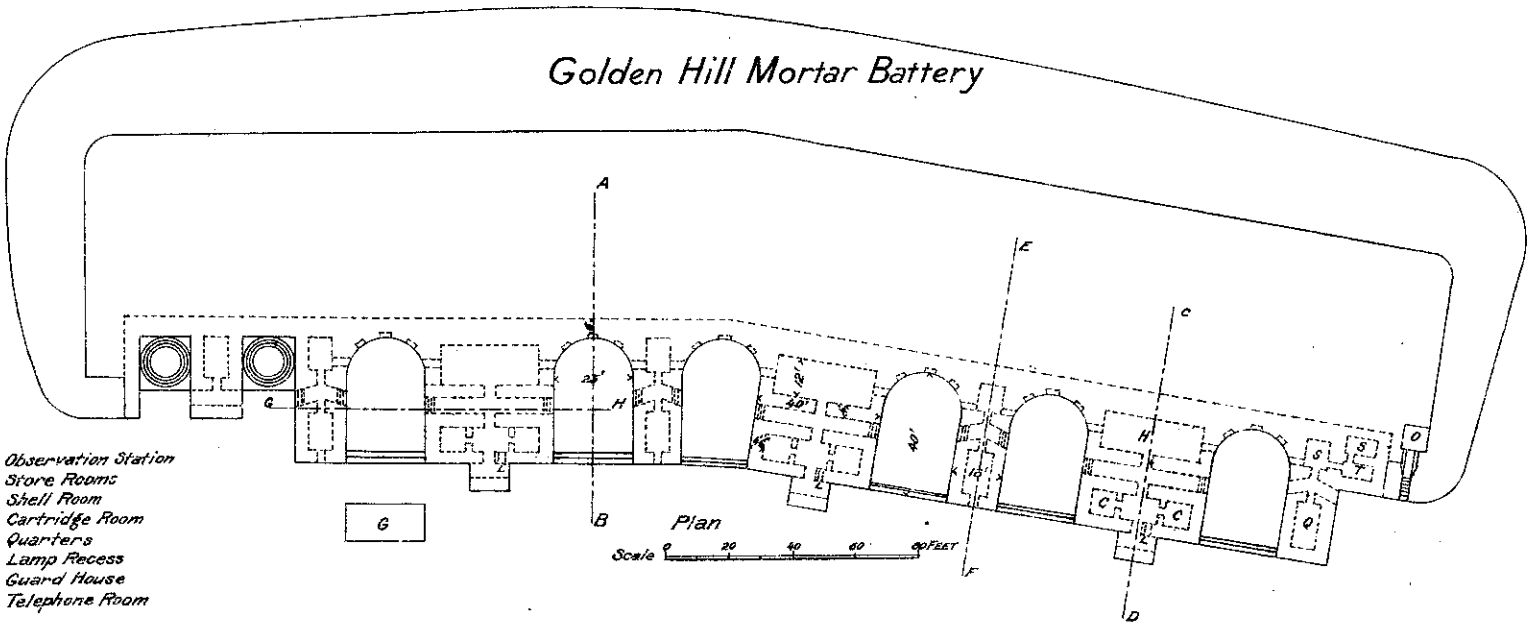
In front of Golden Hill, on an advanced but lower knoll known as Electric Cliff, is the Electric Battery (Pl. XXIX)

mounting five 10-inch high-power guns en barbette. Emplacements for two rapid-fire guns are constructed on the right flank, but these were vacant. Entrance to the magazines and interior rooms was forbidden, so their arrangements could not be definitely ascertained. The loading platforms of the carriages are inclosed by a semicircular steel hood 1 inch thick and 14 feet long. The shell is hoisted from the floor of the gun pit to the breech of the gun through an opening in the loading platform by a system of levers. The battery is electrically lighted, the oil-engine plant being located in a brick building on lower ground in rear of the battery. A view of the battery from the forward slope of Golden Hill is attached hereto. The guns had an all-round traverse and the left-flank gun could be brought to bear landwards and was employed to shell the Japanese siege batteries. The battery bore no trace of any bombardment. The battery has two observing stations only a few feet apart sunk into the parapet on the right flank.

To the left of the Golden Hill and electric batteries is a fine concrete battery for five 15-cm. guns on pedestal mount, No. 4 on Plate XXXVII, some distance back from the water's edge. This battery is clearly shown on Plate XXX, and calls for no further observation. A pivoted frame at the end of the loading platform was employed for lifting the shell from the floor of the gun pit to the breech of the gun. This frame was so designed that when lowered to the floor the shell tray would travel to the bottom of the frame. After the shell had been placed in the tray the pivoted frame would be swung upward and outward to a horizontal position, the tray traveling upward and forward and bringing the shell into position for ramming into the breach. This work had not been bombarded and was uninjured.

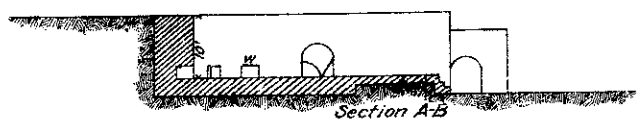
Battery No. 5, on Plate XXXVII, is an old Chinese brick seacoast fort of rectangular trace, with masonry gorge and flanks and earthen front. It resembles generally the type of works built in the United States in 1850. It contained emplacements for seven guns, two of which were occupied, one by a 15-cm. siege gun on old pattern garrison carriage and one by a 3-inch field piece.

Golden Hill Mortar Battery



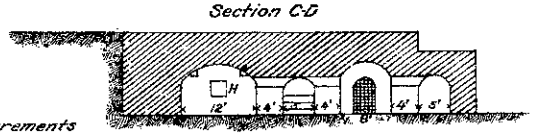
O Observation Station
S Store Rooms
H Shell Room
C Cartridge Room
Q Quarters
L Lamp Recess
G Guard House
T Telephone Room

Six 28 c.m. (11.2") Mortars
2 R.F. Guns

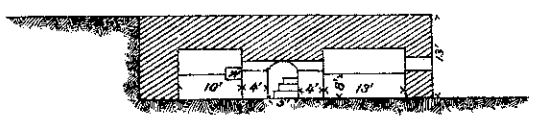


W Window
H Shell hoist
R Recess

Section C-D



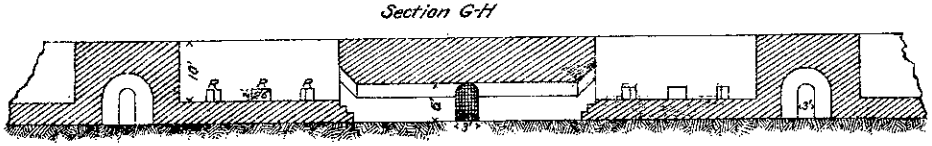
Section E-F



From notes & measurements made on the ground.

Joseph E. Kuhn,
Major of Engineers.
February 1905.

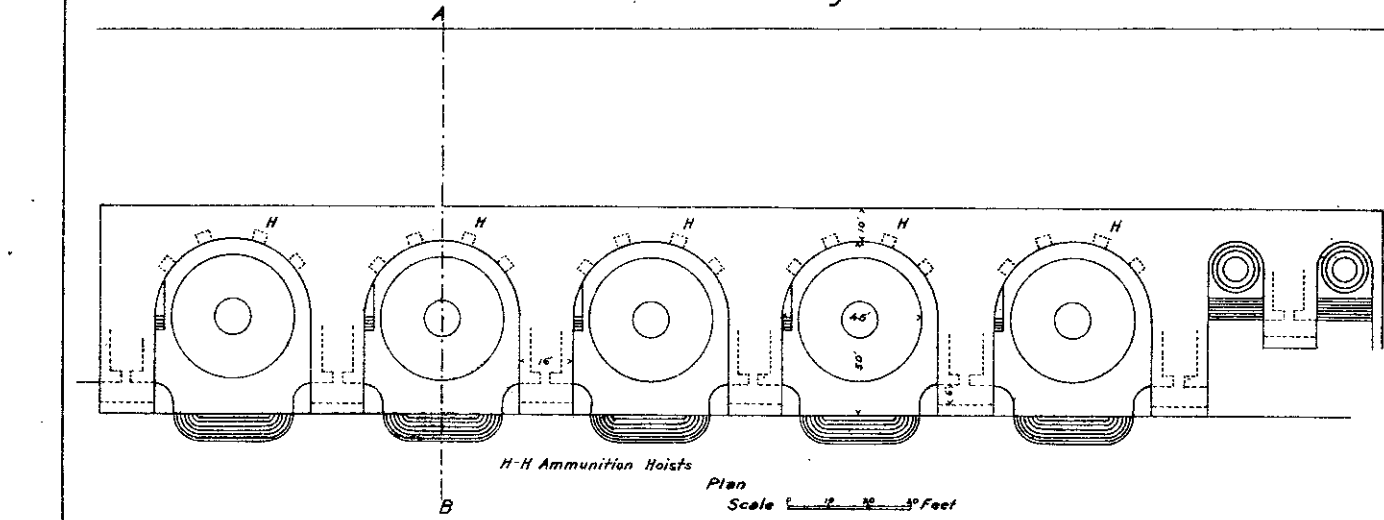
Section G-H



Scale 0 10 20 30 40 FEET

PLATE XXVIII

Electric Battery



Plan
Scale 0 10 20 30 Feet

Section A-B
Scale 0 10 20 30 Feet

From notes and measurements made on the ground.
Joseph E. Kuhn,
Maj. of Engineers. U.S.A.
Port Arthur. Feb. 1905.

PLATE XXIX

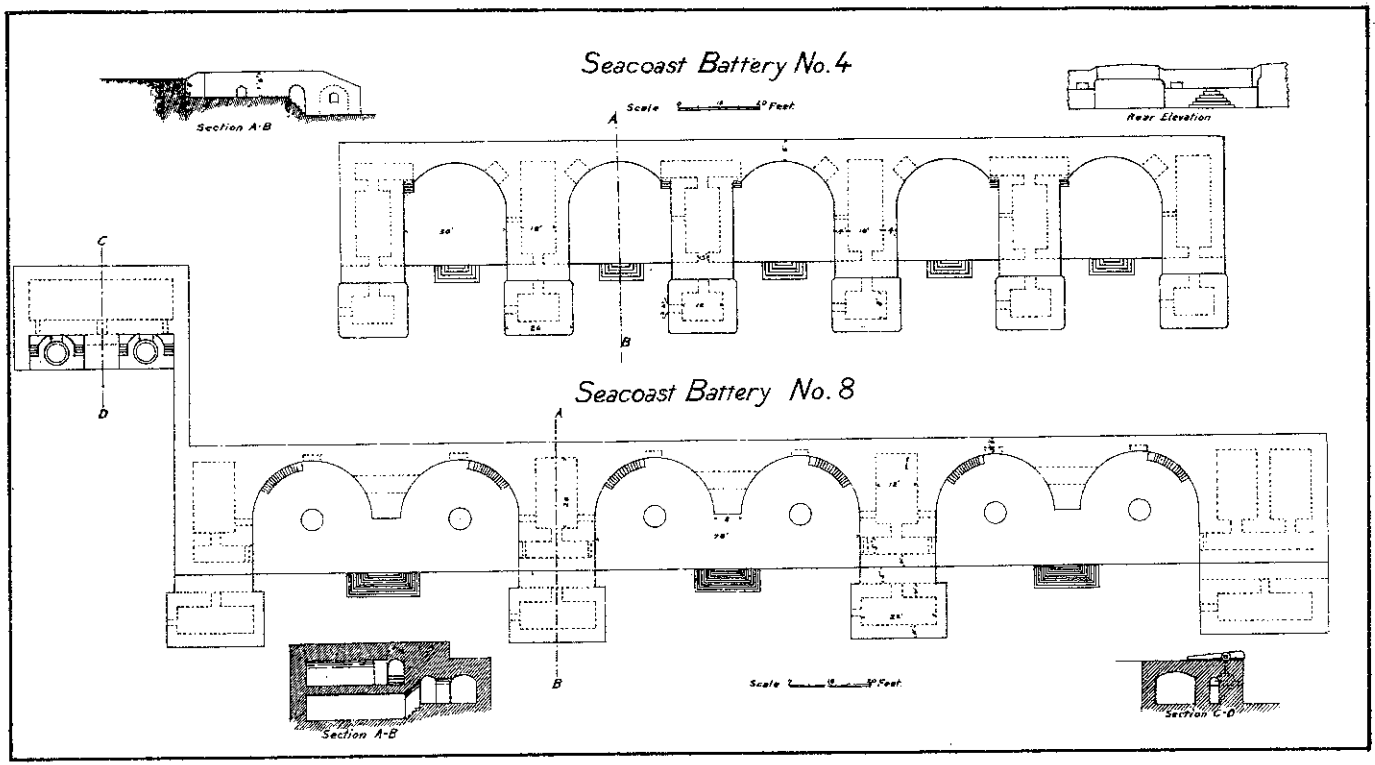

Seacoast Battery No. 4
Section A-B
Scale
Feet
Rear Elevation
A
B
C
D
Seacoast Battery No. 8
Section A-B
Scale
Feet
Section C-D

PLATE XXX

In rear of the old Chinese fort on the ridge is an old-style earth battery, mounting eight 9-inch very short rifles of Krupp pattern, bearing date of 1870, on front pintle seacoast carriages with inclined chassis rail. The platforms were of timber, very poorly built, and rough and uneven. The guns were located in pits about 35 feet wide, with 30-feet traverses between, and fired over a 7-foot bank, revetted with sand bags. A sunken road runs in rear of the battery, and from this road run two covered passageways to the reverse slope, where are located two magazines of Chinese origin similar to those on the Tiger's Tail Peninsula. Farther down on the reverse slope is an electric plant, consisting of oil engine and belt-driven dynamo.

Farther east on a high knoll is another old earthen battery, No. 7, mounting four 23-cm. howitzers and one 10-inch high-power seacoast gun on Krupp center pintle carriage. The howitzers were located in pairs in two pits, the 10-inch gun occupying a third pit, with intervening traverses. At each flank of the battery was a sunken observation station of earth and timber. The traverses and rear slope of the roadway in rear contained the ammunition recesses and bombproofs. The 10-inch gun platform was of concrete and those of the howitzers of timber. The 10-inch gun fired landward during the siege. Neither of the two foregoing batteries showed any marks of bombardment.

In front of battery No. 7, on a lower knoll near the water's edge, is a new concrete battery, No. 8, for six 22-cm. howitzers on center-pintle carriages and for two rapid-fire guns on pedestal mounts. As in other cases, the rapid-fire gun emplacements were vacant. Plan and sections of this battery are shown on Plate XXX, which will serve to explain its construction sufficiently. Attention is invited to the double tier of chambers under the traverses, the upper being used as a shell room and the lower as a powder room. Behind the right-flank traverse is a chamber utilized for an electric plant, consisting of a direct-coupled oil-engine plant made by Koerting Brothers, near Hanover, Germany. The battery appears to have been shelled heavily by the Japanese, numerous fragments of 15-cm. and 28-cm. shells lying about, and the concrete had suffered considerable damage at corners and edges. No. 4 gun had been dismounted by a shell, but

the remaining armament was intact. In only one place had a shell landed squarely upon the upper surface of the concrete, and this was on the roof of the electric-plant chamber, where a 15-cm. shell had gouged out a hole some 10 or 12 inches deep. A careful inspection of the interior of the chamber failed to reveal the slightest evidence of any cracking or scaling, although the thickness of concrete was not more than 5 feet. The general quality of the concrete appeared poor, several of the pintle blocks having cracked under firing and having been banded with iron hoops.

The line of seacoast defenses terminated at battery No. 9. This work contained five 15-cm. (6-inch) guns on pedestal mounts. This battery is built mainly of sand bags, having a concrete slab on the superior slope, about 1 foot thick and extending 37 feet to the front. No. 4 gun was burst at the forward end of the trunnion band, and No. 5 gun bore the mark of the base of a 3-inch shell on its chase, but appeared to be still serviceable. The guns fire over a 6 to 7-foot bank and are located in pits 25 feet wide with 17-foot traverses between. The traverses have passages at the front and joining adjacent pits and at the rear end, giving a continuous communication in rear of the gun pits. These passages are all covered with timber and earth. Ammunition recesses are located under the parapet at the front of the pits, while the magazine is sunk in the ground in rear, being reached by a covered passage from the battery extending beyond the magazine and emerging on the reverse slope. Three electric-power plants and two searchlight stations were found in the eastern sector of seacoast defenses and are located on Plate XXXVII.

Battery No. 11 was for five 15-cm. guns on pedestal mounts, similar generally to seacoast battery No. 4. This battery had evidently been completed only very recently and was without armament. Although intended to fire mainly landward, the battery construction followed that of the seacoast batteries for 15-cm. guns.

The seacoast defenses of Port Arthur proved somewhat of a surprise, in view of all that had been written regarding their formidable character. With the exception of the electric battery, containing five high-power 10-inch guns, there

was not a single battery that merits serious consideration as a formidable work. The 15-cm. (6-inch) guns, while good enough in their way, were not even high power in the present sense of the word, none exceeding 35 calibers length. The 28-cm. howitzers, of which there were ten all told, fire only a 500-pound shell and fall far short of the power of the 12-inch mortars used in our own seacoast defenses.

The drawings of the seacoast batteries submitted herewith were made from pacing and estimation of the dimensions, with as careful notes as were possible under the circumstances. While not absolutely correct as to dimensions, they are so essentially, and afford all necessary information as to their character. An examination of these drawings will serve to show that in their general features the seacoast batteries at Port Arthur bear a striking resemblance to our own. The chief points of difference lie in their relatively more simple arrangements and in the more limited use of masonry to secure cover both vertically and horizontally. In the Electric Battery there are 10 feet of concrete in front of the guns, the greatest observed. All other batteries had from 4 to 6 feet only. The maximum thickness of vertical cover noticed was under 6 feet, the limiting thickness appearing to be about 1½ meters. Provision for fire control, so far as were observable, appear to have been limited to simple observation stations some 6 feet square sunk in the parapets on the flanks of the batteries. These stations were of timber, with a light overhead cover of timber and earth, reenforced occasionally by plate iron. The instruments seen through cracks in the doors were apparently simple azimuth instruments. Whatever the ultimate intentions of the Russians may have been regarding fire control installation, there certainly was no evidence of any of the complicated, elaborate, and expensive system proposed by our Coast Artillery. The batteries were all open to the rear and were perfectly dry, but as the inspection was made in January and February, there is no telling what their condition in this respect may be in summer.

EFFECTS OF SHIPS' FIRE ON SEACOAST BATTERIES.

With regard to the effects of ships' fire on seacoast forts, there was a total absence of evidence of any certain bombardment by the ships.[a] In the vicinity of Golden Hill howitzer battery a steel shell of large caliber was noticed, and the earth superior slope of the same battery had been repaired at a point where a large shell had evidently made a crater; but whether this was from a land or ship gun is unknown. A careful watch was kept on all the seacoast batteries for evidences of ships' fire, but with the doubtful instances above noted none could be found.

In view of the numerous press reports of bombardments of Port Arthur by the Japanese fleet during the first months of the war, efforts were made to ascertain the facts in the case from inhabitants of the town. From their statements it appears that the Japanese fleet did frequently bombard, but their fire was directed against the ships in the harbor and the town, and not against the seacoast batteries. This fire was at first directed over Golden Hill and Tiger's Tail, but owing to the danger from floating mines, and possibly also from the 10-inch guns in the Electric Battery, the Japanese fleet directed its later bombardment from the west over Laotiehshan and Pigeon Bay. The inhabitants questioned on the subject were of the opinion that the Electric Battery rather than the mechanical mines was responsible for the change in position of the Japanese fleet; but in view of the destruction of the *Hatsuse* and *Yashima* by mines, it seems possible that Admiral Togo was influenced more by the latter in changing his position during his later bombardments.

Apparently the Japanese naval commanders appreciated the importance of preserving the ships for naval operations against the Russian fleets and were unwilling to risk any losses by serious bombardments of the forts. That their decision was a wise one will probably not be questioned, but

[a] A Japanese official report states that on August 23, 1904, the cruisers Nisshin and Kasuga bombarded seacoast battery No. 9, and silenced same. The battery bore no evidence of such bombardment. A Japanese official report also admits some losses in the fleet from the shore batteries in the engagement of February 9, 1904.

at the same time it can not but be regretted that the opportunity presented for measuring the strength of ships against forts was not put to the test. The effects of ships' fire on modern seacoast batteries received no practical demonstration in the Russo-Japanese war, and this much-vexed question must still continue to be a matter of uncertainty.

CHARACTER OF CONCRETE CONSTRUCTION AND ITS SUITABILITY AS A MATERIAL FOR BUILDING FORTS AND BATTERIES.

The Russians employed concrete almost exclusively for the masonry work of their forts and batteries. It was largely made of rounded pebbles, and much of it was of indifferent quality, far inferior to what would be acceptable in the United States. The cement employed was of a Portland Russian manufacture, and there is no reason to suppose that it would not make a good concrete. Where damaged by artillery fire the concrete was frequently observed to be porous and friable, as if insufficiently compacted. Much of it was also shelly and seamy, no pains having been taken to secure a monolithic structure. No doubt the poor quality of the concrete was largely due to the employment of unskilled Chinese labor in the construction of the defenses.

Notwithstanding the indifferent quality of the concrete, it appears to have answered the purpose well when subjected to bombardment. Shells striking corners or edges naturally chipped out chunks of masonry, but there was not a single instance of a magazine or chamber penetrated along the entire front. There was no evidence of the Russians having employed armored or reenforced concrete in any of their works.

So far as the results at Port Arthur go, concrete will continue to be a most useful material in building forts and batteries, combining as it does economy and good resisting qualities.

RUSSIAN MAGAZINES.

From statements made by the inhabitants it appears that a total of four magazines were destroyed during the bombardment, either directly by artillery or by conflagrations started in their vicinity. These were all old structures of Chinese origin, located in the vicinity of the old town and insufficiently sheltered.

The Russians had constructed at least three new modern storage magazines of concrete, located as shown on Plate XXXVII, one on Tiger's Tail, one in rear of battery No. 6, and one in the old Chinese fort in front of 192-Meter Hill. These were built in well-sheltered spots, close up against a steep bank, and were wholly above ground and uncovered. Their roofs and walls were about 5 feet thick. The interior was ventilated by ventilators projecting through the roof. The Russians evidently recognized the impracticability of securing reasonably dry magazines in sunken structures, and sensibly built them above ground with free exposure to sun and air, depending for protection upon the location. None of these magazines were touched by the Japanese artillery.

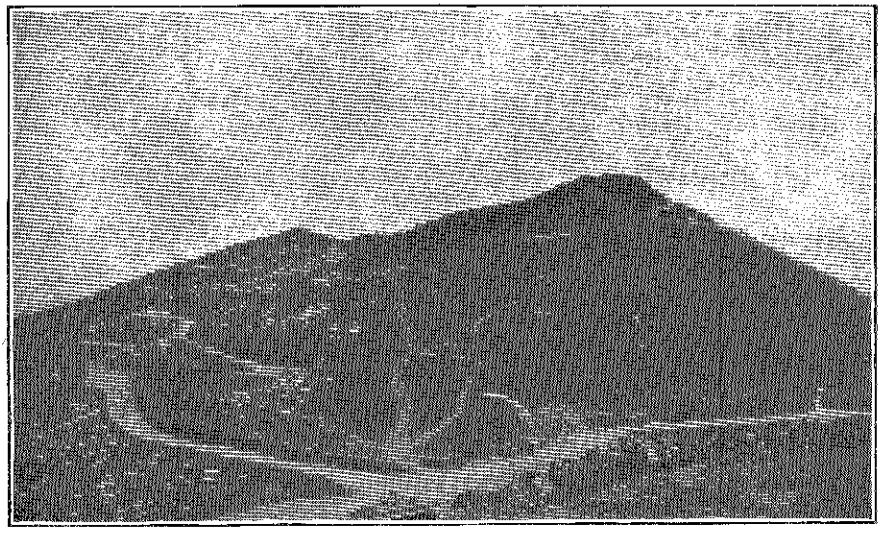
RUSSIAN ROADS.

Owing to the hilly character of the ground upon which the defenses are located, roads were imperatively needed to reach the different points of the line. In rear of the front of the eastern sector of defense, and sheltered behind the ridges upon which were located batteries H, M, N, R, etc., the Russians have built an excellent road, mostly by cutting into the rocky hillside. A similar specially built road leads up to the Antzushan forts. Many of the former Chinese roads had also been improved, so that every point of the line of defense was accessible by good roads suitable for the transport of heavy guns, ammunition, and supplies. The appearance of these roads may be judged from the photographic view. The layout of the roads is clearly shown on Plate XXXVII.

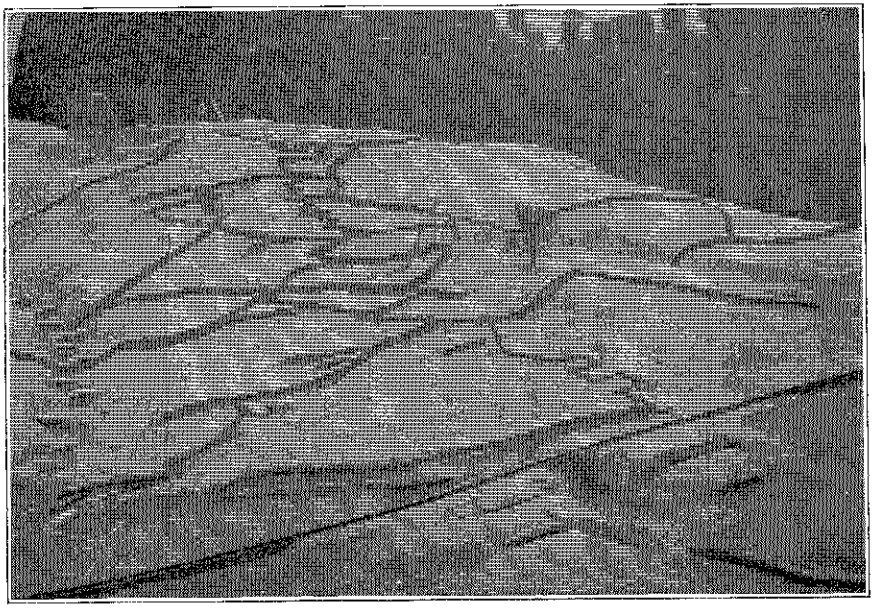
SIEGE ARTILLERY.

The organization and equipment of siege artillery employed by the Japanese during the siege of Port Arthur are given in the subjoined table:

Organization in charge and designation of pieces.	Guns.	How-itzers.	Mortars.
First Regiment Fortress Artillery:			
4 batteries	24	.....	.....
12-cm. bronze siege rifles and 4 batteries 15-cm. howitzers	.....	16	.....
Second Regiment Fortress Artillery, 8 batteries 15-cm. bronze mortars	.....	.....	48
Third Regiment Fortress Artillery:			
1 battery	4	.....	.....
10.5-cm. Krupp siege rifles, 1 battery	6	.....	.....
12-cm. bronze siege rifles and 4 batteries 15-cm. bronze mortars	.....	.....	24
Independent battalion, 4 batteries 9-cm. steel mortars	.....	.....	24



71. TWIN PEAK (168 METER HILL), FROM SOUTHWEST, SHOWING TYPE OF RUSSIAN MILITARY ROADS.



72. MODEL OF SEIGE WORKS AGAINST ERHLUNGSHAN.

Organization in charge and designation of pieces.	Guns.	How-itzers.	Mortars.
Independent groups:			
28-cm. howitzers		18	
7 batteries 12-cm. field howitzers[a]		28	
Field artillery brigade, 12 batteries field guns[b]	72		
Divisional artillery:			
Seventh Division, 2 mountain and 2 field batteries	24		
Ninth and Eleventh Divisions, mountain guns	72		
First Division, field guns	36		
Naval brigade (four 15-cm., ten 12-cm., and eighteen 12-pounders)	32		
Total	270	62	96

[a] Four howitzers knocked out and 7 batteries reorganized into 6 batteries.
[b] Three batteries moved north Nov. 17, 1904.

While this armament may appear formidable in numbers, much of it was of low power and obsolete pattern, notably the thirty 12-cm. bronze siege rifles and the twenty-four 9-cm. steel mortars. The small number of high-power guns and the large proportion of howitzers and mortars are specially noteworthy. The naval 15-cm. and 12-cm. and the Krupp 10.5-cm., aggregating twenty guns all told, comprised the entire armament of direct-fire high-power siege guns. In other words, the Japanese relied mainly on indirect fire from heavy howitzers and mortars to search out the defenses located behind the natural cover so freely afforded by the hilly topography.

The disposition of the siege artillery is given on Plate XXXI. This plate gives the location of all the siege batteries, with changes made during the progress of the siege, with the exception of one battery of two 12-cm. naval guns, which were fired in a casemated battery behind the crest some 500 yards to the left rear of Battery E. This 12-cm. battery was maintained in this retired position for about a month at the beginning of the siege, firing at extreme ranges up to 13,000 yards by sinking the trail into a trench. The casemates in which this battery was placed had a roof of steel rails in contact with 6 inches of timber, 3 layers of sand bags, and 3 feet of earth. The sides of the casemate consisted of 4 to 5 thicknesses of sand bags with loose earth outside. The embrasure admitted of 40° horizontal fire.

Three kinds of projectiles were employed by the naval guns, armor-piercing, semiarmor-piercing, and common shell. The explosive charges in the 12-cm. (4.7-inch) shell were as follows: Armor-piercing, 1.942 kilos picric acid; semiarmor-

piercing, 0.860 kilo picric acid; common shell, black powder bursting charge.

An unexploded 12-cm. naval shell picked up in Port Arthur showed a bursting charge of yellow picric acid in a solid cake, evidently poured in and allowed to harden. The primer of this shell had operated, but failed to detonate the charge.

The use of such heavy ordnance as the 28-cm. howitzers marks a new departure in siege warfare. This heavy gun weighs 10,730 kilos, or about 23,000 pounds. The carriage weighs 5,310 kilos and the metal platform 8,444 kilos. The shell weighs 220 kilos, or about 484 pounds, and has a bursting charge of 7.6 kilos, or about 16.7 of black powder. Practically all the shell fired by the 28-cm. howitzers were common cast-iron shell. A few high-explosive shell were also noted among the ammunition supply of the batteries, and one blinded shell was found along the front of attack. A considerable number of 28-cm. shell failed to explode, and many blind projectiles were found lying in and about the different forts.

The 6-inch naval guns and the 28-cm. howitzers were mounted on concrete platforms.

The 28-cm. platform is so constructed as to admit of the anchor bolts being withdrawn and saved when the mortars are to be moved. This is effected by the use of a slotted cast-iron washer set at the bottom of a 3-inch pipe. By loosening the nut and giving the bolt a quarter turn the bolt can be withdrawn and used again. The cast-iron bedplate of the platform is made up of twelve segments and a central pivot. The different segments are bolted to the concrete and joined by two circular rings with large screw bolts. There are fifty-two bolts in the platform. The carriage consists of two inclined chassis rails with a top carriage on which the gun rests by its trunnions. Under the ends of the chassis rails are four massive roller bearings capable of adjustment as to bearing on the racer by means of a large capstan screw. A recoil buffer lies between the chassis, but inasmuch as the recoil at 45° is nearly normal to the chassis, its functions appear to be more for the purpose of checking motion when running into battery than for checking recoil.

The 28-cm. howitzers were used for bombarding the ships in the harbor and also the masonry forts and 203-Meter Hill.

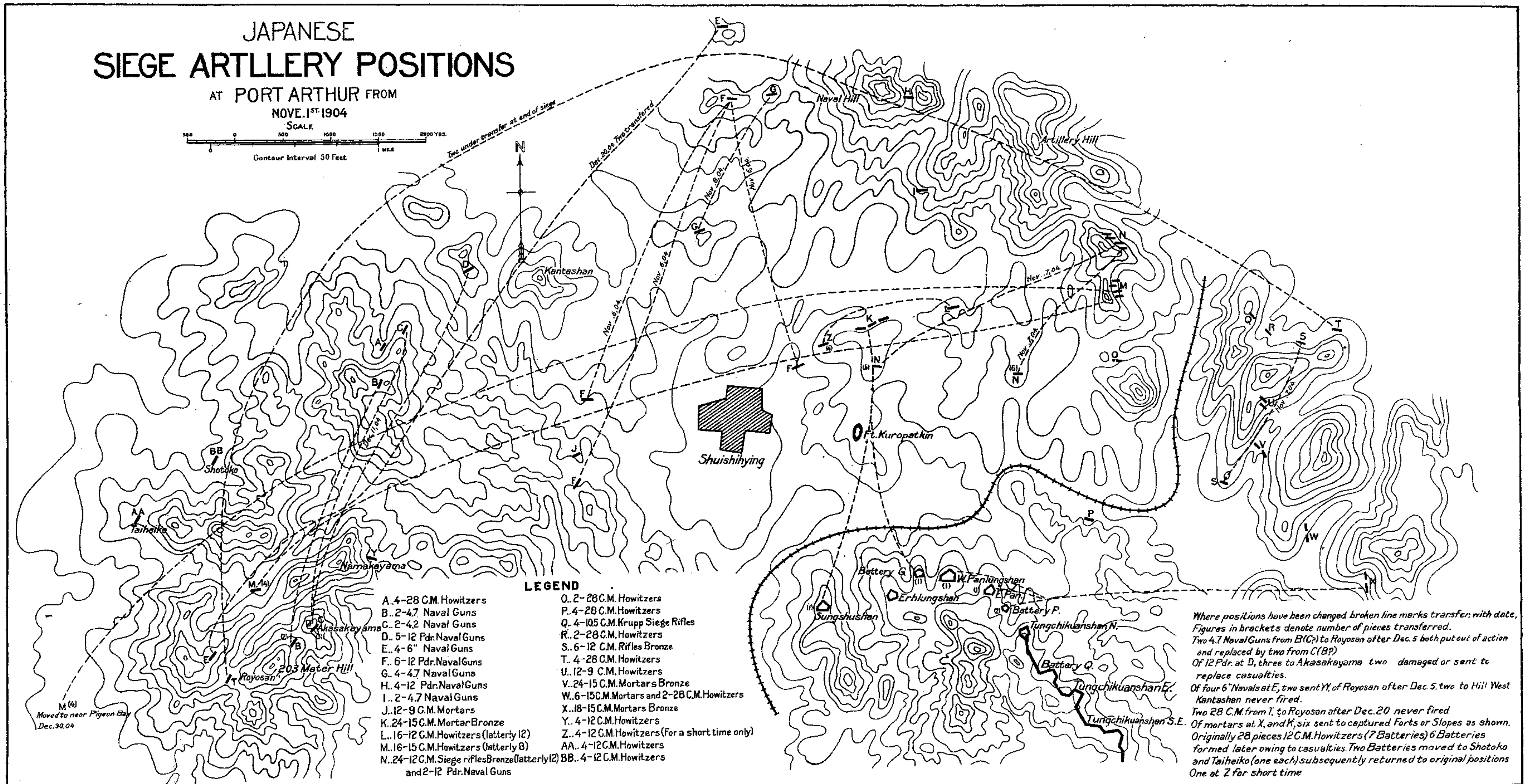

JAPANESE
SIEGE ARTLLERY POSITIONS
AT PORT ARTHUR FROM
NOVE. 1ST. 1904
SCALE
500 0 500 1000 1500 2000 YDS.
0 1 MILE
Contour interval 50 Feet
N
Two under transfer at end of siege
Dec. 20, 04. Two transfered
Nov. 8, 04.
Nov. 6, 04.
Nov. 6, 04.
Nov. 6, 04.
Nov. 7, 04.
Nov. 7, 04.
Nov. 7, 04.
Dec. 11, 04
Naval Hill
Artillery Hill
Kantashan
Shuishihying
Ft. Kuropatkin
Shotoko
Taiheiko
Namakayama
Akasakayama
203 Meter Hill
Royosan
M (4)
Moved to near Pigeon Bay
Dec. 30, 04
Battery G.
W. Panlungshan
E. Pan.
Erhlungshan
Sungshushan
Battery P.
Tungchikuanshan N.
Battery Q.
Tungchikuanshan E.
Tungchikuanshan S.E.
LEGEND
A..4-28 C.M. Howitzers
B..2-4.7 Naval Guns
C..2-4.2 Naval Guns
D..5-12 Pdr. Naval Guns
E..4-6" Naval Guns
F..6-12 Pdr. Naval Guns
G..4-4.7 Naval Guns
H..4-12 Pdr. Naval Guns
I..2-4.7 Naval Guns
J..12-9 C.M. Mortars
K..24-15 C.M. Mortar Bronze
L..16-12 C.M. Howitzers (latterly 12)
M..16-15 C.M. Howitzers (latterly 8)
N..24-12 C.M. Siege rifles Bronze (latterly 12) and 2-12 Pdr. Naval Guns
O..2-28 C.M. Howitzers
P..4-28 C.M. Howitzers
Q..4-10.5 C.M. Krupp Siege Rifles
R..2-28 C.M. Howitzers
S..6-12 C.M. Rifles Bronze
T..4-28 C.M. Howitzers
U..12-9 C.M. Howitzers
V..24-15 C.M. Mortars Bronze
W..6-15 C.M. Mortars and 2-28 C.M. Howitzers
X..18-15 C.M. Mortars Bronze
Y..4-12 C.M. Howitzers
Z..4-12 C.M. Howitzers (For a short time only)
AA..4-12 C.M. Howitzers
BB..4-12 C.M. Howitzers
Where positions have been changed broken line marks transfer, with date.
Figures in brackets denote number of pieces transferred.
Two 4.7 Naval Guns from B(C?) to Royosan after Dec. 5 both put out of action and replaced by two from C(B?)
Of 12 Pdr. at D, three to Akasakayama two damaged or sent to replace casualties.
Of four 6" Navals at E, two sent W. of Royosan after Dec. 5. two to Hill West Kantashan never fired.
Two 28 C.M. from T. to Royosan after Dec. 20 never fired
Of mortars at X, and K, six sent to captured Forts or Slopes as shown.
Originally 28 pieces 12 C.M. Howitzers (7 Batteries) 6 Batteries formed later owing to casualties. Two Batteries moved to Shotoko and Taiheiko (one each) subsequently returned to original positions
One at Z for short time

PLATE XXXI

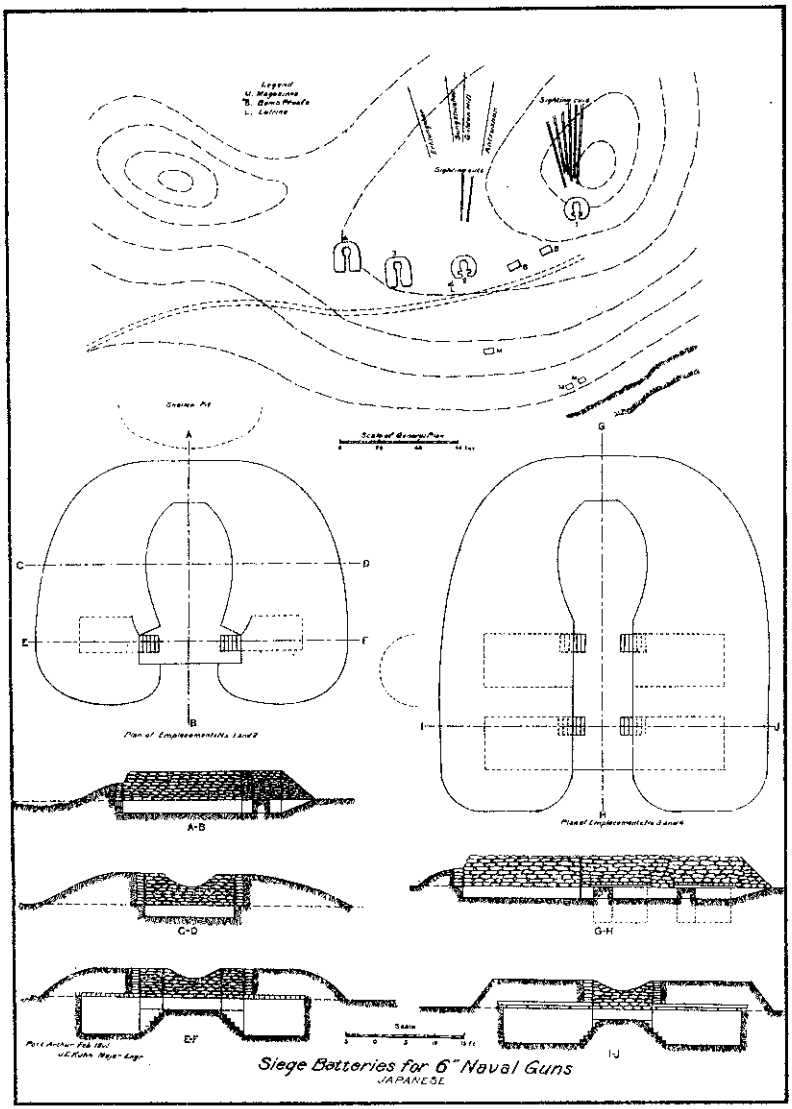


PLATE XXXII

In the bombardment of the ships the average ranges were about 7,000 yards, and considering the character of the platforms and the general inaccuracy of high-angle fire good practice was made. Colonel Sato, chief of staff to the chief of siege artillery, stated that they averaged one hit in six shots on the ships after the occupation of 203-Meter Hill. The practice made in bombarding forts such as Erhlungshan and Sungshushan appeared remarkably accurate, the shells almost invariably landing within the area of the fort.

No exact figures as to the number of rounds fired by the 28-cm. howitzers were obtainable. Colonel Sato, however, stated that an average of 800 rounds were fired by each gun. In order to lessen erosion black powder was used as the propelling charge. The Japanese admit that the accuracy of fire had been considerably affected by the erosion of their heavy artillery.

The 15-cm. (6-inch) naval guns had combination timber and concrete platforms. The 12-cm. (4.7-inch) naval guns were on wheeled mounts, the wheels being wholly of steel, with angle-iron spokes. The heavy naval guns were employed mainly for bombarding the town and ships and the Antzushan and Taiyangkou forts in the western sector of defense.

The construction of the 6-inch naval siege battery is shown on Plate XXXII. It will be noted that the emplacements are detached, Nos. I and II having long cuts in the summit of the ridge directed toward the different targets. Although quite exposed and the object of much firing on the part of the Russians, none of the guns were disabled by hostile fire.

The numerous 12-cm. and 15-cm. howitzers and mortars were skillfully located in folds of the ground, ravines, and trenches which abound everywhere. They were moved from time to time and on occasions to meet special situations, such as an assault upon a particular position. While lacking in penetrative power, the relatively heavy shell of the 12-cm. and 15-cm. howitzers and mortars proved very effective in searching out interiors of forts and batteries and the reverse slopes of positions.

The divisional field artillery was posted along the fronts of the respective divisions and was pushed well forward. The mountain gun proved a specially useful weapon, as it

could be moved along the saps and parallels and set up at any point required. At the short ranges frequently employed from the advanced parallels the mountain gun with its heavy shell did effective execution in destroying head cover and hastily constructed sand-bag parapets. The artillery brigade was posted on the right flank and was handled most skillfully and boldly by its able commander, General Nagata.

With reference to the bombardment of the Russian ships, whose destruction was the chief aim and effort of the Japanese, this appears to have been done blindly at first by shooting up the harbor generally. From several points along the Japanese line of investment glimpses of west harbor may be had, but the greater part of the deep-water portion is screened from view. With the occupation of Namakayama Ridge a fairly good view of the deep-water area of west harbor became possible, and the fire of the Japanese 28-cm. and heavy naval guns was partially controlled from an observatory on the extreme right of the ridge. With the capture of 203 Meter Hill a complete view of the harbor resulted, and the Japanese fire was efficiently controlled by the use of the telephone, many hits being recorded daily by the 28-cm. howitzers, as well as the naval guns. The Russian ships were apparently sunk one after the other, and the Japanese official reports attributed this result to the fire of the 28-cm. howitzers. That the ships went to the bottom is certain. In the hasty examination permitted a number of holes were observable in the upper decks, showing where 28-cm. shells had landed. How far these shells had penetrated could not be ascertained at the time, as the hulls were filled with water above the armored deck. The ships bore numerous shot marks on side armor and turrets, and their upper works were torn and riddled. How much of this was due to the naval action of August 10, 1904, and how much to the land bombardment it was, of course, impossible to tell. The Russians had made a feeble attempt to protect the decks from the fire of the 28-cm. howitzers by covering the same with loose sheets of plate iron and briquettes of coal or coal in bags, but the amount of protection so secured was insignificant.

The appearance of the ships at the time of inspection

belied the expressed hope of the Japanese naval officers that they would be able to save at least several of them. Since then the salvage operations have resulted in the raising of every one of the six sunken war ships, and at last accounts all but one had been taken to Japanese dockyards to be repaired.

Subsequent examinations in dry docks confirmed the suspicion that the ships had been scuttled by the Russians themselves and that they were not sunk by the fire of the 28-cm. shells, as at first believed by the Japanese. It appears, in fact, that very few shells even penetrated the armored deck. As the shell was of common cast iron and had, moreover, a very sensitive fuse, such a result might have been expected. Finding the ships under an effective fire after the occupation of 203-Meter Hill, the Russians deliberately scuttled their fleet, which had long since abandoned any intention of further operations on the high seas and had been stripped of all its secondary armament for use in the land defense. During the night preceding the capitulation the Russians mined their war ships in an effort to render them wholly useless to the Japanese, but this work was poorly done, with the result that all have been saved.

Besides the large war ships the harbor contained a large number of other vessels which were wrecked either by artillery fire or scuttled by the Russians, as follows:

Gunboats (*Bobre* and *Gilyak*)	2
Torpedo-boat destroyers	2
Torpedo-boat catchers	2
Gun vessel (sunk in entrance by Russians January 1–2)	1
Training ship	1
Hospital ship (*Angari*)	1
Mine-laying vessel (*Amur*, in dock)	1
Dredges	2
Auxiliary gun vessel	1
Merchant vessels (2 sunk at harbor entrance January 1–2; remainder belong to Chinese Eastern Railway and average 2,500 tons)	8
Floating crane, 30 tons (sunk at entrance January 1–2	1

Two hospital ships, *Kayan* and *Mongolia*, were found unharmed and in use as hospitals, flying the Russian flag; also one large dredge.

Before surrendering the Russians effectively blocked the

harbor entrance, leaving only a narrow tortuous passage for torpedo boats. Besides the vessels sunk by the Russians, both shores of the entrance are littered by the hulks sunk by Admiral Togo in his three desperate attempts to bottle up the Russian fleet. Incidentally it should be mentioned that the Japanese never succeeded in blocking the harbor entrance, although they made three attempts and sank some fifteen ships, of about 2,000 tons average, all told.

The effectiveness of the Japanese artillery throughout the siege is most noteworthy, and too much praise can not be given for the skillful manner in which batteries were emplaced and handled. Personal observation during action and study of the Russian works would amply satisfy anyone on this point. The ships, town, and forts all bear fearful evidence of the terrible effectiveness of the Japanese artillery fire. Practically all the Russian guns on the front line were knocked out and their artillery effectually crushed by the fire of the Japanese guns.

Only partial data of the losses sustained by the Japanese artillery were obtainable. Of the naval armament, which occupied the most exposed positions and which therefore suffered heaviest, three 12-cm. and five 12-pounder naval guns were knocked out by the Russian fire, while the personnel suffered 250 casualties out of a strength of 1,200. It is also known that four 12-cm. field guns and one 28-cm. howitzer were damaged. A number of the heavy guns were also so eroded by long-continued firing as to be practically worthless. So far as the evidence obtainable goes to show, it appears that the Japanese artillery suffered comparatively small losses considering the duration and character of the operations.

The Russian artillery was about as badly placed and handled as possible. Placed in open batteries, invariably on the most prominent and conspicuous hilltops, it seems as if the Russians were inviting the Japanese fire by every means in their power. The batteries on Wangtai, ridges R, M, N, H, and Ro, and the heavy guns in Sungshushan and Erhlungshan were most conspicuous and prominent. The results are seen in the wrecks of guns and carriages in all the forts and batteries along the front of attack and on the road in rear of this front, which was a veritable graveyard of ordnance material. Bearing in mind that a gun of small caliber can dis-

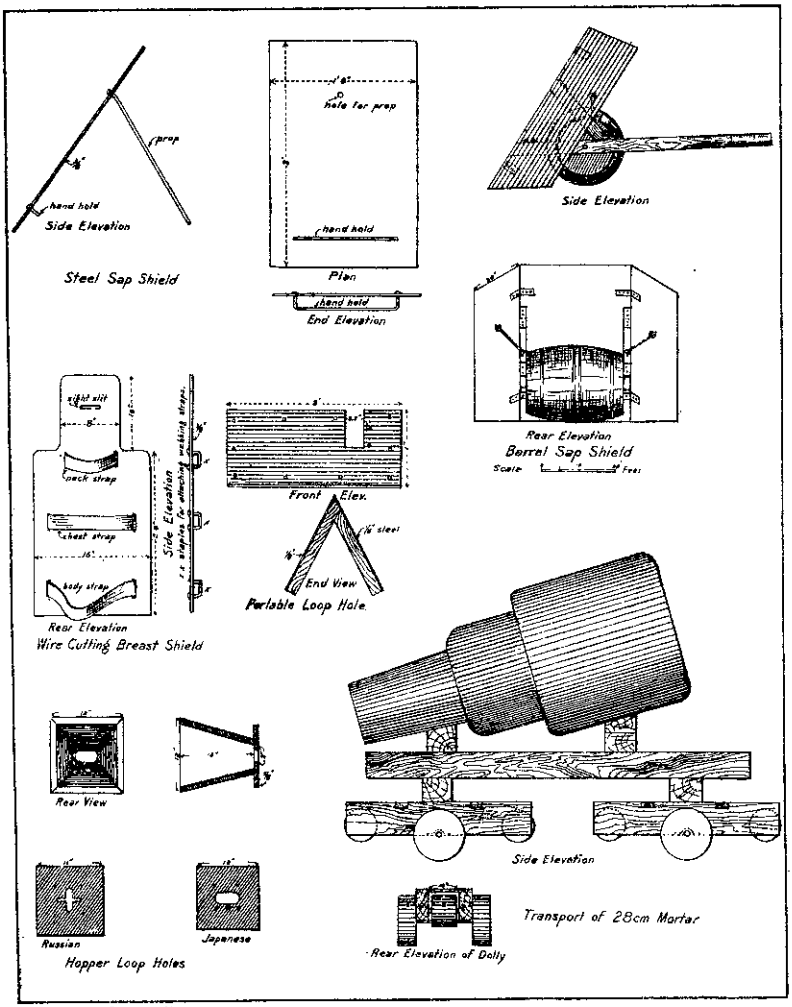


PLATE XXXIII

able a much larger one, the folly of placing fortress artillery in open emplacements on conspicuous heights subjected to concentrated fire becomes apparent.

SIEGE MATERIALS.

The country about Port Arthur is absolutely treeless and affords no timber or brush. Gabions and fascines were out of the question, and sand bags were consequently used almost exclusively by both sides to secure hasty cover. The Russian supply of sand bangs was exhausted before the end of the siege, and the latest batteries and trenches thrown up by them on the inner lines were revetted with sand bags made from any and all kinds of cloth that could be procured. Much of the cloth used was cotton print goods, giving to the parapets quite a gaudy and fantastic appearance. Barrels, boxes, plank, and empty kerosene tins were also employed by the Russians as materials for revetments.

The Russians had a good supply of timber and lumber stowed in the city and were, moreover, fortunate in having all the resources of a large naval yard at their command. Much plate iron obtained from the naval establishment was used by them in the construction of bombproofs, lookout stations, traverses, and loopholes. The Japanese profited by the occupation of Dalny, whose resources in timber, plate iron, etc., were drawn upon to furnish them with material for blindages, sap shields, and loopholes.

The various from of sap shields, wire-cutting shields, and loopholes are shown on Plate XXXIII. The lean-to sap shield was employed to secure temporary cover while placing sand bags or in starting a new section of trench. The barrel sap shield was used for similar purposes in the closer stages of the attack. It is an exceedingly heavy affair, designed to cover four men, and the Japanese admit that it did not work very well, requiring too great an effort to move it on the steep slopes. The wire-cutting breast shield was designed for use by the engineer troops when engaged in making openings through the entanglements. It covers the head and body only, but, as put by a Japanese officer, prevents a mortal wound if the man is careful.

In using this shield the neck and body straps are buckled

about the neck and body, while the chest strap, being drawn tight between the staples, affords an elastic support for the shield against the soldier's chest.

The first form of portable loophole employed by the Japanese consists of two planks, nailed together at one edge at an angle of about 45° and covered on the outside by one-eighth inch sheet steel spiked on. A notch 2½ inches by 6 inches, located as shown in the drawing, completes the construction. The idea is that the first sheet of steel will deform the bullet and the second prevent its penetration. Specimens of the loophole seen in the engineer park apparently confirms this view of the action of a bullet, but the margin of safety was exceedingly small, the inner sheet of steel being all but penetrated by the deformed bullet. This form of loophole was superseded by the hopper loophole with an iron plate five-eighths inch thick spiked on at the front end, used by both Russians and Japanese. This loophole was set in the sand-bag parapets and proved an excellent construction. Many of the Japanese loopholes had the iron plate covered by sand-bag cloth to render them less conspicuous. Many of the loopholes examined showed the iron plates heavily pitted by bullet marks, resulting from the constant sniping at short range.

The difference in the notches in the iron plate as made by Russian and Japanese should be noted.

Scaling ladders were tried by the Japanese, two forms being noted, one being a trussed affair of bamboo and another a cedar spar with cleats nailed thereto.

OBSTACLES.

Practically every form of obstacle described in text-books on military engineering found representation in the Russian defenses.

The principal lines of wire entanglements and military pits are shown on Plate XXXVII. The wire entanglements, with a few exceptions, were made entirely of smooth wire, and were consequently not as formidable as they might have been. They were usually constructed of five rows of stakes projecting about 3 feet from the ground. The wire was ordinary galvanized telegraph wire No. 8, but occasionally

a much heavier wire was used. Owing to the stony character of the soil, the stakes could not always be driven firmly into the ground and were easily pulled out by the Japanese.

Chevaux de frise had been erected where the railroad and wagon road cross the line of defense and conformed strictly to text-book construction.

Deep military pits, each with its sharpened stake at the bottom, were freely employed in the southwestern and southern sector of the land line. The character of the soil prevented their use at other points.

Large numbers of land mines had been planted at all points likely to be used as approaches by the attack.

These consisted for the most part of wooden boxes, 24 by 20 by 16 inches, soaked in tar or asphalt to make them waterproof and filled with powder and made to fire automatically by means of the electric circuit closer shown on Plate XXXIV. This circuit closer was attached in a vertical position to a board supported at the corners by light spiral springs. When this board was stepped upon, the closer would tip, and the ball, coming in contact with the metal ring inside the closer box, would close an electric circuit. Wild stories of frightful losses by mines appeared from time to time in the press during the continuance of the siege, for which no foundation could be found. The Japanese themselves deny that they suffered any noteworthy loss from Russian land mines. That some mines were set off and some few casualties incurred is, however, certain.

Beyond the outer line of wire entanglements from Paiyinshan, old fort, past Sungshusan, and across the valley past the slopes of Itzushan the Russians constructed an electrically charged wire, supported by stout stakes some 20 inches high carrying common porcelain insulators on top. This wire was doubled and trebled in places and appears to have been charged by the electric plant behind the Chinese wall on the right of Erhlungshan. It is understood that one Japanese soldier who had ignorantly come in contact with this wire received a shock. No other evidence of damage was forthcoming and it must be assumed that the wire was a failure. The difficulty of securing insulation with a bare wire so near the ground and the ease with which such a wire

may be disposed of makes the construction of little value. The Japanese employed wire cutters whose handles had been insulated by sections of bicycle tires for cutting the charged wire.

The Russians also employed plank, through which large wire nails had been driven, as obstacles in the ditches and on the exterior slopes, and many of these were seen lying about.

An improvised mitrailleuse, noted in Erhlungshan and Sungshushan, consisted of six old-pattern Mausers mounted in a wooden frame and arranged to be fired simultaneously by a lever engaging all six triggers. This device was trained on galleries and approaches.

SUPPLY, TRANSPORT, AND COMMUNICATIONS.

The besieging army was wholly supplied by way of Dalny, which possessed every needed facility for landing troops, supplies, and siege material. From Dalny food supplies were transported by rail to Changling station and distributed thence to the divisional depots, which carried at least ten days' reserve supply. Supplies for the Eleventh Division were transported by Chinese junks from Dalny to a point on the coast near the left flank of the division, this being more convenient than the long land haul that would otherwise have been necessary from Changling station.

Ammunition, ordnance, and special siege material were carried beyond Changling by rail to Kuochiatun in convenient proximity to the engineer and artillery park

From the artillery park a field tramway, Decauville system, was laid to all the siege batteries so that ammunition could be landed directly at the service magazines. This railway is 60-cm. gauge and comes in lengths of two meters with three metal cross-ties of ⌐¬ cross section. The bottom flange of the rail at one end of the section is bent up to form a hook, engaging in a hook in the end of a fish plate bolted on the end of the adjoining section, thus doing away with all field bolts, the sections being simply hooked together. The cars are small flat cars and were operated entirely by soldiers of the train or fortress artillery. The Japanese siege batteries were required to keep on hand a minimum reserve supply

of 150 rounds per gun in the field magazines, and battery commanders were held responsible for keeping up the supply of ammunition.

For the transport of heavy ordnance, such as the 28-cm. howitzers, the Japanese employed timber dollies with wooden wheels 6 inches wide. The method of transporting a 28-cm, howitzer is shown in Plate XXXIII. A drag rope with 175 to 200 soldiers would walk right along with this arrangement and transport ordnance to the siege batteries. The roads in the Liaotung Peninsula, while rough and unimproved, are sandy and gravelly, and consequently firm.

The telephone was freely used by the Japanese for connecting up all parts of their lines. Every siege battery had its instrument connected with the proper observing station, from which its fire could be directed and controlled. The high peaks of Artillery and Naval hills afforded excellent points for observation from which the effect of the artillery fire could be readily observed and corrected. The whole of the siege artillery was under the command of Major-General Teshima, who resided on Artillery Hill, his quarters being on the reverse slope and his observing station on the summit. From this point the daily number of rounds, the hours of firing, and the target for each battery were prescribed.

Telephone lines were also carried up through the saps so that headquarters could at all times be kept advised of events at the different sap heads. The free use of the telephone saved much time in the transmission of orders and news and made mounted orderlies almost unnecessary.

GRENADES.

The extended use of hand grenades and bomb guns formed one of the most noteworthy features of the siege. These were used extensively by both sides and appeared under many different forms. On the part of the Japanese the simple tin can and section of bamboo were almost exclusively employed, their lightness commending themselves from the point of view of the Japanese who had to throw their grenades up hill as a rule. The Japanese also employed a special grenade of large size for special occasions in the close attack. This consisted of a small keg holding 40 to 50 pounds of

explosive, mounted on the end of a long bamboo handle, 30 to 40 feet long, by means of which the keg could be rolled forward from the trench toward the opposing Russian trench or work. When in position, the charge was exploded by electricity.

On the part of the Russians the varieties of hand grenades were much more extensive; obsolete shell, empty rapid-fire cartridge cases, tin cans, torpedo war heads, fused slabs of gun cotton or bags of dynamite, and tin paint drums were all employed. On Plate XXXIV some of the more common forms observed are drawn to scale and may be understood without detailed description. A, B, G, and K are old cast-iron shells; C, a 37-mm. rapid-fire cartridge case, with its edges bent over a wooden or cardboard cover, and D, N, and H are different forms of tin cans. L and M are, respectively, fused dynamite cartridges and slabs of gun cotton.

All these are, in effect, nothing more than high explosive "firecrackers," the fuse being the ordinary taped fuse used in commercial mining and blasting, was first lit by match or punk and the grenade then thrown by hand.

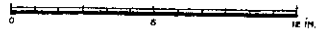
F represents a somewhat more scientifically constructed grenade made by the Russians. In this a rifle cartridge case is soldered on the outside of the rapid-fire cartridge case. The fuse has one end inserted into the end of the rifle cartridge case and the other inserted into a hole in the side of the rapid-fire cartridge case. An ordinary friction primer is inserted through the primer hole in the base of the rifle cartridge case and serves to ignite the fuse.

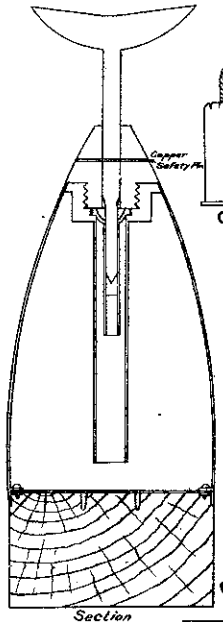
The Russians also used an oil grenade—a tin can of kerosene with a small bursting charge of gunpowder. It could not be learned whether this oil grenade was effective, but in view of the small amount of inflammable material in the saps and parallels it probably failed to do serious harm. The Japanese also attempted to use kerosene oil, using a hand force pump to spray the oil over the Russian works and then hurling burning bundles of rags or sacking soaked in oil.

Bomb guns for throwing grenades to a greater distance than was possible by hand were used by both sides. The Japanese at first employed a 5-inch wooden bomb gun, hooped with bamboo and supported on a frame, as shown

RUSSIAN GRENADES

SCALE

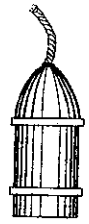




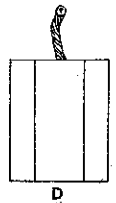
Section

C

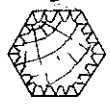
A



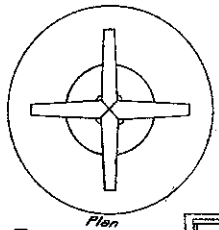
B



D

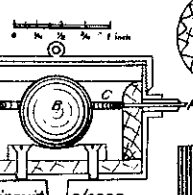


E



Plan

Torpedo War Head

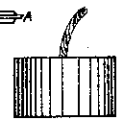


Circuit closer

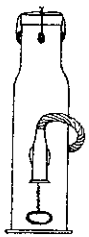
A,A, wires

B, metal ball

C, metal ring

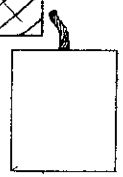


N

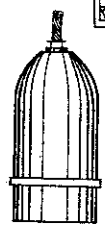


F

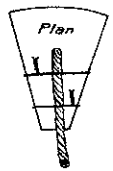
G

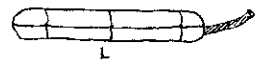


H

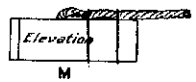


K

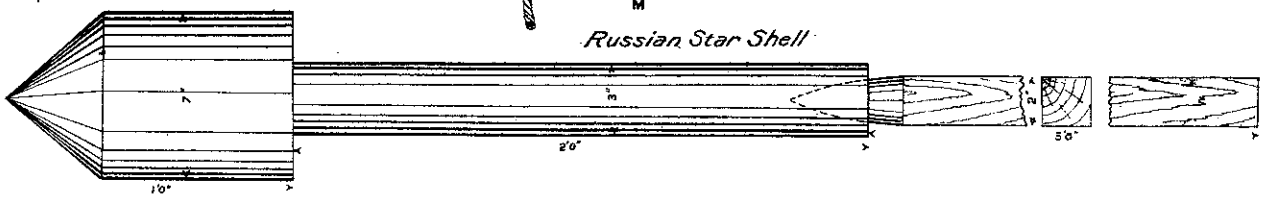




L

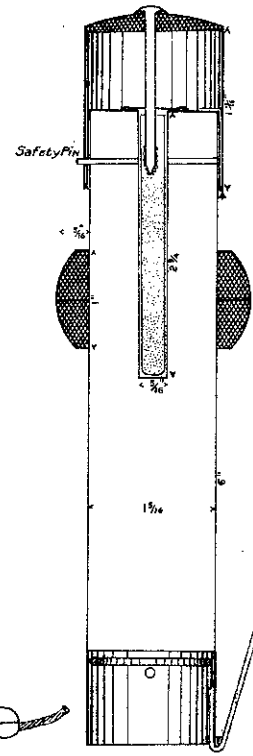


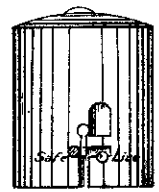
M



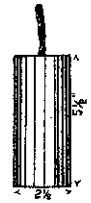
Russian Star Shell

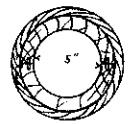
JAPANESE GRENADES



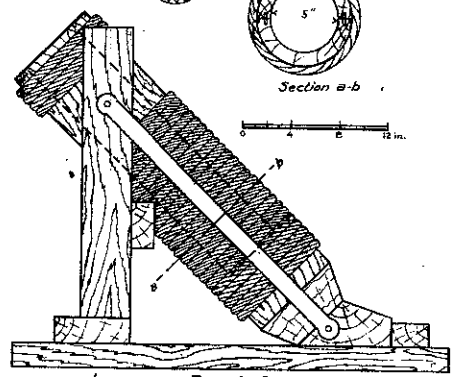


Detail of Safety Device

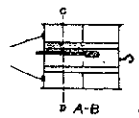


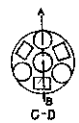


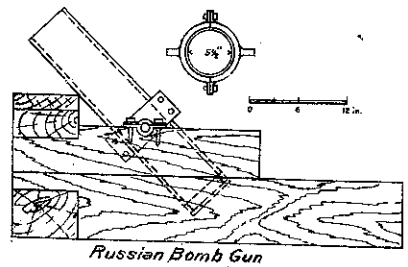
Section a-b



Japanese Bomb Gun







Russian Bomb Gun

PLATE XXXIV

in Plate XXXIV. The grenade was an ordinary tin can, with a hook at one end for lowering and a small bag of black powder wired on the other end. The mortar was always set at an angle of 45°, and the range varied by the propelling charge, which may be from 20 to 80 grams. The maximum range attainable is 400 meters. Later in the siege the Japanese made a 7-inch wooden bomb gun, similar in all respects to the 5-inch gun. Many of these bomb guns were employed by the Japanese, and their advanced trenches were full of them. The gun simply rests in its frame and is so light that it is easily carried by one man and the frame by another.

The Russian bomb gun, of which but a single example was found, is made of wrought-iron tubing $5\frac{1}{2}$ inches internal diameter, and provided with trunnions. It is shown on Plate XXXIV.

The Russians also employed torpedo war heads arranged to fire by percussion and propelled by a light charge from a torpedo tube. A number of these were discharged at the Japanese in the earlier assaults of 203-Meter Hill.

The latest development of hand grenade made by the Japanese is shown on Plate XXXIV. This was not used at Port Arthur, but developed subsequently for use in the field. Its inventor is stated to be the chief engineer of the Second Army. This grenade consists of a tin cylinder about 6 inches long and $1\frac{5}{16}$ inches diameter, closed at both ends, the bottom diaphragm being about 1 inch from the lower end of the tube. The upper diaphragm has a tin tube which projects into the interior of the grenade and of a size to easily admit the copper primer. A double ring of lead, nicked at eight points, surrounds the grenade near its upper end, its object being to provide fragments when the grenade explodes. A tin cup, containing lead to give it weight and carrying an ordinary wire nail, is slipped over the upper end of the grenade, a groove in the side engaging a projecting copper wire, which is soldered transversely of the grenade and bent at the middle so as to clear the primer tube. When the cap has been pushed down as far as the groove in its side permits, the point of the wire nail is just clear of the fulminate in the primer. By turning the cap in either direction the

grenade may be made safe or ready for action, as shown by the details of the groove, in which the shaded arc represents a metal cut-out. By turning down a small strip of tin soldered to the cap the latter can be held in the safety position while being carried by the soldier. By lifting the safety strip and turning the cap the projecting wire is placed in the firing position, a small strip of uncut metal still keeping the grenade safe. At the base of the grenade is a loose wire ring to which are attached three cords passing through holes in the side and having their ends joined to a wide cotton tape some 3 feet long. This tape is folded up and tucked away in the cavity at the base of the grenade until ready for use. A doubled galvanized wire hook soldered to the bottom of the grenade enables the same to be hooked to the soldiers' belts when going into action. The cap is held firmly by three springs made of sheet tin and soldered to the sides of the grenade, while the percussion primer is prevented from falling out of its tubes by two small tin tongues which are bent down after the primer has been dropped into its tube.

The primers are carried by the noncommissioned officers, who issue them to the men carrying grenades just before using them. The caps are removed, primers inserted, and caps replaced to the safety position. Immediately before use the caps are placed in the firing position, the folded tape at the base opened out, and the grenade swung backward and forward several times and then hurled like a sling. The weighted head and broad tape, acting as a tail, keep the grenade head on. On striking, the projecting wire shears through the small strip of uncut metal in the cap and permits the latter to be driven back, carrying the wire nail, whose point is covered with ground glass and glue, into the fulminate of the primer and detonating the charge. These grenades were made and issued to the infantry for practice during July and August, 1905, and were considered very satisfactory. They were made wholly from materials obtained locally, the primers and mealed gun cotton coming from the spoils at Port Arthur.

The part played by grenades in the Russo-Japanese was so important that the possible use of the weapon in future wars merits serious consideration. While their effect is intensely local, they are nevertheless very demoralizing

to men's nerves, and inasmuch as they may be thrown several hundred yards by such simple means as bomb guns, their utility may not be lightly disregarded. That both sides incurred many casualties in their grenade warfare is amply attested by the mangled human remains found in the ditches of Sungshushan, Erhlungshan, and North Tungchikuanshan, and by the frightful wounds treated in Japanese field hospitals.

The Russians, occupying the commanding positions, possessed a decided advantage in using grenades, as these would roll down the slopes and find lodgment in the first Japanese trench. In the close attack the Japanese adopted wooden gratings laid across the tops of their saps or wire screens set up vertically in the parapet, the former permitting the grenades to roll over, and the latter holding them outside, where their explosion could do no harm.

SEARCHLIGHTS AND BALLOONS.

Both sides employed searchlights, but the Japanese found no use for theirs after their lines had been pushed into close proximity to the Russian works. The Japanese searchlight outfit is of the portable type, the power plants being mounted on trucks 3 meters long and 1.6 meters wide. At the rear of the truck is a Damiler oil motor and in front of this a Shuckert dynamo, with switchboard containing the usual governing instruments. At the front end of the truck are the circulating pump, water tank, and cooler, the latter a series of tubes, over which air is drawn by a disk fan. Oil is carried in two tanks under the truck frame, while a muffler exhaust lies on top of the housing. Sliding panels enable the entire plant to be shut in for protection against the weather. The truck complete weighs about 6,000 pounds. The lamps are 90 cm., Shuckert, electrically controlled, with horizontal carbons, mounted on trucks. The lamp emplacements are about 200 meters from the generator, near the summit of a high conical hill, the generator being lower down on the slopes. Both generator and lamps are set up in bombproof covers, the lamps being run out to their emplacements over short sections of Decauville track. The feed cables are simply laid on the ground. The lamps are operated at 80 volts and 90 amperes,

but more current may be obtained by coupling up the two generators available, for which purpose there is a separate switchboard in one of the generator bombproofs.

The electric controller is located in the electric-light observatory on the summit of a conical hill about 250 meters to the left front of the lamp emplacements. Ten lead wires connect the controller and lamp. The entire plant is of German manufacture. The location of the searchlight plant was a short distance to the right of Artillery Hill.

The Russian searchlight stations and plants are all indicated on Plate XXXVII. They consisted of a heterogeneous makeshift, representing a great variety of boilers, engines, and dynamos. The lamps appear to have been taken from the ships. The Russians operated several lamps nightly to the end of the siege, and their beams could be seen searching the foreground during the hours of darkness.

In the same category with searchlights may be included the so-called star shells freely used by the Russians in the earlier stages of the siege. These were nothing but huge rockets containing charges of port fire, which would illuminate the foreground brilliantly for a few moments. A drawing of one of these star shells is given on Plate XXXIV.

The Japanese had one balloon outfit at the Engineer Park, and I was informed that one ascension had been undertaken, with, however, poor results, as a high wind was blowing at the time. The Japanese balloon is of oval shape, with a portable gas plant mounted on wheels. Their outfit was removed from Port Arthur before the termination of the siege and is understood to have been taken north. The Russians are understood to have had a balloon outfit, but there is no reliable record of their having made any ascension. Owing to the topography, each side having a high ridge of hills behind their front line to conceal their inner dispositions, balloons did not have a favorable opportunity to show their usefulness.

MACHINE GUNS.

Machine guns played an important part in the siege, being freely used by both sides. The Japanese gun was a single-barreled gun of home manufacture, while the Russians used mainly the Maxim automatic. The Russian

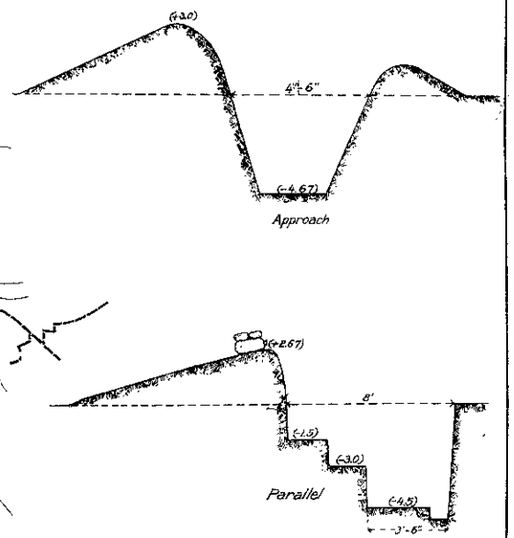
GENERAL PLAN OF SIEGE WORKS

Scale 200 150 100 50 0 200 400 600 800 YARDS

N

Normal Cross-sections

Scale 3 2 1 0 3 6 FEET



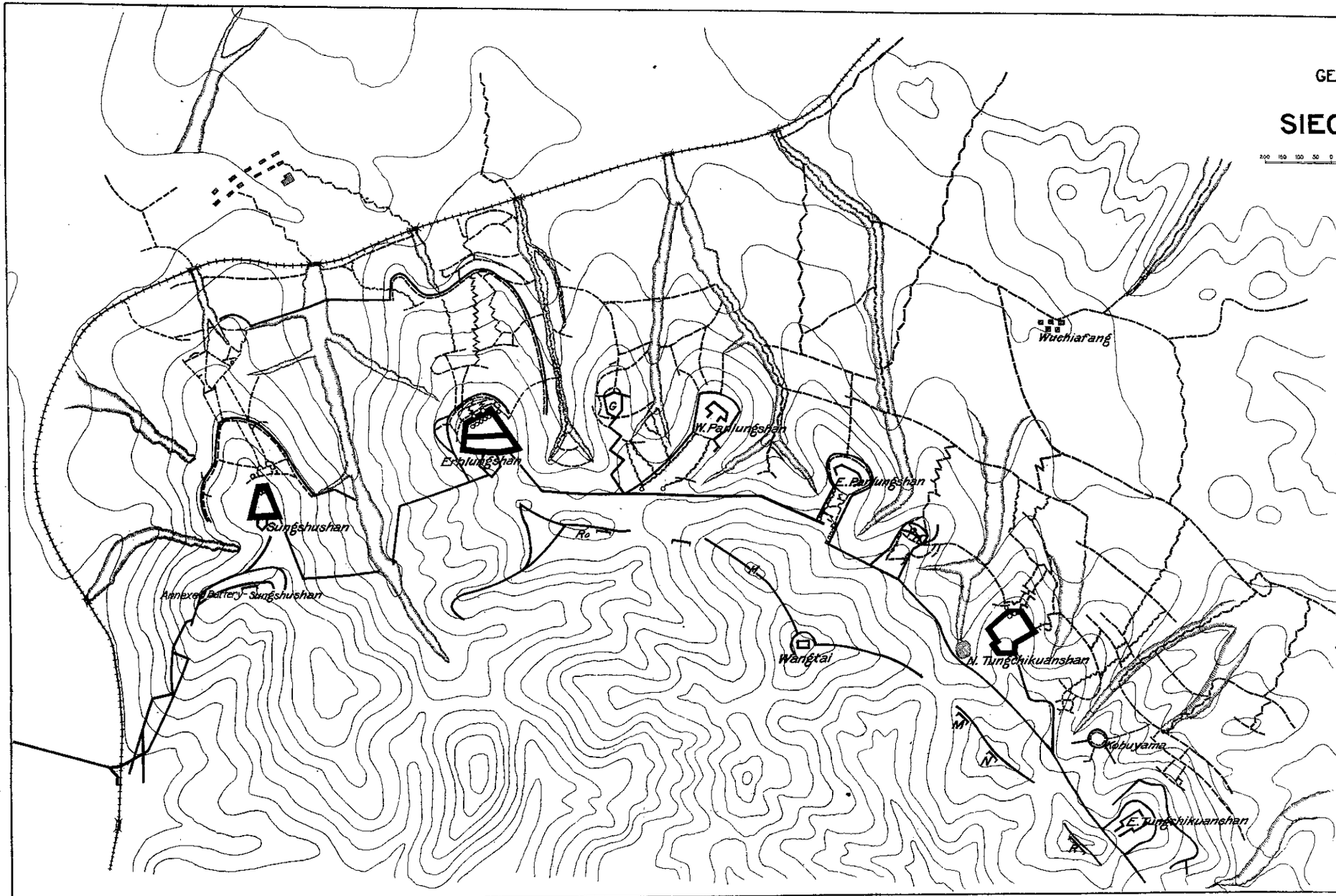


PLATE XXXV

guns were used with telling effect against the Japanese in the numerous bloody assaults, being trained to cover all the approaches with a murderous fire.

EFFECTIVENESS OF THE JAPANESE BLOCKADE.

The Japanese blockade appears to have been very effective. According to statements of the inhabitants but three small steamers managed to elude the Japanese fleet, each bringing in a cargo of flour. Intercourse with Chefoo by Chinese junks landing in Pigeon Bay was so precarious and uncertain as to have been an almost negligible factor. On the land side, of course, all communication with the outside world was barred as the Japanese lines extended from sea to sea.

SIEGE WORKS AND SIEGE METHODS.

A comprehensive plan of the Japanese siege works, showing the saps, parallels, and mines, appears in Plate XXXV, with normal cross sections of approaches and parallels. These lines were all verified upon the ground and are essentially correct.

The bulk of the sapping was effected by the flying method, using sand bags instead of gabions. Most of the work was done at night, following the orthodox methods prescribed in the conduct of sieges. Considerable ground was also gained by the costly but more expeditious method of assault, notably in the October assault, in which the Japanese seized several advanced trenches of the Russians and utilized them as parallels while constructing approaches to the rear. The numerous nullahs running in front of the Russian works and in the intervals between readily lent themselves to the plans of the Japanese and were freely used both as parallels and approaches, but chiefly the latter. A common method of utilizing existing nullahs as approaches was to defilade them by sand bags placed on planks or timbers thrown across the top of the nullah. This may be clearly seen in the view of a most excellent model constructed in August and September, 1905, by the Ninth Engineer Battalion at Tassuchiatzu, near Chinchiatun. This model was constructed in clay on a scale of 1 : 100, and was a faithful portrayal of the siege works in the front of the Ninth Division extending from Erhlungshan to P fort, inclusive. The total

development of siege works as furnished me by an engineer officer of General Nogi's army was as follows: 13,202 meters parallels, 18,906 meters approaches, 8,352 meters approaches to headquarters, and 682 meters mine galleries, making over 25 miles of siege trenches.

The Ninth Division, which covered a greater portion of the front of attack than the remaining divisions, alone constructed the following: 5,478 meters parallels, 6,880 meters approaches, 3,552 meters headquarters approaches, and 206 meters mine galleries.

Except on the steep slopes immediately in front of the forts the soil was easily dug. On the steep slopes, however, the ground was practically solid rock, a rotten quartzite, which could be picked out rather easily, as it was full of seams. The mine shafts and galleries against North Tungchikuanshan, Erhlungshan, and Sungshushan were all in solid rock and required no lining. Those directed against the Chinese wall from the two Panlungs had to be timbered, being in earth.

The sapping operations in the front of the Ninth Division only involved the following casualties: Killed, 109 engineers, 201 infantry; wounded, 449 engineers, 923 infantry.

The battalion commander is authority for the statement that only 14 or 15 soldiers remained in the engineer battalion of the Ninth Division from the original complement that had departed from Japan.

The average daily losses at each sap head were five, or fifteen to twenty per day, according to the number of saps under construction. An engineer officer, assistant to the chief engineer, is authority for the statement that the aggregate losses by sapping, infantry and engineers, exceeded 2,000 men.

The mining operations of the Japanese presented no unusual features. The location of mine chambers and dimensions of resulting craters at Erhlungshan are shown on Plate XXXVI. Five galleries were driven under the front parapet and charges aggregating 5,940 pounds of "yellow powder," or picric acid, were placed. In the case of Sungshushan, two mine galleries were driven under the salient and about 14,000 pounds of black powder placed in the charges. The crater of Sungshushan was enormous, being about 80

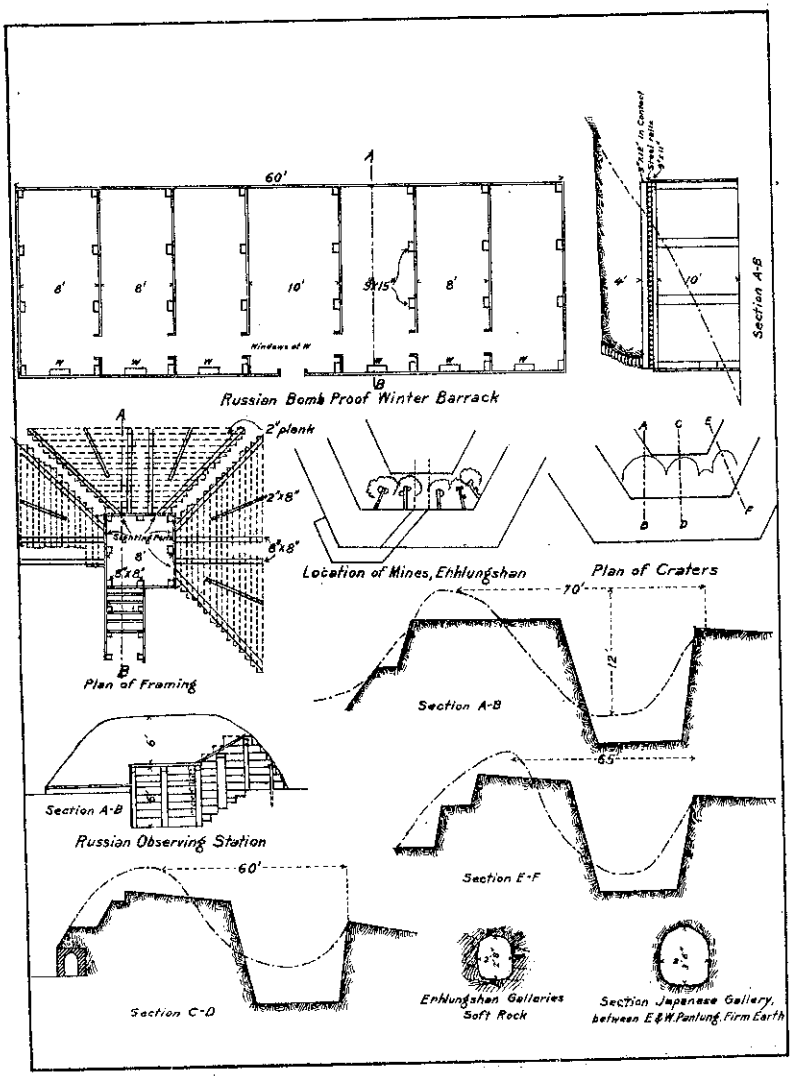

60'
8'
8'
10'
5'15"
8'
Windows at W
Russian Bomb Proof Winter Barrack
Section A-B
2" plank
2"x8"
6"x8"
6"x8"
Plan of Framing
Location of Mines, Ehhlungshan
Plan of Craters
70'
12'
Section A-B
65'
Section A-B
Russian Observing Station
Section E-F
60'
Section C-D
Ehhlungshan Galleries
Soft Rock
Section Japanese Gallery,
between E & W Pantung Firm Earth

PLATE XXXVI

feet diameter and 127 feet deep on the axis. The form and dimensions of cross section employed in some of the mine galleries are also shown on Plate XXXVI. The Japanese excavated their galleries largely by chisels and picks, but resorted also to light blasts.

The Russians do not appear to have engaged in countermining very actively. At North Tungchikuanshan they fired a countermine, breaking in the Japanese gallery of approach, but this did more harm than good, as the Japanese promptly utilized the Russian gallery. At Erhlungshan a countermine was in progress, and from prisoners it was learned that the Russians had expected to complete and fire the same four days after the Japanese blew up the parapet. A number of small countermines or camouflets were also reported to have been fired by the Russians, but appeared to have been barren of serious results. The Japanese employed dummy men to draw the fire of the Russians, while the latter, in at least two instances, had mounted dummy guns to deceive the Japanese gunners.

RUSSIAN BOMBPROOFS AND OBSERVING STATIONS.

Numerous bombproofs were constructed by the Russians along the Chinese wall and on the reverse slopes of the hills along the front of attack. In none of these did the vertical cover of timber and earth exceed 5 feet—an insufficient cover against the 28-cm. shell, as was shown by several covers which had been penetrated. On the reverse slope of Battery M a bombproof of the type under construction had evidently been struck in the closing days of the siege and its occupants blown to atoms, their remains still lying about when the fortress was first inspected. A large bombproof barracks, not entirely finished, is shown on Plate XXXVI. The sole noteworthy feature of the bombproofs was the occasional layer of plate iron above the roof timbers. Where applicable such construction is believed to be advantageous in offering increased resistance to the penetration of a projectile through the superincumbent layer of earth.

Many lookout stations or observatories were built by both sides. These generally took the form of a bombproof chamber 6 to 8 feet square, with a horizontal slit for sighting. An exceptionally strong observation station, built by the

Russians in an exposed position on the front slope below batteries No. 56, was built of steel rails, concrete, brick, and earth.

Another form of observation station noted on height near battery No. 94 (Pl. XXXVII) is shown on Plate XXXVI. This is built wholly of earth and timber and affords a field of view extending through 225° of arc.

The numerous gullies along the front afforded excellent sheltered camps for the Japanese troops where they built their little huts, using odds and ends of timbers, planks, and mattings, to make them weather tight. By digging and banking up, and using shelter tents or straw matting as a roof they made themselves snug and cozy. Even in the advanced saps, cubby-holes or recesses were excavated in the reverse slopes, and here the guards of the trenches made themselves comfortable with the inevitable fire box, teakettles, and their blankets spread on the ground.

In the rearward camps many of the troops had accumlated considerable flocks of poultry, chickens, and ducks, from which they derived a supply of fresh eggs. Fresh fish was frequently issued, being obtained from the Chinamen in and about Dalny. In short, when not on duty in the trenches, the Japanese soldiers took life quite easily, there being no marching and his food coming regularly and abundantly.

In anticipation of bitter cold weather a number of winter camps were laid out and built on the north slopes of the ridge occupied by the Japanese artillery line. These camps were for the accommodation of a battalion each and consisted of dugouts covered over by canvass or matting. Owing to the mild winter and the unexpectedly early termination of the siege these winter camps were never occupied, the soldiers continuing to live in the nullahs and ravines nearer the front until the end of the siege and their departure for the north.

LOSSES.

Some difficulty is experienced in reaching a reliable conclusion as to the losses experienced by the Japanese during the siege, no separate official figures being available. In a tabulated statement, furnished at my request by the chief medical officer of the Third Army, the number of killed and wounded, including the battle of Mukden, is put at 76,586.

The losses at Mukden were stated by a staff officer after the battle to be about 18,000, which would call for about 56,500 for the siege of Port Arthur.

Shortly after the capitulation a staff officer reported the losses in killed and wounded from August 1 to the end of the siege as 39,158. To this must be added the losses at Nanshan, officially reported at 4,204, and the losses at Kensan and Antzuling. Informal statements by the chief medical officer, however, indicate that the losses were somewhat greater, he having said that the aggregate losses in killed and wounded for the entire Third Army at Port Arthur were about 65,000. Weighing all the evidence attainable, I should estimate the Japanese losses in killed and wounded at Port Arthur at not less than 60,000.

The chief medical officer is authority for the statement that in November the percentages of wounds for those treated in field hospitals were as follows: Bullets, 72 + per cent; artillery, 21 + per cent; all others, 6.5 per cent.

The final tabulated statement of losses for the entire war in the Third Army gives the following percentages for dead and wounded:

	Per cent.
Bullets	59.44
Artillery	19.63
Bayonet	.69
Miscellaneous (including grenades)	12.13
Untraceable	8.11

The relatively small percentage of bullet wounds in the Third Army in this war is noteworthy and bears testimony to the effectiveness of the artillery and grenades in the siege of Port Arthur.

Of the Russian losses little definite could be learned. The inhabitants estimated the number of killed at 10,000, but as no accurate returns appear to have been rendered it is more than likely that the casualties in killed were more numerous. About 16,000 sick and wounded were in hospital at the date of capitulation, of whom about one-third were wounded. Many soldiers were stated to have been wounded several times.

COMPOSITION OF THE BESIEGING ARMY.

Commander in chief, General Baron Nogi.
Chief of staff, General Idichi.
Eleventh Division.—Generals Tsuchiya and Samejima; chiefs of

staff, Colonels Ishida and Saito; Twenty-second Brigade, General Kamio: Forty-third Regiment, Twelfth Regiment; Tenth Brigade, General Yamanaka: Forty-fourth Regiment, Twenty-second Regiment; 6 batteries mountain guns.

Ninth Division.—General Oshima II; chief of staff, Colonel Adachi; Sixth Brigade, General Ichinohe: Seventh Regiment, Thirty-fifth Regiment; Eighteenth Brigade, Generals Mayeta and Hirasa: Nineteenth Regiment, Thirty-sixth Regiment; 6 batteries mountain guns.

First Division.—General Matsumura; chief of staff, Colonel Yoshino; Second Brigade, General Nakamura: Second Regiment, Third Regiment; First Brigade, Generals Yamamoto and Baba: First Regiment, Fifteenth Regiment; 6 field batteries.

Seventh Division.—General Baron Oseko; chief of staff, Colonel Ishigomo; Thirteenth Brigade, General Yoshido: Twenty-fifth Regiment, Twenty-sixth Regiment; Fourteenth Brigade, General Saito: Twenty-seventh Regiment, Twenty-eighth Regiment; 2 batteries field and 2 batteries mountain guns.

First Kobi Brigade, General Oki: First Regiment Kobi, two battalions; Fifteenth Regiment Kobi, two battalions; Sixteenth Regiment Kobi, two battalions.

Fourth Kobi Brigade, General Yakanachi: Eighth Regiment Kobi, two battalions; Ninth Regiment Kobi, two battalions; Thirty-eighth Regiment Kobi, two battalions.

Artillery brigade, 72 field guns under General Nagata.

Naval brigade, 1,200 men, under Commander (now Captain) Kuroi.

Three regiments, plus one battalion, plus two independent groups of fortress artillery, under command of General Teshima.

All the divisions were complete with engineers, sanitary, and train services.

Besides the troops enumerated the Seventeenth Regiment of the Eighth Division assisted in the final assaults on 203 Meter Hill. It is believed that this regiment remained behind at Chinchou when the Eighth Division landed in October, 1904. It departed for the north after the capture of 203-Meter Hill.

At its maximum the besieging army numbered fully 80,000 combatants, and with noncombatants fully 100,000 men.

Mention was also made of the Ninth Kobi Brigade, which appears to have accompanied the besieging army at the outset, but which was later sent to the rear. This brigade is reported as having behaved in an unsatisfactory manner during the August assaults and as having been in disgrace.

SPOILS OF WAR.

Among the principal spoils of war, as officially published, are the following:

Prisoners (including 15,307 sick and wounded and 1,398 paroled)	41,641
Flour ---pounds--	1,460,250
Ground barley ---do---	132,000
Corn meal ---do---	15,100
Rice ---do---	2,322
Biscuit ---do---	990,000
Canned beef ---do---	87,750
Horses	1,920
Horse fodder (sufficient for 56 days).	
Guns of various descriptions	528
25-cm. (45-caliber) (electric battery)	5
24-cm. (34-caliber)	1
23-cm. (20-caliber)	12
15-cm. quick-firing naval	30
15-cm. (22-caliber)	16
12-cm. quick-firing naval	5
10.7-cm. (20-caliber)	4
7.5-cm. quick-firing naval (12-pounder)	51
57-mm. naval and casemate	28
37-mm. naval	52
28-cm. howitzers	10
23-cm. howitzers	22

All the foregoing have fixed mountings. The following have movable mounts:

15-cm. (21-caliber) cannon	14
15-cm. (15-caliber) howitzers	15
10.7-cm. (35-caliber)	12
10.7-cm. (20-caliber)	13
8.7-cm. field, various	63
7.5-cm. field, various	60
5.7-cm. quick-firing Krupp	7
6.5-cm. naval	10

Ammunition for various kinds of ordnance:

	Rounds.
28-cm. howitzers	47
25-cm. rifles	130
24-cm. rifles	34
23-cm. rifles	136
15-cm. (25-caliber)	719
15-cm. naval	2,741
15-cm. howitzers	267

	Rounds.
12-cm. naval	827
10.7-cm. cannon	1,723
8.7-cm. field	13,449
7.5-cm. field	46,543
57-mm. and 37-mm.	109,777
Infantry rifle	5,436,240

An examination of the foregoing table shows that while the ammunition for the heaviest gun was pretty low, there was still a considerable quantity of ammunition for the medium and small caliber artillery, as well as for the infantry rifle. The provisions on hand, such as they were, would have sufficed the garrison for at least a month longer. That the pinch of hunger had not yet been felt by the garrison was evident from the chunks of black and brown bread found thrown away all along the Russian trenches. There also appears to have been an abundance of drink, for the ground about the trenches and the bombproofs were littered with vodka, rum, and wine bottles. A prominent merchant stated that, so far as drink was concerned, the town was so well stocked it could have held out for another year.

In view of the showing made by the above tables, the question of what would have happened had the Russians resisted à l'outrance suggests most interesting possibilities. Had the battle of Mukden been delayed two weeks it could not have been fought on the marshy terrain of the Mukden plain. On the 10th of March the ground was still frozen hard and the passage of rivers practicable at all points. Riding over the fronts of operations of the Fourth, Second, and Third Armies between the 23d and 26th, I found the rivers ice free and the ground to the west of Mukden so soft and boggy that it was difficult to move about on horseback.

Without General Nogi's army it would have been impossible to dislodge General Kuropatkin from his strong position before Mukden, and even with the army it is extremely doubtful whether the Japanese could have won their success at any other time than in winter. In my judgment it is not too much to say that the entire fate of the Mukden campaign was intimately connected with the period of the fall of Port Arthur.

As to whether General Stoessel could have prolonged his defense, it need only be pointed out that 25,000 effectives

marched out of the fortress within a week after its capitulation, and that the supplies of food and ammunition were far from being exhausted. While the civil population was enrolled for duty, it appears to have been employed solely as a police force and for manufacturing ammunition and grenades. The lack of intrenching tools appears to have been somewhat serious, as many picks were found worn down almost to the helves. All the evidence attainable goes to show that the defense, while stubborn, was lacking in resourcefulness and enterprise. The early death of Admiral Makarov and later that of General Kondratchenko were serious blows to the Russian cause, as both had demonstrated themselves to be men of energy and resourcefulness. Friction is also reported to have existed between General Stoessel, the governor, and General Smionov, commander of the defenses, which did not help matters.

Although Port Arthur had ultimately to surrender, as will be the case with any fortress, it yet paid for itself many times over by neutralizing for five months an entire Japanese army and the entire Japanese fleet, which had to do guard duty so long as the Russian Port Arthur Squadron was in being. The time thus gained proved invaluable to the Russians and enabled them to gather their forces and to withstand the Japanese advance in the north. Had the defense of the fortress been conducted a little more energetically, the final results might have been materially different, as has already been pointed out. That Port Arthur proved a serious stumbling block in the prearranged plans of the Japanese seems certain, and there is no doubt that they had counted on reducing the fortress much earlier. Even before my departure from Japan, in July, 1904, the public anticipated the fall of the fortress daily and confidently to such a degree that festivities to celebrate the event had been arranged and tickets placed on sale.

THE THIRD JAPANESE ARMY IN THE BATTLE OF MUKDEN.

OPERATIONS.

On February 26 the Ninth Division was at Tafanshin, the Seventh Division at Huangniwa, the First Division near Hsiaopeiho, the artillery brigade and infantry reserve behind the Seventh Division. A cavalry brigade was posted

on the left bank of the Taitzu River, opposing the Russian cavalry which operated between the Liao and Hun. The main base of supply for the army was Liaoyang, with a large intermediate depot at Hsiaopeiho. A brigade each of cavalry and infantry were detailed to guard the line of communication.

The Third Army received orders to advance February 27 with the general object of turning the Russian right and compelling a retreat from the strong lines of the Shaho. On the night of February 27 the army occupied the following positions: Ninth Division, Mamikai to Kuotaitzu, artillery brigade and infantry following; Seventh Division, Lokonto-Sojushi; First Division, Mashanchiatzu to Kalima; cavalry brigade, Chechangkantzu (right bank of the Liao). In its advance this day the army swept the Russian cavalry patrols before it without any fighting.

February 28.—The orders for the day were: Ninth Division to line Ssufangtai-Changchiwopeng; artillery brigade and infantry reserve to Tatzuying; Seventh Division to Tahoangchipu; First Division to Chentzukou; cavalry brigade to Yanglanchiapu (right bank of the Liao). The enemy's cavalry at Ashihniu, Wupanyulu, and Shya-Kushi resisted this advance, but all columns reached their destination except the Ninth Division, which found Ssufangtai strongly held by the enemy, and therefore halted north of Tsuyutai.

March 1.—As a result of orders, the Ninth Division opened fire on Ssufangtai from the southwest at noon. In advancing to their destinations the Seventh and First Divisions drove back the detachments of Russian cavalry in their front, meeting bodies of considerable size. The artillery brigade advanced to Suchiaan, from which place it fired on Tapingchuang, dislodging from the latter village a force of some 15 Russian squadrons, which retreated northeast. A part of the brigate then took position at Tapingchuang and opened fire on the Russian rear at Ssufangtai. In spite of the enveloping fire the Russians continued to hold the village until dark, when they retired. The Ninth Division had made preparations for a night attack, which was launched at 11 p. m., only to find the village practically evacuated, the affair ending in a comparatively insignificant skirmish.

March 2.—Continuing the flanking movement, the Ninth Division was ordered to proceed on this day to Linchiatai, if possible; Seventh Division to the vicinity of Shalingpu; First Division to Lamuho, and the cavalry brigade to Mashanchiatzu on the Hsinmintun highway. The Ninth Division, which had occupied Ssufangtai the night before, found the Russians holding a strong defensive line eastward from the latter village, and owing to the failure of the Second Army to make the advance anticipated was unable to proceed farther than Santaitzu, before which village it halted and fronted the enemy the night of March 2–3, keeping contact with the Second Army. The Seventh and First Divisions reached their destinations about noon without encountering any force of the enemy. At this time information was received through a spy (later found to be untrue) that the Russians were retreating north from Mukden. It was accordingly deemed necessary to atack the enemy and push on as far as possible. The Seventh Division was ordered to the line Tehsiangyintzu-Tatzupu and the First Division to the line Chienmintun-Hsiniulu. The cavalry brigade reached Chinchiatai and the artillery brigade and infantry reserve reached Shalingpu by 6 p. m. A second brigade of cavalry was this day attached to the Third Army and was first posted at Panchiatai to close the gap and keep up the connection between the Ninth and Seventh Divisions. At 5 p. m. the Russians advanced toward Shalingpu and Tatzupu with a force estimated at two or three batteries and one brigade of infantry, and behind this force a reserve of one division. The advance of the Russians was directed at the center between the Seventh and First Divisions, which brought them under a cross fire and checked their advance. The Russians, however, continued to hold the front villages and exchanged fire with the Japanese lines till dark.

March 3.—The continuation of the flanking movement was delayed on this day by the Russian offensive movements, as well as to enable the Ninth Division to come up into line. The Russians were holding a defensive position from Chienmintun to Changshihtun, and at 7 a. m. launched an attack against Shalingpu with a force estimated at 30 guns and an army corps (Sixteenth). Shalingpu was occupied at the time by the artillery brigade and infantry

reserve, which engaged the enemy. As on the day before, the direction of the Russian attack brought it under the cross fires from the Seventh and First Divisions, and the attack was repulsed, the Russians losing heavily. On the extreme Japanese left the Russians also made an offensive demonstration with a force estimated at 1 brigade of infantry, 25 squadrons, and some artillery. The Japanese cavalry brigade, reenforced by two battalions of infantry, intercepted this force at Tafangshen. The Russians advanced to within 500 yards from the Japanese line, but retreated in the evening without any severe fighting. In this affair the Japanese cavalry fought dismounted. On this day a division from the Second Army replaced the Ninth Division, enabling the latter to move north past the enemy and to reach Linchiatai, where it again came into communication with the Seventh Division.

March 4.—The different columns were ordered to direct their march as follows: Ninth Division on Mukden station, Seventh Division on North Tombs, First Division on Chengitun. At 1 p. m. the Seventh Division reached Fentai, where it was learned that the enemy was occupying Likuanpu; so one regiment from this column was assigned to attack it from the direction of Yuchiatun. The enemy was posted behind strong intrenchments and the Japanese did not press the attack, only driving the Russians from some of their advanced trenches. A part of the artillery brigade assisted in the attack. The First Division reached Tashihchiao without meeting any of the enemy. The Ninth Division reached Changshihtun in the evening after more or less skirmishing. The enemy's main defensive position had now been clearly developed, the right wing being at Tafanhsintun and extending through Likuanpu, Yukuantun, Yangshihtun, Machiapu, and continuing thence to Linshengpu, on the Shaho, along the front of the Second Army. The cavalry brigade which joined the army March 2 was on this day joined to the original cavalry brigade, forming a division under one command, to which were added two batteries of artillery and six machine guns. The cavalry division reached Chienshentaitzu.

March 5.—The Third Army was now in front of the enemy's main defensive position and a farther advance to the right

rear was deemed necessary. As the Second Army had been following up the flanking movement of the Third, the latter was enabled to continue its march on the right rear of the Russians. The extension of the Japanese flank on this occasion was made in part by a transposition of the columns of the Third Army, the Ninth Division being withdrawn and placed between the Seventh and First Divisions, the place of the Ninth Division being taken by a division of the Second Army. As it had been expected to give battle on the 5th, the Japanese troops were quite close to the Russian positions, rendering flank marches and the relieving of troops dangerous operations. The new positions were, however, taken up without mishaps. The relieving column from the Second Army reached Changshihtun in the evening of the 5th and took the place of the Ninth Division under cover of the darkness, the latter marching to its new position. The cavalry division retained its position at Chienshentaitzu.

March 6.—Under the new arrangement, the Seventh Division held the front from Fentai to Tashihchiao; the Ninth Division north of the Hsinmintun highway and the First Division between Pinglupu and Koushihyang with reserve at Mashanchiatzu. At about 11 a. m. and before the Ninth Division had completed its march, the Russians made an attack with about one and one-half brigades against Tashihchiao along the Hsinmintun highway and north of the same. The situation was critical, but fortunately the reserves at Mashanchiatzu engaged the enemy while troops from the Ninth Division deployed from the march. The artillery brigade took position at Houchang, from where it fired on the enemy. By 3 p. m. the attack was checked and the situation restored. The Russians held a defensive line from Chaohuatun through Tachiatzu to Hsiaochiatun. On this day the cavalry division was at Erhtaitzu, opposing the enemy's cavalry.

March 7.—Up to this time the operations of the Third Army had consisted mainly of maneuvers having for their object to reach the enemy's right rear, and such fighting as had taken place was of a comparatively mild character. From this date on, however, desperate fighting commenced, which lasted until the end of the battle. The object of the

Third Army now was to break the Russian line between Chengitun and the North Tombs. For the severe fighting which was now anticipated the reserve of the Third Army was strengthened by the addition of the two and one-half brigades from the general reserves of the Manchurian armies, which brigades reached Mashanchiatzu on this day. The brigades of the reserve were assigned to the different columns by the army commander from day to day, according to the necessities of the situation. The Seventh Division was ordered to direct its march on the North Tombs; the Ninth Division on Yunsontun, and the First Division on Chengitun. By evening the First Division had reached the line Siutaitzu-Chengitun. The Ninth Division attacked Chaohuatun, which was stubbornly held by the Russians all day, but carried by a brilliant assault in the evening, with heavy losses on both sides. The artillery brigade assisted in this attack. The Seventh Division attacked Chuanwanchiao and Tafanhsintun, but was unable to occupy this village until evening. The cavalry division advanced to line Tashintun-Lichiaputzu, opposing the enemy's cavalry. An attempt to destroy the railway north of Hushihtai by the cavalry was not successful.

March 8.—The day's orders were for the Seventh Division to march on Kinchiauatzu, the Ninth Division to the village at junction of principal road and railroad, the First Division to Yunsontun. Information had been received in the morning that the Russians south of Mukden had abandoned their positions on the Shaho and had commenced to retreat. The task of the Third Army was now to press the enemy hard and, if possible, to intercept his retreat. One brigade from the Seventh Division, which made an attack on Hsiaofanhsintun, was repulsed with heavy casualties. The main body, however, having driven back the Russians from Chuanwanchiao, made continual attacks on Hsiaochiatun, but did not carry the village until evening. The Ninth Division, with the artillery brigade, meanwhile attacked Tachiatzu, and after a severe fight occupied the place about 1 p. m. The Russians lost very heavily in this affair. The First Division attacked the enemy's line Yuanchentun-Santaitzu, but after fighting all day failed to carry the position, the Russians receiving constant reenforcements. The cavalry division was

at Houshintun skirmishing with the enemy's cavalry and infantry, fighting both mounted and dismounted. The left of the Second Army, which had been checked in its attack of the 7th, was still fronting the Likuanpu position. The advance of the Third Army on this date had not made the progress expected, both flank columns having failed to accomplish their appointed tasks, but the situation was such that each column looked forward to a successful night attack.

March 9.—During the night of March 8–9 it was heard that the Russians north of Mukden were also retreating, and that the First and Fourth Japanese Armies were approaching the Tiehling road from the east. With a view to cutting off the retreat a further movement to the north was deemed necessary, and a new disposition of the columns of the Third Army was decided upon. The Ninth Division was ordered to the left of the First Division, the place of the Ninth being taken by the Seventh Division. The latter division proceeded north to Siutaitzu with its main body, from where it made an attack on the Russian position Santaitzu-Tachiatun. This attack failed. The First Division made a night attack on Santaitzu and Yuanchentun, which also failed, and the division spent the entire day before the Russian position. At about 1 p. m. a brigade of Russians suddenly appeared on the left flank of the detachment of the First Division attacking Yuanchentun and compelled it to fall back to Chengitun by a flank fire. The violent dust storm of this date obscured objects and enabled the Russians to approach quite closely before being discovered. The reserves of the First Division, however, drove off the Russians, and at 2 p. m. another detachment from the First Division essayed a fresh attack on Yuanchentun. At about 6 p. m. the Russians resumed the counter attack with a force estimated at one division, again compelling the Japanese to fall back on Chengitun. The Russians pushed their attack as far as Chengitun, but were driven off with the cooperation of a brigade from the army reserve, which arrived at this time. The Ninth Division, which had been concentrated near Taochiatun, launched an attack about 2 p. m. with its main body against Hsiaochiaotzu, and with a detachment against Hushihtai. The main body first drove the enemy, about four battalions, from Kuochitun, then occupied Kuo-

shantun and opposed the Russians at Tungchangshang. The detachment dispatched in the direction of Hushihtai could only get as far as Waishutzu, where it was stopped by the resistance of the Russians. Owing to the dust storm the artillery brigade did not take part in the fighting of the 9th. The cavalry division was at Tashintun and Houshintai opposing the enemy's cavalry.

March 10.—The Seventh Division made a night attack on the enemy's line Santaitzu-Tachiatun with four battalions, and, breaking through the first line, penetrated the forest of the north tombs, and after severe fighting reached the tomb inclosure, behind which they maintained themselves against the Russian counter attack. The Russians in the meantime reoccupied their line between Santaitzu and Tachiatun, cutting off communications with the four battalions in the tombs, which were for the time being given up for lost. Early on the 10th another part of the Seventh Division attacked Tachiatun, assisted by some batteries of the artillery brigade. The Russians made a strong fight, but Tachiatun was finally carried at 4 p. m. By this time the necessity for strong resistance on the part of the Russians had ceased, their army having practically all retreated beyond the front of the Seventh Division. During the retreat of the Russians through the forest from Tachiatun they met with considerable loss from the four battalions of Japanese shut up in the tombs, who fired on them while passing. By 5 p. m. the entire forest was fully occupied. The Second Army was still being held on this day before the Likuanpu position, and the gap between it and the Third Army was temporarily closed by a brigade of the army reserve at Hsiaochiatun. Owing to the retreat of the Russians the Second Army was, however, enabled to extend its left as far as Chuanwanchiao.

The First Division was finally able to occupy Santaitzu at 5 p. m. and Yuanchentun later in the evening, after strong resistance by the Russians. During the night of the 10th the Ninth Division established communication with the Fourth Army at Yulingpu.

The Ninth Division, now on the left, attacked Tungchangshang with the assistance of the artillery brigade, capturing the place a little after noon and pushing its front line to the

east of the village. The detachment which had reached Waishutzu the previous day made an attack on this place, but was repulsed. About 2.30 p. m. the Russians counter attacked with about one division from the direction of Hushihtai, but they were in turn repulsed with considerable loss.

The Russians continued to hold until nightfall a defensive line through the villages immediately west of the railroad from Waishutzu through Hsiaochiaotzu to Yuanchentun, covering the retreat of their forces over the ground between the railroad and the Tiehling highway. The advance of the Fourth Army reached Yulingpu at noon of the 10th, and the advance of the First Army reached Puho, but before either could join hands with the Third Army the main part of the Russian retreat had passed. The events of the 10th ended the fighting of the Third Army, which now proceeded to change its flank position to a front position, with the Ninth Division on the right, the First Division in the center, and the Seventh on the left.

The Japanese report more than 26,000 Russian dead as having been left on the field of battle and estimate the Russian wounded at 90,000, a number not at all disproportionate to the killed. The number of prisoners have been generally put at about 40,000, but General Kodama informed one of the attachés that the prisoners of war numbered only 21,000, a number which agrees more nearly with a later published statement of the total of Russian prisoners detained in Japan. Large quantities of military property also fell to the lot of the victors, including the following:

Field guns		60
Rifles		60,000
Transport wagons		1,200
Artillery ammunition	rounds	200,000
Rifle ammunition	do	26,000,000

The Japanese losses were admitted to be about 50,000 in killed and wounded, a figure which is generally conceded to be below the mark. Judging from certain figures of losses in divisions and armies, I am of the opinion that the Japanese casualties easily exceeded 60,000 and may have reached 75,000. Even at this latter figure their losses were materially less than those of the Russians, a somewhat remarkable

result when one considers that, in the two weeks' battle, the Japanese were continually attacking the Russians in fortified positions.

That the Russian right wing was considerably demoralized and disorganized at the termination of the battle is clearly proved by the testimony of the battlefield. A ride along the Russian line of retreat between the highway and railroad for a distance of 5 miles north of Yuanchentun on March 11–13 revealed an enormous quantity of abandoned property, transportation, clothing, equipments, and, most significant of all, rifles, which had been cast aside in large numbers.

COMMENTS.

In the numbers engaged and in the extent of front covered, the battle of Mukden surpasses any battle of the past century, and no single observer could hope to master all its details. Being familiar with the operations of but one army, the Third, any deductions or comments on my part must seem hazardous. I, however, venture the following observations:

1. The conception of the Japanese to surround the Russian army by advancing both flanks with a force whose numerical superiority was practically insignificant must be viewed as exceedingly bold. In the absence of any marked superiority in numbers, such strategy can only be justified by a marked superiority in the quality of the troops and their leaders. That this superiority of quality is taken into account by the Japanese in their calculations seems certain. As one Japanese staff officer puts it, "A Japanese division is equal to a Russian army corps."

2. Much has been heard of the Russians possessing a large cavalry force, reported at 20,000 sabers. I am unable to give any satisfactory explanation for the almost negligible part played by this cavalry in the battle. The country over which the Third Army operated is ideal for cavalry movements and the opportunities for harassing the movements of that army abundant. The Russian cavalry must either be overrated as to numbers or must be of an indifferent quality. The Japanese cavalry, on the other hand, appears to have fulfilled its functions in a highly creditable manner. One thing is certain, that up to the

present time (April, 1905) the Japanese cavalry has held its own against the Russians at all points. In fact the Japanese cavalry is, in my opinion, a much better force than the estimate generally placed upon it at the beginning of the war. While not an ideal horseman nor ideally mounted, the Japanese trooper is an exceptionally intelligent soldier and thoroughly trained. In the modern duties of scouting and reconnoissance it is often more a question of wits than superior horsemanship and, in this particular at least, the dull and stupid Cossack is no match for his more clever adversary.

3. The lack of initiative on the part of the Russians was noticeable on several occasions. On March 2 and 3 a considerable gap separated the Ninth Division from the remainder of the Third Army, which would have afforded a good opportunity to a more active and wide-awake enemy. True the Russians delivered strong attacks on these days, but they were misdirected. Again, on March 8 and 9 there was a gap between the Second and Third Armies of which the Russians failed to take any advantage, even after they had repulsed the Seventh Division in its attack on Hsiaofanhsintun on the 8th. The attachés of the Third Army were at Chuanwanchiao on the 8th and they inform me that this village was under not only a front fire, but also under fire from the right rear where the Russian position jutted behind the front of the Third Army. On the evening of the 8th the attachés with the Third Army thought an attack by the Russians against the gap between the Second and Third Armies was imminent. It must be observed, however, that the order for the general retreat of the Russians had already been given twenty-four hours earlier, and that serious offensive operations no longer formed part of the Russian programme.

The transposition of Japanese columns on two occasions when the troops were already engaged must also be viewed as hazardous undertakings in the presence of a wide-awake enemy, although performed at night and favored by the ground, as was the case. Here also the Japanese relied upon a besetting fault of their adversaries, namely, that when once safely intrenched the Russians will not leave their defenses unless driven out.

4. During its entire advance the Third Army at no time fought a general engagement. All the fighting consisted of isolated combats for the possession of villages which were utilized by the Russians as defensive points, fieldworks and hasty intrenchments being impracticable owing to the frozen ground. Some of these combats were very bloody in character. The ground being perfectly bare and without cover of any kind, the attacking troops were under fire at all times from extreme ranges down. In my judgment, there is no better tribute to the quality of the Japanese troops than their achievements in capturing such villages as Chaohuatun and Tachiatzu. I question whether any umpire at peace maneuvers would ever rule in favor of the attack under the conditions which existed on March 7 at Chaohuatun.

6. So far as I am able to judge from the facts, the operations of the Third Army were directly responsible for the issue of the battle. The so-called Army of the Yalu, which operated in the hilly country to the east and northeast of Mukden, could not make much progress. It undoubtedly played an important rôle in making the Russian commander apprehensive for his left wing, and the Japanese prefer to believe that General Kuropatkin was deceived into thinking that the entire Third Army was operating on this flank. The task of the First and Fourth Armies appears to have been limited to containing the Russians in their strong lines on the Shaho. To the Second and Third Armies was assigned the task of turning the Russian right wing. Although effectually checked by the strong position at Likuanpu, the fierce attack of the Second Army on this point kept the Russian reserves on the right wing occupied, enabling the Third Army to continue its flanking movement.

7. Although the Third Army succeeded in reaching a position favorable for cutting the Russian line of retreat as early as March 9, it was unable to break in on the line owing to the excellent defense of the Russians. Had the Japanese been able to reach the railroad on the evening of March 9, or even earlier on the 10th, the fruits of their victory would have been much more extensive. On the 10th, especially, the left of the Third Army fronted the railway the entire day at a distance of from 2,500 to 3,500 yards, and was compelled to watch the Russians streaming by hour after hour without

being able to break through the strong defensive line west of the railroad. As the Fourth and First Armies both reached the Tiehling highway in the early afternoon, the last of the Russian troops were compelled to retreat through a narrow lane several miles long extending from the railway to the Tiehling road, much of this ground being under long-range artillery fire. The defense of the Russians along the front of the Third Army was magnificent, but, in justice to the Japanese, it must be observed that their troops had been marching and fighting night and day for twelve days, giving and receiving heavy blows, and they were therefore in no condition to break the Russian desperate resistance at the last hour.

The retreat of the Russians was further favored by the dust storm on the 9th, which prevented the use of artillery, and by exhaustion of the artillery ammunition of a part of the Japanese artillery on the 10th.

ATTACK ON CHAOHUATUN.

Chaohuatun was the scene of an important combat on March 7, in which the Ninth Division, Third Army, by a brilliant assault broke the Russian defensive line and threatened the line of retreat. My personal view is that this affair, more than any other event, decided General Kuropatkin to order the retreat of his army, which commenced the night of March 7–8. The Pu River, with a general course from northeast to southwest, flows west of Chaohuatun, about 1,200 yards distant at its nearest point, and played an important part in the combat. Like all the streams of this region, it has a sunken bed, which in this case was about 25 feet wide at top and 8 to 10 feet deep. For the details which follow I am largely indebted to information kindly furnished by the other attachés of the Third Army.

At this time the Russians were holding a defensive line through Chuanwanchiao, on the Hsinmintun road, to Chaohuatun, thence northeastward and eastward through Siutaitzu and Chengitun. Except for the villages, the lines lay in the open, save for such scant cover as the few accidental features (Chinese tombs, etc.) afforded. On the morning of March 7 the Ninth Division approaching from the northwest, first occupied Waniutun, expelling a detachment of

Russian cavalry. The left brigade of the division, which had been assigned to attack Chaohuatun, then entered the stream bed from the north, marched along the ice under cover of the banks, and fronted the Russian position. The mountain guns of the division were posted on both flanks of Koulingchitun (on the west bank of the stream and about 1,600 yards directly west of Chaohuatun). The artillery brigade at first took up a line through Houchang, at a distance of some 4,000 yards. The forenoon was taken up by an artillery duel, with the Russian batteries located generally on a line about 1 mile southeast of Chaohuatun; the Japanese, however, firing occasionally on the village and Russian lines. Toward noon the infantry commenced their attack, entering the stream bed from the north and marching along its length till opposite their places and moving from the bed in deployed formation by successive platoons or sections.

At 1.45 p. m. the headquarters Ninth Division moved to a point about 2,500 yards from Chaohuatun, the attachés at the same time entering the stream bed in the vicinity of Waniutun, where they had an excellent view. At this time the first line of Japanese infantry was about 600 yards from the village with a few advanced groups. The ground over which the Japanese were advancing was perfectly bare and open. Behind the first line were numerous zugs and sections, all deployed as skirmishers with considerable intervals, which continually reenforced the firing line, advancing by rushes. The interval in the firing line was maintained at about 1 pace. Successive reenforcements, a company at a time, kept entering the stream bed from the north and deploying therefrom by platoons or sections. Whenever fresh troops emerged from the stream bed they were met by Russian shrapnel. The Japanese kept extending their lines to the left so as to take the village more from the north. At 4 p. m. the Japanese firing line was 400 yards from the village. The lightly wounded made their way back to the stream bed, where they were attended by the surgeons at the battalion dressing stations. The Japanese officers exposed themselves fearlessly, standing in the open and giving directions to their troops as they moved from the stream bed.

At about 4.45 p. m. a battery of the artillery brigade

moved forward with large intervals—about 100 yards—and took post near Koulingchitun, only 1,600 yards from the Russian position. The other batteries gradually followed, the mountain guns having also advanced several hundred yards to the edge of the stream. During the advance of the artillery the Japanese firing line was materially strengthened. At 5.45 p. m. the Japanese were 300 yards from the village, while Russians in the open could be seen falling back individually. At 6.30 the firing line was 150 yards from the village. At this time the Japanese reenforcements were moving to the left on the north of the village and in closed formation. The Japanese artillery concentrated its fire on the village and its rear. At 6.55 the Japanese appear to have entered the village from the left, the Russians leaving as the Japanese entered. In the open the Russians did not wait for the lines to close, but fell back as the Japanese reached within 200 to 300 yards. It was quite dark when the Japanese were in possession of the village, which was in flames, as were also Houchang, Koulingchitun, and Chuanwanchiao. While the attack on Chaohuatun was being made another brigade was attacking the Russian line north of Chuanwanchiao. This part of the line was carried at the same time as Chaohuatun.

The Japanese took their first reserve of infantry ammunition with them on pack ponies into the stream bed. From the stream bed ammunition was carried to the firing line by soldiers carrying slings on their shoulders and advancing in skirmish order. As a rule the Japanese infantry on going into action is supplied with extra ammunition carried in haversacks, bento bags, etc., so that each man has a total of 300 to 400 rounds. As soon as he has expended his "extra" ammunition, and before touching that in his belt pouches (120 rounds), he reports himself to his officers as "entirely out of ammunition."

The Japanese lost about 2,000 in the attack on Chaohuatun. On March 9 I rode over the field, which had not yet been cleared. I observed that the dead lay in well-defined lines, from which it would appear that the losses were greater during the long halts lying down than during the brief periods of the rushes. This agrees with observed facts, the attachés stating that they observed very few men fall during

the rushes. The dead lay from about 150 yards in front of the village down to the stream bed. Judging by the lines of dead, the rushes were from 50 to 100 yards long.

ATTACK ON TUNGCHANGSHANG.

This combat shows the daring with which the Japanese handled their artillery. After the capture of Kuoshantun by the Ninth Division on the 9th, the Japanese infantry was opposed by the Russians at Tungchangshang, the outer walls of the villages being but 350 yards apart, as determined by pacing. The Russians resisted stubbornly and the Japanese infantry could not dislodge them. Two batteries of the artillery brigade were accordingly pushed forward from Kuochitun on the morning of the 10th and, taking post behind the eastern walls of Kuoshantun, fired on Tungchangshang with high-explosive shells. The Russians made their counter attacks against Kuoshantun, but were repulsed. Finally they were driven out of Tungchangshang, mainly by artillery fire, and the Japanese infantry was able to push the lines to the east of this village in the early afternoon of the 10th. The artillery naturally suffered some loss in this affair, but its services decided the issue. In fact, the artillery brigade rendered most conspicuous service during the battle, and its commander received the following commendatory letter from General Nogi:

To the first brigade of field artillery:

During the engagement on the 7th of March in the neighborhood of Chuanwanchiao and Chaohuatun an attack carried out by the Seventh and Ninth divisions was severely checked. At this critical moment the field artillery brigade left its position near Houchang and, regardless of losses, advanced for 2,000 meters over perfectly open ground under the enemy's fire. The brigade then took up its position near Koulingchitun and poured a heavy concentrated fire on the enemy, thus giving great assistance to the attack.

Again, at the attack of Tungchangshang by the Ninth Division on the 10th of March, the second battalion of the —— Regiment, forming part of this brigade, advanced about 1,500 meters under a severe fire and came into action at a distance of only about 500 meters from the Russian position, opened a heavy fire on the enemy, thereby affording invaluable support to the attacking infantry. Moreover, when the enemy delivered a vigorous counter attack this battalion aided materially in repulsing it by the intensity and accuracy of its fire.

In recognition of the valor and great merit of the above deeds I have the honor to confer this "Konjo."

General Baron KITEU NOGI.

This is the same artillery brigade that was so efficiently handled during the siege of Port Arthur. Its losses during the battle of Mukden were 15 officers, 350 rank and file, and some 300 horses. Each gun fired an average of 550 rounds during the battle.

It being impossible to dig gun pits during the period of fighting, the guns of the artillery brigade were provided with provisional plate shields wired to the cannoneer's seats each side of the piece. This provided a fair degree of shelter for the crew against shrapnel.

While on the subject of artillery, I may observe that the efficiency of the Japanese artillery in the present war is in a considerable measure due to the fact that it carries a liberal supply of high explosive shell, whereas the Russians fire shrapnel only. Against cover of any kind shrapnel is practically valueless, and an artillery provided with shrapnel only will often find itself in situations where it is powerless to inflict damage on the enemy. With a varied supply of ammunition the Japanese possess a decided advantage over the Russians, notwithstanding that their gun is distinctly inferior in power to the Russian gun. Several instances will serve to illustrate this point. On March 4 the Japanese at Yuchiatun were subjected to an intense shrapnel fire from the Russians for over an hour. The village was filled with troops of all kinds, sheltered behind buildings and walls, and, although it rained shrapnel bullets, but two men were wounded, one of them a doctor. I have this on the authority of the attachés who were in Yuchiatun at the time. Again, at Kuochitun, on March 10, the Russian shrapnel burst well over the village without doing any damage to the troops therein. Chaohuatun and Tungchangshang, on the other hand, are examples of the effects of Japanese shells. In fact, all of the villages attacked by the Japanese artillery reveal the effective work of the shell in their breached walls and wrecked buildings.

In connection with the combat at Tungchangshang it seems appropriate to describe the events of the 10th, which I witnessed from the village of Kuochitun. Shortly before noon the attachés were permitted to enter the village, which was in the line of the artillery brigade. The ground eastward from the railroad has a slight dip to the railroad, thus af-

fording an excellent view point. As we entered the village Japanese batteries were firing in the direction of the railroad, apparently at some batteries east of the track, one of which was plainly visible projected against the sky line. while others could be located by their flash. A Japanese infantry force, apparently a brigade, was just completing its deployment in the direction of Yuanchentun, the first line, lines of supports, and reserves appearing as faint brown streaks from our view point. At this hour the atmosphere was hazy and the sun in my front, so that nothing could be made of the Russian position except a couple of the batteries east of the railway. There were also one or more Russian batteries at Yuanchentun which could not be definitely located, but, from what followed and from an examination of the ground on the following day, I think the position was just west of Yuanchentun, screened by the trees and tombs of a Chinese burying ground at this point. The Japanese artillery was posted behind village walls, except two batteries in a sunken road north of Chengitun. The deployment of the Japanese infantry appeared to be against Yuanchentun and to the north of this village. The infantry had piled their knapsacks on the ground between Chengitun had Kuoshantun before going into action.

A steady and sustained artillery fire was going on from both Russian and Japanese guns, the former dividing their attentions between the Japanese batteries and the infantry deployed in the open. The Russian artillery practice was good, and I am satisfied that all the Japanese troops in the open suffered heavily. On the villages the shrapnel, although bursting well, produced no effect. and the losses here were insignificant.

In spite of their losses the Japanese infantry held its ground all day in the open. From time to time a light line of dust showed where the first line had made a rush. No infantry fire could be heard, although this does not prove that there was none, for the distance was considerable and the noise of the artillery and bursting shell confusing. Up to the time of darkness the Japanese infantry had not assaulted the Russian position.

The target of the Japanese guns could not at first be made

out clearly, but with the improving light of the afternoon it was found to be the Russian column of retreat marching on the road parallel to the railroad track. At about 3 p. m. the Russian troops could be plainly seen on the road, infantry units, batteries, cavalry detachments, trains succeeding one another closely, and this procession kept up until darkness intervened. At first the Russian troops appeared to be fairly well in hand and their march orderly in spite of the Japanese fire, but after 5 p. m. the organizations were more broken, with numerous stragglers and small groups.

From Yuanchentun north for about 1,000 yards the railroad runs in a cut and the wagon road alongside on the east lies on the top of the bank, exposed to fire. North from the bridge at this 1,000-yard point the railroad is on an embankment, with the wagon road close up against the embankment and still on the east side, being thus screened from the Japanese fire for a considerable distance.

The Japanese artillery concentrated its fire on the section of road exposed to view, and their shrapnel could be seen bursting well over the retreating column. At 3.30 p. m. the Japanese batteries at Chengitun ceased firing, owing to the exhaustion of their ammunition. About 4.30 p. m. a new Russian battery opened up from an invisible point some distance north from Hsiaochiaotzu, bringing a sharp oblique fire on Kuoshantun. This fire lasted only half an hour.

At 5.30 p. m. a Russian battery came into view on the north side of and close to Yuanchentun, making for the railroad crossing at a trot. After about half the carriages had crossed the track one of the teams was seen to stop, compelling the following carriages to turn out in order to pass it. Shortly after the withdrawal of this battery a Russian line of skirmishers was seen to rise from the ground west of the railroad and north of Yuanchentun. This line fell back, being joined by supports and reserves, and reached the wagon road in a confused mass, the men moving hither and thither. An officer on horseback was seen riding back and forth, evidently endeavoring to assemble his troops. The body, which was about one battalion, finally moved off in fairly good order. In the gathering darkness more Russian skirmishers could be seen rising from the ground farther north and fall-

ing back to the road. The Russian batteries east of the railway fired steadily, and at the time of my withdrawal, 6.30 p. m., were still in action. The artillery fire kept up for about half an hour longer, but about 7 p. m. firing ceased and the twelve days' battle was ended.

The Russian troops whose retreat I witnessed were undoubtedly those who had been opposing the Japanese up to the last day on the west side of the railway at Santaitzu, Tachiatun, and the Imperial Tombs. Considering the position of the Third Army on the 10th and that the advance of the First and Fourth Armies had reached the Tiehling road on the same day, the covering of the retreat of their last troops must be viewed as a skillful tactical achievement on the part of the Russians.

After the battle the Fourth Army continued the pursuit of the Russians along the line of the railway, occupying Tiehling March 16, Kaiyuan March 19, and Changtufu March 21.

The Third Army changed front on March 11 and 12, facing north with the Ninth Division on the right, the First in the center, and the Seventh on the left.

On April 13 the Third Army moved across the Liao River, army headquarters and the attachés' camp being established in Achiniuluputzu.

On May 4 the Third Army made a third and final advance to the line Fakumen-Chinchiatung, army headquarters and attachés' camp being at Fakumen. The Japanese did not at first have accurate maps of the region penetrated by the Third Army, but their surveyors were soon at work and fine maps, scale 1:50,000, soon appeared. Unfortunately these good maps were withheld from the attachés, and I was unable to secure any copies.

Coincident with the final movement of the Third Army to the north, the Second Army moved out from its position in reserve at Mukden and occupied the front between the Third and Fourth Armies. With the final adjustment of their lines in May, 1905, the Japanese armies from right to left occupied the following order: Fifth, First, Fourth, Second, Third, with the two cavalry brigades on the left.

The Third Army held the line from Kangpienhsien through

Chinchiatung, with the Fourth Division of the Second Army on the immediate right. The First Division of the Third Army was mainly in reserve, having but one regiment in front line between the Seventh and Ninth Divisions. The Eighth Division of the Second Army was also known to be in reserve, and it appears that the bulk of the Second and Fourth Armies was massed along and on both sides of the railway.

The general expectation of the attachés was that an early movement north would follow the battle of Mukden, probably after the frost was well out of the ground and before the rainy season set in. As the weeks rolled by it became gradually more and more apparent that the Japanese had no intention of leaving their fortified line taken up in May, and it is my settled conviction that if hostilities had continued the Japanese would have gone on the defensive. This conclusion is reached mainly from considerations of the transport difficulties which hampered Japanese mobility; not that they ever suffered for lack of supplies, but that the difficulties presented by the increasing distance from the sea determined the Japanese leaders to proceed no farther than their previously worked out plans of transport would permit. Their advance had carried them beyond the head of navigation on the Liao River, without which they would have had difficulty in supplying their vast forces, estimated at not less than 600,000 all told, even in the positions reached. A distance of 275 miles still intervened to Harbin, and without the occupation of this strategical point any partial advance would not have affected the strategical situation sufficiently to have compelled the Russians to sue for terms. Harbin, in my opinion, was beyond the limits of the Japanese transport methods, which determined the limits of the Japanese advance.

During August, 1905, large reenforcements reached the Japanese lines, including several new line divisions, one of which, the Fourteenth, Lieutenant-General Tsuchiya commanding, was assigned to the Third Army and stationed to the left rear of the Seventh Division, with headquarters about 8 miles west of Fakumen. The arrival of these fresh organizations did not, in my judgment, indicate any intentions of an offensive movement by the Japanese. They were simply

brought forward to meet the constantly increasing strength of the Russians, who had developed a capacity of transport on the Siberian Railroad far beyond the expectation of all judges.

Having reached a decision not to advance beyond their now established lines, the Japanese quietly awaited the next move of the Russians. The latter, having recovered from the effects of the battle of Mukdên, commenced reconnoitering the Japanese front from about May 1, displaying considerable boldness and enterprise in these affairs. In the middle of May General Mishchenko, starting from Liaoyangwopeng, rode around the Japanese left flank with a force estimated at about fifty squadrons, and proceeded as far as Shihfossu and Hsinmintun, raiding a Japanese field hospital and transport column en route. Although abundant opportunities existed for doing serious damage to the Japanese, the net results of the raid were insignificant.

Having learned that General Mishchenko was again assembling his cavalry for a raid, the Japanese made an attack on Liaoyangwopeng the night of June 15–16 with the Fourteenth Brigade of Infantry, four batteries, and the two cavalry brigades. The advance was made in two columns, each column consisting of one regiment of infantry, one brigade of cavalry, and two batteries. Each column was preceded by a thick line of skirmishers thrown out by three advanced companies, which followed in close order, with intervals of 100 meters. The cavalry brigades marched on the right flank of the right column and on the left flank of the left column. Two companies for each column, at 1,000 meters, protected the flanks not covered by the cavalry. The remaining seven companies of each regiment, with the artillery, followed on the roads close behind the supports of the skirmish line. The Russians were struck at 4 a. m. by the right column, the Twenty-seventh Regiment, and completely surprised and routed, their camp destroyed, and considerable property captured.

With the exception of Mishchenko's raid and the attack on Liaoyangwopeng, no other affairs of any importance occurred on the front of the Third Army. I except, of course, the numerous collisions between patrols operating in front of the outposts, which were of frequent occurrence.

The Russians appeared in the direction of Chinchiatung several times in considerable force and bombarded at extreme ranges, but never came to close quarters.

The methods employed by the Japanese for securing their front differed in no way from those prescribed in the regulations of all armies. There was the usual fortified line of resistance, and in front of this was the fortified line of outposts, and beyond this the observation line.

On September 9 General Fukushima, of Manchurian headquarters, was deputed to arrange the terms of an armistice, and on September 11 firing ceased along the outpost line, thus terminating hostilities.

GENERAL CONCLUSIONS.

In the absence of more detailed information any general deductions as to the lessons of the Russo-Japanese war must necessarily be viewed with considerable caution. Considering the magnitude and duration of the war and the fact that it is the first great war between nations having modern arms and training since 1877, one might reasonably expect some startling and original methods. If there is one fact more than any other which has impressed itself on my mind it is that, in its general features at least, the war was conducted by both sides along strictly orthodox lines. The formation of infantry for the attack, the massing of guns, and the concentration of their fire, the value and employment of field fortifications, the siege of permanently fortified localities, and many other features, all savor strongly of the text-book. So far as I am able to judge, the recognized rules and principles for conducting warfare underwent no serious modification in their application.

In two important particulars the war demonstrated the falsity of preconceived ideas, viz, Japanese mobility and the Russian cavalry. With respect to the former, it was generally believed that the Japanese troops would astonish the world by their marching powers, rapidity of movements, and ability to exist independently of established depots and supply lines. The slowness and deliberation of the Japanese movements was distinctly disappointing, especially in view of their preparedness and the brilliant results that might reasonably have been anticipated from rapid operations

early in the war. Instead of the rush of the avalanche it was the slow but irresistible creeping of the glacier that characterized the Japanese advance. The Japanese transport system, excellent enough in its way, was responsible for this result. Instead of the supply depot and line of communication being subservient to the movements of the troops, the conditions were reversed and the troops had to wait on the supply department. In the matter of land transport the achievements of the Russians far exceeded those of the Japanese. The transport and maintenance of a force of 1,000,000 men in the theater of war over a single-track railway far exceeded the most liberal estimate and deservedly entitles the Russian transport system to great praise.

With respect to the Russian cavalry, it simply accomplished nothing. Just why this was so must be for others to say. Opportunities for doing excellent work were not lacking, and much damage could have been inflicted on the Japanese by a proper use of the great superiority in cavalry possessed by the Russians.

The siege of Port Arthur has again given prominence to the value and importance of permanently fortified places when occupying strategical positions. Port Arthur in itself possessed no value for the Japanese, but being the Russian naval base and sheltering the main Russian squadron it became strategically of the greatest importance. Among the results contributed by Port Arthur to the Russian cause may be mentioned the following:

1. Neutralizing for five months four out of thirteen Japanese line divisions.

2. Engaging the attention of the whole Japanese fleet for a period of over ten months, thus leaving Vladivostok unguarded and practically an open port for the Russians.

3. Securing time for the Russians to concentrate and oppose the Japanese advance at Mukden.

As was to be expected from the destructiveness of modern firearms, great use was made of night attacks and maneuvers. The Japanese generally utilized darkness for bringing up their troops into position quite close to the Russian lines, and thus escaped the losses that would otherwise have been incurred in traversing fire-swept ground in daylight. Some of the night maneuvers of the Japanese were conducted on

a fairly large scale, such as the flank marches of the Ninth Division during the battle of Mukden and the attack of a brigade of the Seventeenth Division on Liaoyangwopeng, June 16, 1905. The Japanese appear to have encountered no difficulties in maneuvering their troops in darkness, and I attribute part of their success, at least, to their thorough reconnoissance of the ground before making an advance. It seems quite certain that night attacks and maneuvers will receive a wide application in future wars, and troops should be carefully trained for this work in time of peace.

Another prominent feature of the war was the extended use of high explosives, both in hand grenades and gun shells. The advantages of high-explosive shells to the Japanese artillery have already been pointed out. With respect to hand grenades, while they are no doubt demoralizing, their material results are not very damaging, owing to the intensely local action of high explosives and the shortness of the range. Although used by the Japanese in their field armies, it is doubtful whether sufficient occasions will arise to justify any extended training and preparation with this weapon, which owed its inception and use in the war to the siege of Port Arthur, where the lines were very close together for long periods of time.

In the formations for infantry attacks the Japanese adhered closely to the principles laid down in the drill regulations of all nations having modern armies. The great dispersion which was threatened by the lessons of the Boer war found no application in Japanese tactics. The intervals in the firing line were kept at a pace or pace and a half, a rather close formation theoretically, for modern weapons, but giving a volume of fire sufficient to cope with that of the defense. The Japanese have shown that frontal attacks by infantry over open ground are still feasible when made by good troops, well handled, and supported by an adequate artillery fire. No doubt the successes of the Japanese in this particular must be attributed, in part at least, to the poor shooting of the Russians. On no other basis can I account for the outcome of the Japanese attacks on Shihliho, October 12, 1904, and on Chaohuatun, March 7, 1905.

The expenditure of ammunition, both artillery and infantry, reached extraordinary proportions, and its supply

and distribution to the troops will undoubtedly make still greater demands upon the transport system in future wars. The Japanese largely obviated the question of the distribution of ammunition to the firing line by giving each soldier from 300 to 350 rounds before going into action. The Japanese ammunition, caliber .26, weighs almost exactly 5 pounds per 100 rounds, which means that the Japanese soldier carried from 15 to 18 pounds of ammunition on his person. For caliber .30 ammunition the weight for an equal number of rounds would be materially greater, and it is a question whether a soldier could conveniently carry as many as 300 rounds into action. In the battle of Mukden the artillery brigade of the Third Army expended about 500 rounds per gun, or 4 tons in weight for each piece. For the heavier field guns of most armies it is quite possible that a long engagement will call for the expenditure of 5 or 6 tons of ammunition per piece. These figures seem appalling, but they will have to be reckoned with if an adequate ammunition supply is to be maintained.

A noteworthy feature of the three great pitched battles from Liaoyang to Mukden is the enormous front covered by the armies and the long duration of the fighting. At Liaoyang, on August 30–31, the Japanese front extended over 27 miles, more than double the front of the German army at Gravelotte with about equal numbers engaged. At the termination of the Shaho battle the Japanese front covered 40 miles and before the beginning of Mukden 55 miles. During one stage of the battle of Mukden the Japanese front covered fully 80 miles from wing to wing. In duration the three pitched battles far exceeded anything in the annals of war. The extension of front and thinning of lines, together with the long duration of the battles, was undoubtedly due to the containing power of modern firearms, which preclude anything like good troops being run over even by vastly superior numbers.

Machine guns, used sparingly at first, rapidly demonstrated their value and were employed in increasing numbers in the later stages of the war. It seems certain that this weapon will play an important part in the future, and the equipment and tactics of machine guns should receive serious and prompt consideration for our army.

With the great extent of front covered in battle the means of intercommunication between the army units and the commander-in-chief are of the utmost importance. The telephone and telegraph afford all needful facilities for this purpose, and so far as I was able to learn the Japanese communications were never interrupted during battle, and the commander-in-chief was at all times informed as to the state of affairs at all points of his front. It is easy to conceive that in a hostile country the safety of an army's communications might be seriously endangered by overt acts of its inhabitants to such an extent as to paralyze operations; and this suggests the advantages and possibilities of wireless telegraphy, provided it can be simplified and perfected for field use.

In attempting to account for the uniform success of the Japanese arms during the war two prominent reasons occur to my mind: First, their operations were conducted systematically; second, the individual character of the soldier. With regard to the first the Japanese military system was thoroughly worked out and planned down to the slightest detail. They knew the capacities and limitations of their military machine and did not attempt anything beyond. They took no chances and left nothing to chance. Their system was ironclad and rigid, and they stuck to it from beginning to end. It worked as previously planned, but it would have been interesting to learn what would have happened had any part of the machinery gone wrong.

With respect to the individual character of the Japanese soldier, he is unquestionably better, man for man, than the Russian. Not that he possesses more animal courage, but because he is quicker witted, more resourceful and intelligent, and possesses greater nerve and tenacity. In speaking of the soldier I include the officer, for while unacquainted personally with the character of the Russian officer, I can say that the Japanese officer takes his profession most seriously, and that he is highly trained, well educated in his calling, and of correct habits. Besides being intelligent and brave, the Japanese are an essentially warlike people, fond of fighting for fighting's sake. All their history and traditions teem with stories of the brave and chivalric deeds of national heroes, stories which the coming soldier imbibes at

his mother's knee. Just how soon the spirit of commercialism will destroy the military spirit of Japan, time alone can tell, but that the latter was a living force during the Russo-Japanese war was apparent to the most casual observer.

ARMAMENT SHEET.

1. Six 28-cm. mortars, mounted, one mortar hors de combat; emplacements for two R. F.
2. Two 47-mm. R. F. naval guns.
3. Five 10-inch high power guns; two 47-mm. R. F.
4. Five 6-inch pedestal mounts R. F.
5. Old Chinese fort: One 15-cm. Krupp, garrison mount; one 3-inch field gun.
6. Eight 9-inch Krupp rifles, model 1870, on F. P. Russian carriages, model 1894.
7. One 10-inch high-power rifle on Krupp C. P. carriage; four 23-cm. howitzers on F. P. carriages.
8. Six 23-cm. howitzers, F. P. carriages; emplacements for two 47-mm.
9. Five 15-cm. pedestals (shielded) R. F.

9a. Three 47-mm. R. F. shielded.

9b. One 47-mm. R. F. shielded.

10. Four 47-mm. R. F.
11. Emplacements for five 6-inch R. F., new battery unarmed.
12. Two 47-mm. R. F.
13. Four 15-cm. rifles, C. P. carriages; two 5-barreled revolving cannon, 37-mm.

14a. One 47-mm. R. F.

14b. One 47-mm. R. F.

15. Two 15-cm. R. F. naval.
16. Two 47-mm. R. F.
17. Two 47-mm. R. F.

18 and 19. One 47-mm. R. F. each.

20. Two 5-barreled revolving cannon, 37-mm.
21. Six 15-cm. siege guns, three in position.

21a. One 47-mm. R. F.

21b. One 10.5-cm. siege rifle.

21c. One 47-mm. R. F. in blinded construction.

21d. One 15-cm. siege gun, Krupp pattern.

22. Two 3-inch field guns.
23. Two 15-cm. field howitzers; one 3-inch field; four 8.5-cm. field; four naval 12-pounders; one 12-cm. naval, latter wrecked.
24. Four 47-mm. R. F.; two 12-cm. naval guns, one on improvised siege carriage.
25. Two 15-cm. siege guns; additional burst gun on ground.

25a and 25b. Each two 47-mm. R. F.

26. Two 15-cm. naval guns.
27. Tungchikuanshan, East, five 15-cm. guns, garrison mountings.
28. Battery Q, one 47-mm. (wrecked); one 3-inch field gun (wrecked); one old bronze smoothbore, English make; one 15-cm. siege gun (shot in two); one machine gun, Maxim (wrecked).
29. Battery N, one 10.5-cm. siege rifle (disabled); wrecks of four siege and field gun carriages and remains of one 15-cm. siege gun.
30. Battery M, one 15-cm. naval gun; one 10.5-cm. siege gun; one 7.5-cm. field; one 6.5-cm. mountain.
31. P fort, one 3-inch field gun.
32. Panlungshan, East, four naval 12-pounders and two 3-inch field guns.
33. Panlungshan, West, two naval 12-pounders and four 3-inch field, all disabled.
34. Wangtai fort, two 15-cm. naval.
35. Battery H, emplacements for four 15-cm. siege guns, one gun (disabled) in position; wrecks of three guns and four carriages back of battery.
36. Four 23-cm. howitzers on F. P. carriages, two total wrecks, two damaged.
37. Two emplacements for field guns; one overturned gun in rear.
38. Erhlungshan fort, four 15-cm. siege guns, one serviceable gun remaining; varied mobile armament of machine and small R. F. guns.
39. Sungshuhan fort, two 15-cm. naval, shielded (wrecked); varied mobile armament.
40a. Five 15-cm. field howitzers.
40b. Emplacements for five field guns, two guns (one blinded) in position; emplacements for two 12-pounder naval in blinded casemates, one gun in position; one 47-mm. R. F. shot in two; miscellaneous lot of field and naval guns and carriages, mostly wrecked, on road in rear.
40c. One 7.5 and one 8.5 cm. field pieces and emplacements for four 37-mm.
41. Emplacements for four field guns, one wrecked gun behind.
42. One 15-cm. siege gun, Krupp pattern.
43. One 47-mm. naval, blinded.
44. One 47-mm. open emplacement.
45. Two 47-mm.
46. Four 12-pounder naval.
46a. Two 12-pounder naval, one gun missing.
46b. Two 12-pounder naval (indirect fire).
47. One 12-cm. (4.7) naval.
48. Three 47-mm. mounted; pedestal for one 37-mm.; two 12-pounder guns (one damaged) without mounts.
49. Two 47-mm.
50. Two 12-cm. Krupp pattern, old-style ship mounting, blinded.
51. One 47-mm.
52. Two 10.5-cm. siege guns; emplacements for two additional guns.

53. Naval gun battery; two 15-cm. and one 12-cm. mounted; one 15-cm. and one 12-cm. burst.
54. Cathedral Hill, two 12-cm. Krupp pattern, old-style ship mounting.
55. One 47-mm. naval.
56a. One 12-pounder naval.
56b. Two 47-mm. naval.
56c. One 47-mm. naval.
57. One 15-cm. naval.
58. Three 47-mm.
59. Four 23-cm. howitzers; additional burst gun on ground.
60. One 15-cm. siege gun, Krupp pattern, burst.
61. One 15-cm. naval.
62a. One 3-inch field gun, blinded.
62b. Three 10.5-cm. siege guns.
62c. Two 15-cm. field howitzers.
62d. One 3-inch field gun, blinded.
63. Four 12-pounder naval; emplacements for three more.
64. Two 47-mm.
65. Two 47-mm.
66. Two 47-mm.; emplacements for third gun.
67. Three 15-cm. siege gun, emplacement for fourth; one 12-cm. naval; one 47-mm.
68. Two 47-mm.; one 37-mm.
69. Five emplacements for 15-cm. guns, garrison C. P. mountings (four guns present, fifth knocked out); one 12-pounder, naval.
70. One 6.5-cm. mountain gun; one 37-mm.
71. Itzushan: Three 12-pounder naval, one partly mounted; pedestals for two 12-pounders and one 47 mm. On parade behind parapet one damaged 3-inch field gun, four 12-pounder guns without mounts, of which three damaged; three 15-cm. siege and one 15-cm. field howitzer, apparently serviceable.
72. One 3-inch field gun, emplacement for second.
72a. Two emplacements for field guns, no armament.
73. One 3-inch field gun.
74. Two emplacements for 15-cm. siege guns, one gun in place.
74a and 74b. Emplacements for field guns, no armament.
75. One 47-mm. blinded and two 47-mm. open emplacements; one additional emplacement for 47-mm.
76. Three 47-mm. open emplacements; one 47-mm. blinded.
77. Two 37-mm. blinded.
78. One 47-mm. and one 37-mm.
79. Four 15-cm. siege guns, two 12-pounder navals, one 15-cm. howitzer, three 3-inch field guns, one 47 mm.
80. Two 12-pounder naval guns.
81. Two 47-mm.
82. Emplacements for eight field guns, no armament.
82a. One 12-pounder naval, open emplacement.
83. One 12-pounder and one 47-mm. naval.
83a. Two 47-mm.

83b. Two 47-mm.
83c. One 47-mm.
83d. One 37-mm.
84. Two 47-mm.
85. Taiyangkou fort: One 3-inch field; one 12-pounder naval, two 15-cm. naval (one wrecked); emplacements for 37 and 47 mm. guns along infantry parapet; guns and parts of carriages collected on parade.
86. One 3-inch field gun.
87a. Two 3-inch field guns.
87b. Two 12-pounder naval.
88. One 15-cm. old pattern Krupp on old-style ship's mounting.
89. Two 3-inch field guns.
90. Taiyangkou battery: Six 15-cm., F. P., garrison mounting, siege guns (No. 4 gun burst), and one 15-cm. naval gun.
91. Two 37-mm., with pedestal for third gun.
92. One naval 12-pounder, one damaged gun additional.
93. Fort Hsitaiyangkou: Four 12-pounder naval, blinded; four 10.5 cm. siege guns.
94. Emplacements for four siege guns, no armament.
95. Two 12-pounder naval.
96. Four 47-mm. naval.
97. Two 12-pounder naval, casemated.
98. Two 47-mm. blinded.
99. Two 12-pounder naval, open emplacements.
100. Three 12-pounder naval, open emplacements, horizontal 1 to 2 inch shields.
101. Four 37-mm.
102. Five 15-cm. pedestal mounts, coast defense.
103. Four 23-cm. howitzers, F. P., carriages.
104. Four 9-inch Krupp (model 1870) rifles.
105. Eight 23-cm. howitzers, F. P., carriages.
106. Four 28-cm. howitzers (one piece with cracked trunnion band).
107. Five 15-cm. pedestal mounts, No. 1 gun missing, No. 4 gun burst.
108. Three 15-cm. short rifles, garrison C. P. mounts.
109. Three naval 12-pounders.

NOTE.—The armament listed is that actually accounted for at time of inspection during January and February, 1905. Very little of the mobile armament is included, all of it, or nearly all, having been at once collected and parked or put in buildings by the Japanese.

JOSEPH E. KUHN,
Major of Engineers.

DEFENSES OF PORT ARTHUR

PREPARED BY

MAJOR J. E. KUHN, CORPS OF ENGINEERS, U.S.A.

0 1 2 MILES

YARDS

Contour interval - 10 Meters

Note.- Contours from Japanese Official Map, scale 1:20000. All defences and most of topographical features located by field observations during January and February, 1905.

- Trenches
- Batteries
- Wire Entanglement
- Military Pits
- Line sharpened Stakes
- Fougasses
- Figures thus (5) refer to Armament Sheet
- Figures thus (100) indicate heights in meters
- Rectangles are old Chinese Forts
- Searchlight plant
- Searchlights
- Main Magazines

PLATE XXXVII

INDEX.

11536—07——16