720

PROVISIONAL
DRILL REGULATIONS FOR
FIELD ARTILLERY

75 MM. GUN.

1917

WAR DEPARTMENT
OFFICE OF THE ADJUTANT GENERAL

PROVISIONAL

Drill Regulations For Field Artillery

(75 MM. Gun.)

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The following Provisional Drill Regulations, Field Artillery, 75 mm. Gun, is announced as the provisional manual on the subject, and, until modified by proper authority, its provisions will be accepted as official.

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BY ORDER OF THE SECRETARY OF WAR:

H. P. McCAIN,
The Adjutant General.

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CONTENTS.

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INTRODUCTION

ARTICLE I.

GENERAL PRINCIPLES.—THE OBJECT AND SUBDIVISIONS OF THE INSTRUCTION COURSE.

1. The firing unit is the battery. The tactical unit is the group. The group commander, in theory, indicates the target and the battery commander takes the necessary steps to hit it.

2. The object of artillery instruction is to produce with a view to active service:

a. Disciplined and easily handled batteries under the orders of their battery commanders;

b. Skilful commanders, able to use their batteries in the most effective way against the designated objectives. Consequently, Artillery instructions may be divided in two parts:

School of the soldier;

School of the battery commander.

The school of the battery commander is very useful for chiefs of platoon and section who, under exceptional conditions, may have to command isolated platoons or pieces; under these conditions the chief of platoon or section would be a real battery commander, although the battery was reduced to two or even one piece.

School of the soldier.

3. The school of the soldier is divided into:

Gunner drill,

Section drill,

Battery drill.

4. Gunner drill has as its object the instruction of all the cannoneers individually in the duties which they may have to perform in manning the pieces.

Rapidity of fire, which is the essential quality of a field piece, necessitates great promptness and accuracy in practice. The different movements succeed each other almost without a break, and, as each cannoneer can act independently of the others, the operations of loading go on simultaneously.

The supervision of details being thus made very difficult, a sufficient number of drills must be devoted to the individual instruction of the cannoneer so as to develop

in him the necessary qualities of precision and loyalty. The section drill will only be undertaken with gunners able to execute the different duties of the cannoneer perfectly and without any hesitation.

All the movements must be executed briskly and in as military a manner as the service of the piece will allow.

It is advisable from the time of these very first drills to fire several shots in front of the cannoneers, so that they may see how the piece works, and may quickly grasp the reason for the positions which will be taught them later. Practice in actual firing, whenever possible, may be combined to good effect in the instruction in the working of the gun.

In theory, each cannoneer must be able to fill every post except that of gunner.

The instruction of gunners is pushed sufficiently rapidly for the cannoneers who take this course of instruction to be able to act as gunners as soon as battery drill is begun.

The drivers, in theory, only receive instruction concerning the post of numbers 2, 4 and 5.

5. Section drill.—Section drill (standing gun drill) is instructed by sections. It serves to coordinate the different individual movements so as to insure the rapid serving of the piece.

In all section drill practice, the instructor must insist on great precision in each movement. Speed will come later by itself.

6. Battery drill.—Has as its object the breaking in of the personnel of each battery to fire discipline and in the practising of all the operations which shooting involves.

7. The school of the soldier, strictly speaking, consists only of commands and the methods of executing them.

School of the battery commander.

8. The school of the battery commander is divided into several chapters corresponding to the successive operations which a battery commander must perform in combat:

Of fire preparation,

Of fire execution,

Of fire control,

and a final chapter on the battery within the group.

9. The school of the battery commander consists, strictly speaking, only of information and advice.

The battery commander makes use of these on his own responsibility, — the battalion commander having the right of correction in case of faulty application.

The drill in peace times is expressly meant to establish between the battalion commander and the officers under him similar ideas as to the best use of the printed regulations.

The regulations can not foresee every individual case. They would gain nothing by being treated as an infallible text for all conditions which one might be tempted to rely on and so replace intelligent initiative by memorizing. It is the duty of the officers to supplement the drill book whenever it does not cover a special case.

BOOK IV.

ARTILLERY INSTRUCTION

FIRST PART

SCHOOL OF THE SOLDIER

CHAPTER I.

GUNNER DRILL.

19. Definitions.—The gun is said to be in battery when its trail rests on the ground and the muzzle of the piece is in the direction of the target.

The caisson is said to be *in battery* when it is resting on the supporting brackets, with its pole down and pointing toward the target.

When the piece is *in battery* the gun and caisson body are side by side, 50 centimeters apart; with the gun on the right side.

Duties of the cannoneers.

21. The 75 piece is generally served by six men whose chief duties during firing drill are as follows:

Two ammunition carriers (Nos. 4 et 5) place shrapnel in the fuse setter, or fuse high explosive shells.

One fuse puncher (No. 3) punches the shrapnel fuses or distributes the detonators for explosive shells, he also hands the shells to No. 2.

One loader (No. 2) loads the gun.

One firer (No. 1) sets the range, opens and closes the breech and fires the piece.

One gunner sets off the angle of site and deflection and lays for direction and elevation.

ARTICLE I.

OFFICE OF THE AMMUNITION CARRIERS.

I. Opening and closing the caisson.

22. With the caisson resting on its supports and the chest closed, the instructor teaches the cannoneers how to open the chest padlocks and fasten them on the hook of the bolt handle, how to open and close the box lids and also how to put back the padlocks.

When the lids are being opened, the chest locking bar lever handle must be held while the bolt is being turned.

When closing it again, be sure the chest locking bar nose has caught properly in the lid.

II. Taking cartridges out of chests.

23. The caisson being *in battery*, the fuse setter down, the empty sand bags in place and the chest open;

Nos. 4 and 5 are placed to the right and left of the fuse setter facing the caisson and kneeling on the sand bags.

Caisson of shrapnel and high explosive.—The cartridges are taken from the boxes, beginning from the rows farthest away from the drawers, and in each row beginning with those at the exterior and working toward the interior.

Caissons of homogeneous loads. — The shells are taken in the following order; empty alternately the top and bottom rows, and in each row, work from the outside inwards.

III. Use of fuse-punch.

24. The duty of the ammunition carriers is to keep projectiles in the ogival cups of the fuse setter, this having previously been opened by No. 3.

To put a shell in a cup of the fuse-punch, take a shell from the chest by grasping it at the base with the hand nearest the fuse-punch and support the nose with the other hand. Turn it so that it points straight down into the fuse setter, with the cartridge case uppermost, and with the left hand guide the fuse into the nearest cup, put it in without a jar and let go of it with the hand nearest to the nose. Then with the right hand on the brass shell case, turn the cartridge slowly clockwise until the stud falls into its groove.

IV. Fusing explosive shells.

25a. This operation requires the help of No. 3. When passing to the use of the explosive shells, Nos. 4 and 5 first replace if necessary the shrapnel in the chest. Each of them takes (from the chest at his side) an explosive shell, and having pulled it out, places it cross-wise on his thighs with the cartridge shell case to the left. He should be careful not to let it down on the ground. He holds it in this position with his left hand, places one finger of his right hand in the ring of the plug, which closes the shell and pulls out the plug, being careful to pull along the axis of the shell.

Nos. 4 and 5 each receive from the fuse puncher a detonating fuse having a round felt washer. This they turn by hand in the thread of the shell, being careful to screw it all the way in. The fuse being fixed, Nos. 4 and 5 each pass their shells to No. 3. They both regulate their speed to that of the gun, so that No. 3 never has in his hand more than one shell. The shells shall on no account ever be allowed to touch the ground.

When firing is stopped or firing with shrapnel is resumed Nos. 4 and 5 unscrew the fuses from the shells which have not been shot and give the fuses back to No. 3.

The shells are put back in their places in the chest without trying to replace the plugs.

DISCS.

25b. Each caisson carrying explosive shells contains two sizes of discs called:

Discs P, Discs of 68 m/m. diameter.

Discs L, Discs of 58 m/m diameter.

There are as many discs of each size in each caisson as there are explosive shells.

When a disc is to be used, it is placed over the opening in the shell at the moment of screwing on the fuse detonator by the ammunition carriers. The fuse passes through the central hole in the disc and holds it tight when it is screwed in.

ARTICLE II.

DUTIES OF NO. 3.

I. Preparing the fuse-punch.

26. The fuse-setter is used to punch fuses, that is to say, to pierce the fuse at a particular spot so that the projectile bursts in the air at the desired point.

The instructor teaches the cannoneer to pull down the fuse-punch, to open it and close it and to push it back into place.

To lower the fuse-punch, push on the catch and turn the punch straight toward the rear, keeping it pressed against the carrying bar on which it is fastened, till it is resting on the ground.

To open the fuse-punch, push on the catch button and lift the lid.

To replace the fuse-punch in its position, put the corrector at the division marked "20," turn the crank handle in the direction of the diminishing numbers till it is stopped by the stopping bolt, shut the lid of the box, and fasten it with the clasp. Lift up the fuse setter without removing the hands until it is in its traveling position.

II. Use of the fuse-punch.

27. To punch a single shrapnel.—The caisson being in battery No. 3 places himself back on the fuse-punch, facing the caisson and kneeling on the sand bags. The cups being filled with cartridges at the command:

Corrector so much, for example: *Corrector sixteen.*

Loosen the thumb nut of the corrector, and move it with both hands until the index is opposite the required division. Then holding on to the corrector with one hand, tighten the nut with the other and call out the division of the corrector which is opposite the index, thus:

Corrector so much, for example: *Corrector sixteen.*

At the command: *2,500* or some other number indicating the range, grasp the crank handle with the right hand, press on it to disengage it and turn it in the proper direction while still pressing on it, till the range required is opposite the index. Let go the handle, read the distance on the range ring and announce it out loud.

For example: *2,500* or whatever it may be.

These operations being completed, the cannoneer sets only one fuse, always using his right hand, even for the handle on the left side. To set the fuse, push the lever smartly all the way down with right hand. Then raise it completely so that it is vertical, in order to pull back the punch blade from the fuse. Then let go. Grasp the middle of the shell with the right hand, lift it clear of the cup, put the left hand under the nose of the projectile and be ready to pass it to No. 2.

The two operations must always be performed in the order named: first the corrector and then the range.

If the command: *Corrector so much* and a range have been given, and the instructor then gives a second command giving only the range:

For example: *2,500.*

Without indicating any corrector division, No. 3 leaves the corrector at the point where it is. No. 3 must be careful to lift the operating lever all the way up, so as to withdraw the punch blade from the fuse, as the spring which in ordinary conditions keeps the lever slightly raised is not always strong enough for this purpose. If this precaution is not followed the pulling out of the cartridge may break the blade which then remains in the fuse.

When shooting is going on, No. 3 punches alternately right and left, so that the consumption of ammunition will be the same in the two boxes.

29. To punch several fuses at the command:

1. *Corrector so much* 2. *So many rounds* 3. SUCH A RANGE	for example:	*Corrector 16* *Four rounds* *2,500*

follow the directions in par. 27. Then set with the right hand the indicated number of fuses and pass them as needed to No. 2.

In passing them to No. 2, No. 3 counts the shrapnels out loud: *One, two, three, four,* and he stops when he has reached the desired number. The instructor must insist that No. 3, after punching a fuse, hands the shrapnel to No. 2 before punching another fuse. He gives the cannoneers practice in changing without stopping from fusing a certain number of rounds to one round at a time, and the reverse; and calls out *so many rounds* (indicating the number) every time there is a change in the number of shrapnels to be set.

30. Percussion-firing.—At the command:

1. *Percussion,*
2. RANGE SO MUCH,

or

1. *Percussion,*
2. *So many rounds,*
3. RANGE SO MUCH,

No. 3 leaves the corrector where it is, and operates as if for time shrapnel practice, except that he does not punch the fuses. During firing, the command *Percussion* is not repeated.

The fuse puncher places the range ring at the indicated mark, and passes the cartridge to the loader at the command:

RANGE SO MUCH,

or

1. *So many rounds,*
2. RANGE SO MUCH.

III. Distributing the detonating fuses.

31. At the command:

1. *Shell,*
2. RANGE SO MUCH,

or

1. *Shell,*

2. *So many rounds,*

No. 3 after having closed the fuse punch takes the fuse box from the case in the larger drawer, and, placing it on the lid of the fuse punch, opens it. He hands to No. 4 and 5 detonator fuses which he takes from the box, one at a time, as fast as they are needed for fusing, receives the fused shell, and passes it to No. 2. He must never have more than one shell in his hand at a time.

When firing is over or when the order is given to use shrapnel No. 3 puts back in the box the detonator-fuses which Nos. 4 and 5 have unscrewed. He closes the box, puts it back in place, and either pulls up again or opens the fuse setter, depending on circumstances.

ARTICLE III.

DUTIES OF NO. 2.

32. The piece being *in battery* and the breech opened, the position of No. 2 and his movements are not laid down. They depend on his height, his skill, the rate of firing and the position of the caisson.

The following position has been found convenient in ordinary cases. No. 2 stands 50 centimeters back of the left wheel, between the wheel and the trail, sheltered by the shield and facing the gunner's seat, his right foot almost perpendicular to the trail and the left foot almost 30 centimeters from the right one.

In order to load, turn on the left foot in the direction of the fuse-punch; grasp the shell which No. 3 presents with the right hand, steadying it with the left hand

under the nose of the shell; resume the position facing the gunner's seat and insert the point of the shell carefully in the chamber. Then letting go with the left hand, slide the shell along by pushing on the base of the case with the right palm, fingers spread, and finally shove it all the way in, the open hand hitting against the rear face of the breech hoop.

The best position to throw the shell into the chamber is to have the neck of the cartridge case completely within the loading recess, there only remaining about one-third of the length of the cartridge case outside. In this manner it enters without shock and without danger of the rotating band being flattened on the rear end of the bore.

ARTICLE IV.

DUTIES OF NO. 1.

I. To set and release the wheel brakes.

33. This operation requires the help of No. 2.

When the gun is in battery, to *release the wheel brake* No. 2 gets between the left wheel and the trail and No. 1 between the right wheel and the trail, each grasps the tie rod on his side near the brake beam. No. 1 turns the carrier pin to the right, raising it as far as it will go, without trying to lift it from its place, and commands:

STEADY.

At this command, the cannoneers raise the brake beam

and No. 1 tilts the carrier by pulling it backwards. As soon as the brake beam is disengaged the two cannoneers let go of it and allow it to fall by its own weight.

To set the wheel brakes No. 1 and No. 2 get in the same places as for the last movement and lift the brake beam at the order: STEADY, given by No. 1. No. 1 swings the carrier forward and puts the carrier pin back, which should fall into place of itself.

If there seems to be any difficulty about setting the brake, whether from unequal or insufficient lifting of the brake beam, No. 1 repeats the command: STEADY, in order to have the traverses lifted again and kept level.

II. Use of the safety piece.

34. The breechblock being closed and the safety piece in the traveling position, to get ready to fire grasp the safety bolt with the left hand, pull it to the rear and turn at the same time towards the right as far as it will go and let go.

The safety piece being in firing position, in order to put it in road position, repeat the same movement, but turn the safety piece towards the left.

In either of these motions, be careful not to touch the hammer.

III. Opening and closing the breechblock.

35. Suppose the piece to be in battery, by the side of the caisson and the safety piece in position for firing:

No. 1, according to circumstances, either stands facing the gun, between the right wheel and the breech, or straddles the right seat and faces the gun, his left knee below the knee guard and his hands by his sides.

To open breech: grasp the handle with both hands, fingers down and turn the breechblock as far as it will go. The end of the movement must be done energetically so as to eject the cartridge case.

The instructions about grasping the handle with the fingers down and with the hand almost closed, must be rigorously observed. If the fingers are extended, or if one of them should press on the cradle, they might get caught between the breech hoop and the end of the slide.

If this accident should occur by negligence on the part of No. 1 the first thing to be done to free the hand is to uncouple the gun and draw it back on the cradle. If No. 1's arm above the handle prevents the breechblock from being opened, do not hesitate to cut the safety lug pin so as to uncouple the piece.

To close the breechblock, grasp the handle with both hands, fingers closed and nails down, and turn the breechblock back without jerking as far as it will go. Then drop the hands by the sides.

36. The opening and closing of the breech, without ammunition, must only be performed a sufficient number of times, at the start of individual instructions, to make the cannoneers understand the mechanism. As soon as this is accomplished No. 1 works with No. 2 and the loading of the piece is executed with dummy cartridges of wood. The breech being open, No. 1 keeps his hands on the handle with palms open. As soon as the shell enters the chamber it gives a slight turning motion to

the breechblock; No. 1 must take care not to oppose this motion, which shows that it is time to close the breechblock. He should continue it, in fact, finally closing the breechblock as is indicated above.

37. When No. 1 has learned to open and close the breech as explained above he is given practice in executing successively these operations a certain number of times with No. 2, until there is perfect team-work between them. For this purpose wooden dummy cartridges are used exclusively.

38. When the instruction of No. 1 is assured he is given practice in cocking the pawl.

The pawl becomes automatically cocked when firing the piece from the effect of the recoil. No. 1 need only cock it to open the breech, for the first shot or after a misfire.

To cock the pawl, push plunger toward the front.

IV. Giving the range.

39. The instructor first practices the cannoneers in reading ranges on the range drum of the range scale, then he teaches them to set ranges.

At the command:

RANGE 2,400 (or any other range),

grasp the range crank handle with the right hand and turn it, pushing it in toward the drum, till the required range is opposite the index, then let it go.

There is in the 75 mm. gun a certain amount of play

between the parts which affects accuracy, especially in elevation. This can be eliminated by always making the last motion in elevation or deflection in the same direction.

For the elevation drum finish the motion so that the top part of the drum is going from rear to front, that is, in the direction which decreases the range.

Finally, the instructor teaches the cannoneers to set the ranges which have 25 or 75 for their last figures.

V. Firing the piece.

40. If No. 1 is standing, the breech of the piece being closed and the safety piece in the firing position.

At the command:

1. FOR THE FIRST SHOT,

the firer moves away from the right wheel.

At the command:

2. FIRE,

he leans over, grasps the handle of the lanyard in his left hand, pulls it backwards and slightly downward as far back as it will go, being careful not to pull it toward him, and lets go smartly.

41. If No. 1 is on his seat,

At the command:

FIRE,

he grasps the lanyard handle with his left hand and fires the shot as prescribed in Sec. 40.

42. In case of misfire the firer must immediately pull the lanyard again, and only stop after two successive misfires. A shell which has three successive times missed fire must never be put back in the chests.

When a misfire has occurred, No. 1 being in position for the first shot, waits a moment before beginning operations again.

VI. Use of rammer.

43. The rammer and sponge belonging to the piece must not be taken out of their case and handled except by No. 1 of that piece.

The rammer is used to extract from the piece the shells or the cartridge cases which could not be ejected by the extractor.

If a cartridge is stuck, the sponge and rammer must be assembled.

In either case, insert the rammer in the muzzle of the gun and strike, with the rammer, the fuse of the projectile or the bottom of the cartridge case.

Use the rammer with the cup-shaped end in the same way; the cup pressing on the point of the shell.

If it is a shell, the loader standing by the breech receives it in both hands.

The rammer and the sponge are not put back in place till the shooting is over.

ARTICLE V.

I. HANDLING OF THE SIGHTS.

44. *a.* **To assemble the sights.**—To assemble the sights, stand between the left wheel and the muzzle of the piece, undo the strap of the support cover and remove it, disengaging first its lower side from under the level holder, and let it hang down in front of the left shield. Then take the sight by the column with both hands, and insert the base of the column in its socket, and driving lug entering its recess.

The zero mark of the plateau must correspond with the index on the column. When the sights are in place, if these marks do not correspond, press straight down on the sight shield and turn the instrument to bring the index opposite the zero mark, then allow the column to rise again. Loosen, if necessary, the drum clamp, grasp the milled edge and turn it so as to bring the 100 mark even with the index, and tighten again the drum clamp.

45. *b.* **To remove the sights.**—The cannoneer being placed as indicated in above paragraph, grasps the column with both hands and exerts a lifting force straight upwards. (If pressure is exerted sideways, there is danger of straining or bending the instrument.) Then replaces the support cover, and buckles the strap.

46. *c.* **Setting deflection.**—The gunner either stands facing the front, between the left wheel and the breech, or straddles the left seat, facing the front, body erect, arms falling naturally without touching the piece, hands on knees, and feet resting on brake beam.

47. The instructor teaches the cannoneers to read off the graduations of the plateau and the drum, then to place the index of the column opposite one of the plateau graduations, and finally to place a given division of the drum opposite the index.

48. At the command:

PLATEAU 14;

DRUM 105 (or any other number),

put the right hand on the sight shield and press down on it, giving a rotary motion at the same time to the column in the proper direction to bring the index of the column opposite division 14 of the plateau. Then loosen the drum clamp, grasp the milled edge of the deflection drum and turn it till the desired division comes opposite the index. Always finish the turning movement of the drum in the increasing direction. Then tighten the clamp, and call out aloud the deflection *Plateau 14: Drum 105* (or other figures indicated).

49. *d.* **Correcting deflection.**—Every time that a change of deflection is ordered, by the command:

Increase (*or diminish*) *10* (or any other number),

the gunner announces aloud the deflection as it stands, and again after the change, the new deflection as follows:

Plateau 14: Drum 105, then after changing the deflection:

Plateau 24: Drum 115, (or whatever the figures may be).

50. Simple drum corrections.—Add (or subtract) mentally the number ordered, turn the drum to the new deflection, being careful to have it exact and tighten the clamp again. Changes of deflection involving change of plateau must only be taught to gunners previously found proficient in all other duties. They should then be subjected to frequent practice. Instead of calculating mentally, the cannoneer can calculate on the drum itself, counting the number of tens and units which pass the index.

51. Cases where corrections involve change of plateau and drum.—When the increase (or decrease) of deflection, although less than 200 mils, is such that the gun layer can not accomplish it on the drum, he increases (or decreases) the plateau I division and decreases (or increases) the drum by the difference between 200 and the prescribed correction. This can also be done by converting to mils the marked deflection, add to it (or subtract) mentally the prescribed change, and transfer the result obtained to the plateau and drum. Remember that plateau 0 and plateau 16 are equivalent. A correction of more than 200 mils may immediately be resolved into an increase (or decrease) of the plateau of one or several divisions, and a drum change of less than 200.

52. *c.* Taking the axis lines.—The axis lines are two bright lines, one vertical and the other horizontal, which are seen on a black ground when looking into the sight. The cannoneers are first given practice in recognizing these lines, then in projecting each of these lines outside of the sights. To do this:

a. Close the left eye (or the right one);

b. Look into the sight without bending the body forward, so as to keep the eye as far as possible from the sight, and;

c. Move the head rapidly up and down to project the vertical line, and from right to left to project horizontal line.

As the gun layer gains in experience, these movements are reduced.

53. Giving the angle of sight.—The gunner being at his post, the instructor gives him practice in reading the graduations of the angle of site, then in placing the required division opposite the index.

At the command:

> *Angle of site plus (minus) 25* (or some other number)

grasp the eared head of the site screw, turn this in the proper direction and bring the desired division opposite the index. The angle of site ordered is always a multiple of 5 mils (thousandths).

II. Laying for direction.

54. To lay for direction, the gun layer makes the prolongation of the vertical axis line of the sight pass through the aiming point.

Laying for direction is done in two ways:

1. By moving the trail of the piece;

2. By sliding it on its axle.

55. Laying for direction by moving the trail.—This action requires the help of Nos. 4 and 5. These place themselves on each side of the trail, facing each other, No. 5 being on the left side. Each grasps with both hands the trail handle on his side. Then both lift the trail slightly. The gunner, standing by, has the trail shifted so that the prolongation of the vertical axis line passes through the aiming point.

In hard and flat ground, one man suffices to move the trail. He stands (and faces the front), back of the pintle which he grasps with both hands.

56. The aiming point may be a point in the target, or it may be some other point in front of it, back of it, or beside it; it may be some natural object, a picket, the line of a man's coat buttons, the aiming circle or sight column of some neighboring piece.

When the gunner is bothered by the wheels, the shields, the chase or some irregularity of terrain, he uses the sight extension bar for the sight, which raises the sight 1.50 meters above the ground, and permits a survey of the entire horizon through the sight. The sight extension bar is removed as soon as the gun laying is completed, and must not be left in place while firing nor while putting the gun on the brake shoes.

57. Laying for direction by traversing.—The gunner makes the gun carriage slide along the axle by turning with his left hand the handle of the traversing wheel in the proper direction till the projection of the axis line passes through the aiming point.

This method of laying is only used on an aiming point to the front.

During firing, as soon as a deflection correction has been made, the gunner lays again.

58. *a.* **Marking the deflection.**—The gun having been laid for direction, marking the deflection consists in bringing the vertical axis line on the chosen aiming point by using the deflection scale without changing the position of the piece.

To mark the deflection, choose a new aiming point, and work the plateau and tambour to bring the vertical axis line of the finder sight on the chosen marking point.

As soon as the deflection has been determined, the gunner must always lay the gun on this chosen aiming point with the same deflection.

The gun layer chooses his aiming point as far beyond 50 meters distance as possible, either in front and preferably to the right rear. In the latter case, the mirror attached to the sight must be used.

The aiming point must be stationary, easily recognized and not likely to disappear during the combat.

In case there is no natural aiming point which fulfils the required conditions, one is created by means of a stake.

59. The gunner may have to find merely the angle of deflection from some designated point.

To do this he uses the sight extension bar if necessary.

60. When the *angle of site* to the reference point or aiming point is too great to allow the vertical axis of the ordinary sight being directed toward it, the finder sight is used which has a horizontal spindle so that any inclination in a vertical plane can be given to it.

When sighting to the rear, the mirror is inclined more or less by pressing on it with the thumb and index finger.

61. Changing the direction by turning traversing wheel.—The gun being laid, at the command:

Two turns on the right (or any number of turns to the right or the left),

the gun layer gives the required number of turns.

If later the command is given:

Back on the original line,

he brings the gun back to the aiming point by working the traversing wheel in the opposite direction. If, however, the order is:

Lay,

he takes his sight as indicated in paragraph 58, that is, by marking his deflection.

III. Laying for elevation.

62. Laying for elevation is usually done with the level. After the angle of site has been given, it consists in leveling the air bubble.

The angle having been given as laid down in § 53, turn back with the left hand the cover of the level, unwedge, if necessary, the elevating wheel by pushing downward on the bolt knob and turn it so that it rests against the trail. Then grasp the wheel in the right hand and turn it in the proper direction to level the bubble. The last turn while leveling the bubble must always be in the direction which elevates the breech.

While doing this, the gun layer leans forward so as to look straight down into the level.

63. On rare occasions, and for the first shot, the laying for elevation may be done with the sight.

At the command:

With the sight,

make the horizontal axis line of the sight pass through the base of the aiming point, by working the elevating wheel.

That being done, the sighting for elevation is done by turning the eared head on the site screw so as to level the bubble.

The sighting being done, the laying of all rounds after the first consists simply in leveling the bubble by working the elevating wheel.

IV. Gun laying for direction and elevation.

64. When the cannoneers execute correctly each of the operations indicated in § 54 to 56, they are given practice without interruption in gun laying for direction and elevation.

The operations are performed in the following manner:

1. Give or change, if needed, the deflection and angle of site.

2. Decrease the elevation, if necessary, so as to be able to lay for direction.

3. Lay for direction (§ 54 to 57).

4. Lay for elevation (§ 62 or 63).

65. As soon as the gunner has finished or corrected the laying, he raises his right hand to the height of his collar, calling out at the same time:

Ready.

CHAPTER II.

SQUAD DRILL OR STANDING GUN DRILL.

ARTICLE I.

PRELIMINARY ARRANGEMENTS.

Formation of the gun section (platoon).

66. The section consists of the cannon, the caisson, and personnel to work it. It is under the command of the chief of section.

At the command:

Fall in,

the six cannoneers necessary to serve the piece form in double rank, facing the chief of section, as is prescribed in the dismounted instruction.

From left to right, the front rank consists of the caisson servers, placed in the following order: Nos. 4, 3 and 5.

The rear rank consists of the gun servers in the following order: Gunners Nos. 2 and 1.

Places of the cannoneers on the limbers.

67. Cannoneers sit on the limbers of the caisson or gun which they serve in the same order as they fall in.

At the command:

1. *Cannoneers,* (2) MOUNT,

they take up double time, slinging the carbine on the left shoulder without passing the right arm between the carbine and the sling, and take up their positions on the limbers.

As soon as they are seated, they put the stock of their carbines between their knees, the gun remaining suspended to their necks by the sling. The cannoneers on the outside grasp the caisson handle with the outside hand, and their carbine at the bolt with the other. The one in the middle holds his carbine at the bolt with his left hand, and passes his right arm up through the left arm of his neighbor.

At the command:

1. *Cannoneers,* (2) DISMOUNT,

the cannoneers jump smartly to the ground and fall in in the order prescribed in par. 66.

Arrangements for combat.

68. The piece and caisson being limbered at the command:

PREPARE FOR ACTION,

the cannoneers go to their piece and caisson.

No. 1 opens the sight case and draws from it a sight

which he gives to the gunner; a chest key which he gives to No. 4; cotton which he distributes to the cannoneers, to the chief of the section and to the chief of platoon if necessary.

No. 4 opens the chest padlocks of the caisson; fastens them as indicated in § 22, and gives the key back to No. 1, who puts it back in the sight case, which he closes again.

No. 5 removes the muzzle cover and hangs it on the luggage frame of the gun limber between the two middle stanchions.

No. 2 removes the breech cover and hangs it to the right of the muzzle cover as above indicated.

The gunner puts the sight in place as prescribed in § 44 and puts the zero division of the site scale opposite the index. He turns the traversing and elevating wheels to make sure that the rocker works easily and that the gun carriage traverses easily, and puts the gun carriage in the middle of its traverse.

No. 1 verifies the working of the breech mechanism and the firing mechanism, and puts the safety piece back in traveling position (safety position). He makes sure that the range scale works properly. Then he sets it to some range greater than 3,500 meters and less than 5,500 meters.

This last operation being completed, the gunner makes the cradle bear on the cushion by turning the elevating wheel and locks this wheel. No. 1 then turns the range scale so as to depress the breech as far as it will go.

The chief of section oversees these operations and verifies by the gauge that there is sufficient oil in the recoil apparatus.

Traveling position.

70. The piece and caisson being limbered and the order "Prepare for action" having previously been given, at the command:

MARCH ORDER,

the gunner removes the sight as indicated in par. 45, and passes it to No. 1. No. 1 puts the sight back in the sight case; gives No. 4 a padlock key; sets the range scale to some range longer than 5,000 meters.[1] If necessary, he is aided by the gunner, who works the elevating wheel in the proper direction. That being done, the gunner makes the cradle rest on the cushion and locks the wheel.

The first ammunition carrier replaces the chest padlock and gives the key back to No. 1, who puts it back in the sight case and recloses it.

No. 5 replaces the muzzle cover; No. 2 puts back the breech cover.

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[1] Difficulty is experienced in keeping the lines of sight correct if in the traveling position the cradle always occupies the same position relative to the gun carriage.

[2] To properly execute the abatage:

ARTICLE II.

BRINGING THE PIECE INTO ACTION.

71. Action left (right).—The piece and caisson being limbered, the piece 1½ meters to the right of the caisson, the cannoneers being on the chests, and the piece prepared for action, to put the piece in battery facing left (or right) the cannoneers jump down on the ground and unlimber as indicated below.

Caisson.—Nos. 4 and 5 go to the caisson trail; No. 4 on the right side. Each grasps one of the handles, No. 3 applying his strength to the left (or right) wheel of the caisson. No. 4 pulls the pintle latch towards him and keeps hold of it with his right hand. The two carriers then disengage the lunette and immediately slide it to the left (or right), No. 4 commanding:

Drive on.

As soon as the limber moves forward, the cannoneers turn the caisson in place to the left (or right).

No. 5 unfastens the toggle of the small chain of the trail locking bolt; straightens this bolt, and grasps the handle on his side again.

Nos. 4 and 5 now raise the trail till the caisson is balanced on its axle, and then lower the trail to the ground, while No. 3, who has grasped the caisson rest rods with both hands, completes the upsetting, being careful to prevent too abrupt a fall at the end of the movement.

The Gun.—The gunner and No. 1 go to the trail end of the gun carriage, the gunner being on the right side. They grasp one of the handles, No. 2 applying his strength to the right wheel of the gun carriage and No. 4 comes to the left wheel.

The cannoneers then unlimber the gun as explained for the caisson. The gunner commands:

Drive on.

As soon as the limber begins to move away, the four cannoneers turn the gun facing the target, and then push it forward or backward, turning around the caisson so as to bring it exactly 50 centimeters (about 20 inches) to the side of, and 50 forward of the caisson.

The gunner and No. 1 then place the trail on the ground.

If the ground is bad, the chief of section may put the caisson and gun in battery one after the other, using all cannoneers to move the piece.

72. Action front.—The piece and caisson being limbered, the gun 1½ meters (approx. 60 inches) to the right of the caisson, they are unlimbered and put in battery facing the front in the same way as in the flank action.

The caisson cannoneers put it in battery as soon as it is freed from the limber.

To put the gun in place the cannoneers turn it about, turning the muzzle toward the caisson.

Position of the cannoneers with the piece in battery.

73. As soon as the piece is in battery, at the command from the chief of section, the cannoneers place their

carbines against hubs and outer wheels of the gun carriage and caisson.

No. 2 lowers the left apron shield, No. 1 lowering the right one. No. 3 draws down and opens the fuse setter; draws out the sand bags; puts the corrector at 18 and the range ring at 2,500.

Nos. 4 and 5 open the caisson chest and fill the fuse setter with shrapnel; No. 1 puts the safety piece in the firing position and opens the breech.

Each cannoneer takes his post as indicated in Gunner Drill. The gunner and No. 1 only straddle their seats only when the spade is firmly seated by the first shots.

The chief of section stands on the right of the gun, facing the trail. He may go momentarily wherever his presence may be useful in controlling operations, but he must never step across the trail.

74. Under fire.—The chief of section and cannoneers take such positions as will afford them the maximum protection back of the piece without hindering them in the execution of their duties.

75. At the command:

FALL IN,

the cannoneers take up their carbines and assemble as prescribed in par. 66.

76. After command:

POSTS,

they take up double time and each goes straight to his post.

To limber.

77. At the command:

Limber rear,

No. 6 stands on the left of the caisson trail, Nos. 4 and 3 remaining back of the caisson.

Nos. 4 and 3 grasp with one hand one of the caisson rest props and push with the other hand against the upper edge of the chest. Together, they lift the chest without jerking it. At the same time No. 5 raises the trail till the sides come in contact with the trail locking bolt; then he lets it down to the ground; pushes down the trail locking bolt and replaces the toggle of the small chain. Then the three caisson cannoneers turn by hand the caisson so as to make the trail describe a one and a half right angle turn to the left.

At the same time, the gunner and No. 1 stand by the trail end of the gun, the gunner on the left, and with the help of No. 2 turn the trail half right and at right angles to the trail of the caisson.

As soon as the limbers are in place, the cannoneers limber the caisson and piece and then mount on their limbers again.

78. At the command:

Limber front,

the movement is executed in a similar manner, but it is the gun which is turned so that its trail describes one and a half angles to the right, while the caisson is half turned to the left, so that its trail makes a right angle with that of the caisson.

To move by hand the carriages unlimbered.

79. The number of cannoneers needed to move the piece or caisson unlimbered depends on the distance to be traversed, natural obstacles, and the slope of the ground. The moving of the piece and caisson are usually done successively.

When the six men assigned to the piece are unable to move it, the men of a nearby piece are called.

As a rule, Nos. 4 and 5 assist at the gun or caisson trail handles; Nos. 1 and 2 at the gun wheels; Nos. 3 and 2 at the wheels of the caisson.

The chief of section distributes the other men at suitable places.

The picket rope may be used in taking it under the fuse punch and passing it through the lunette; both ends are used for pulling.

ARTICLE III.

PREPARATIONS FOR ACTION.

80. Laying for direction.—A piece may be laid for direction by:

1. *Direct laying.*—The chief of section gets behind the piece and makes Nos. 4 and 5 shift the trail as needed. No. 1 may have to depress the muzzle by working the elevating wheel.

2. *Indirect laying.*—By means of an aiming point. The gunner after having given the desired deflection, aims with the help of Nos. 4 and 5, as prescribed in par. 53.

No. 1 helps the gunner in putting on or taking off the rear sight extension bar, if used.

81. Sighting.—The piece having been turned in the right direction, the gunner lays for direction (par. 58) and then sets if needed the angle of sight ordered (par. 52).

82. If, after laying, a deflection is ordered the gunner makes the change and lays the piece again on its aiming point by having the trail moved.

If the change is such that the gunner fears his aiming point will be hidden either by the gun itself (aiming forward) or by the personnel, he chooses a new point on which he sights again before making the prescribed change in deflection.

But this auxiliary aiming point has been as a rule only a temporary character. The gunner must not lose sight of the fact that the controlling deflection written on the shield must agree with his original aiming point.

83. Measuring minimum elevation: When ready to fire in a masked position, always find out the lowest elevation at which the battery can clear the crest.

The gunner sets the given angle of sight; then he lays the gun at the top of the mask by having No. 1 turn the range scale. The latter reads off the distance on the range scale and calls it out.

This range, changed if need be (see par. 48), is written on the right hand shield with the corresponding angle of sight. The piece must not be fired at a lower distance than that written down while the angle of sight remains unchanged.

ARTICLE IV.

ABATAGE. FIRING WITHOUT ABATAGE.

84. A piece is said to be *in abatage* when the wheels rest on the brake shoes. The operation of getting the gun on to the brake shoe is called abatage.

A piece is said to be *seated* when the trail spade has sunk into the ground sufficiently so that the gun carriage does not go further backwards when fired.

When the piece is seated, the wheels should stand even with those of the caisson. This relative position forward and back of the two elements of the complete section, as also the 50 c/m interval between them (§ 19) is very important in the regularity and ease of serving the piece in actual fire.

The operation of seating the piece comprises a recoil of about 40 c/m plus 10 c/m for the sinking of the trail spade in the soil at the first shot. Therefore the piece should be about 50 c/m in front of the caisson before the first shot. This distance may be reduced to 40 c/m when but a few rounds are to be fired.

I. Abatage.

85. The piece being pointed, the chief of section commands:

1. *Prepare for abatage.*

At this command, No. 1 and the gunner bring the cradle on the cushion if it is not already there. No. 2 and No. 1 unhook the wheel brakes, but keep them

raised. No. 4 and No. 5 go to the trail, the gunner makes sure that the vertical axis line of the sight is in the direction of his aiming point, and calls out:

2. *Ready.*

At that warning Nos. 4 and 5 keep the trail in the position which it occupies. The chief of section places himself about 1 meter (39.37 inches) back of the gun. As soon as the gun layer says *Ready*, the chief of section puts his right toe about 70 c/m from the lunette in a prolongation of the central line of the trail and commands:

3. MAKE-FAST.

At this command, Nos. 1 and 2 allow the wheel brakes to fall to the ground; Nos. 4 and 5 stationed at the trail end, lift the trail sufficiently for the locking to take place, being careful to prevent any side motion so as to keep the trail in the indicated direction, taking care also not to touch the ground with the muzzle roller cases. As soon as the teeth of the slide block pawl have been engaged with those of the rack and making sure that the vertical plane of the trail passes through his right foot, the chief of section commands:

4. DOWN.

Nos. 4 and 5, aided by Nos. 1 and 2, who grasp the trail, bring the trail down without a jar. As they start the movement, they should be very careful to point the lunette toward the chief of section. The chief of section grasps the lunette as soon as he can reach it and directs it toward his right toe, which he has not moved.

86. The spade resting on the ground, the chief of section gives the angle of sight, if needed; No. 1 sets the

range for 2,500; and the gunner lays the gun as prescribed in par. 64. The other cannoneers take their places for firing. (1)

II. Lifting the brakes from the wheels.

87. The cannoneers being at their posts around the piece, the gun is taken off the brake shoes by the command:

Lift brakes.

At this command the gunner replaces the gun in the middle of its traverse if it is not there; No. 1 goes to the right of the trail and lifts the side block pawl lever with his left hand. No. 2 mans the left wheel and No. 4 the right one, both facing forward, No. 5 being at the end of the trail end. The two men at the wheels pull backward to aid in unfastening the rack. As soon as No. 1

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1. The compensating beam must be perpendicular to the trail. Obliqueness of the beam, the sighting being completed, may be due to two causes. The first is the irregularities of the ground and results in the brake beam and consequently the compensating beam not being perpendicular to the gun carriage. This can be avoided by choosing proper ground for abatage. The second is due to the fact that the general direction of the piece before abatage has been badly kept.

2. The gun being normally in the center of its traverse before abatage must stay approximately there after the abatage is completed. This will result if not more than five turns of the traversing wheel are needed to complete the laying for direction. Nevertheless, abatage is not recommended in actual firing if the number of turns of the traversing wheel exceeds this number.

It is imperative to prevent all lateral movement when the trail is being lifted and especially when it is being lowered and only engage the brake shoes against the wheels when the trail is in the given direction.

feels that the teeth are no longer in contact, he gives the command, *Lift*, and continues to keep the lever lifted. Nos. 2 and 4 push forward to roll the piece off its brake shoes. No. 5 follows and steers the motion if necessary by pushing on the trail end.

The brake being on the ground, it is only hooked up at the command of the chief of section.

If the abatage must be performed again, the chief of section commands, *Prepare for abatage*, and the movement is executed as before, Nos. 1 and 2 lifting the brakes from the wheel.

III. Firing without abatage.

88. To fire without abatage the chief of section commands:

1. WITHOUT ABATAGE.

The gunner lays the piece with the help of Nos. 4 and 5 as prescribed in § 55. The wheel brake remains hooked up and the cradle is left in the position which it occupied. As soon as the gunner has laid the piece for direction, he calls out: *Down*, and Nos. 4 and 5 let the trail spade down and the manœuvre continues as indicated in par. 86.

ARTICLE V.

CONDUCT OF FIRE.

I. Loading.

89. The piece being laid at the command *Corrector* so much, or *Percussion*, followed by range (so much), or *Shells*, (range so much).

No. 1 puts the range scale at the indicated range; Nos. 4, 5 and 2 conforming to the rules laid down in par. 22 and 32.

The chief of section commands *Stand clear*. At this command all the cannoneers come out from between the wheels.

II. Firing.

90. The cannoneers being outside the wheels or, if the piece is seated, being at their posts, the chief of section orders *Fire*. This command is executed as prescribed in par. 40 and 41.

Having fired the shot, the cannoneers resume their posts if they have left them; No. 1 opens the breech and the gunner lays again for direction, if necessary (par. 64).

Loading begins again at the command:

1. *Corrector so much*
2. RANGE SO MUCH

or simply: 1. RANGE SO MUCH.

according as the corrector must or must not be changed.

No matter how quickly the chief of the section wishes to fire, he is careful not to order *Fire* till after the *Ready* of the gunner.

91. In firing without abatage, when the piece is sufficiently seated (usually after two or three shots) the chief of the section may allow the wheel brakes to rest on the ground. The gunner and No. 1 then straddle their seats and the loading and firing go on in the ordinary manner.

III. Changing the laying of the piece.

92. The laying of a piece may be changed in two ways:

1. **By changing the deflection.**—When a change or deflection is desired there may exist one of two conditions:

a) When the change may be executed by traversing on the axle. In this case the gunner follows directions laid down in par. 57.

b) When the change is impossible by traversing on the axle. The cannoneers then follow the instructions for *Lifting;* they change the direction of the piece by moving it forward towards the aiming point (displacing the trail laterally). If time permits the caisson is removed also to its correct relative position.

The gun must be moved far enough so that the trail spade does not recoil into the hole previously dug.

The gun is again put in *Abatage* (or simply laid again if it was not previously in abatage).

2. **By turning the traversing wheel.**—Follow directions as prescribed in par. 61.

IV. Suspend firing.

93. At the command:

Suspend firing, the service of the piece is stopped. No. 1 opens the breech.

At the command:

Resume firing, the firing of the piece continues from the point where it left off.

During instruction when the chief of section wants to control the operations of the cannoneers he commands:

1. *Suspend firing*,
2. *Fall in*,

at which No. 1 opens the breech and the cannoneers stand back 6 meters from the gun, leaving the range, the angle of sight, the deflection and the fuse setter as they stand.

V. Cease firing.

94. At the command "Cease firing," the chief of the section makes sure that the piece is not loaded. No. 1 closes the breechblock, puts the safety piece in traveling position, and the range between 3,500 and 5,500 meters.

The gunner sets the deflection and sight at zero; turns down the sight level cover; puts the cradle in the center of the traverse and locks the elevating wheel.

Nos. 4 and 5 pack the unpunched shrapnel and shell with the fuse removed in the caisson and close the lids. No. 3 sets the fuse setter at division 20; turns the handwheel in the diminishing direction till it is stopped by

the stopping lug; then closes and lifts up the fuse setter and puts back the sandbags in their places.

The cannoneers release the wheel brakes and place them on the traveling hooks, as indicated in par. 87; Nos. 2 and 1 lift up the apron, the cannoneers take their posts; Nos. 3, 4 and 5 remain standing behind the caisson.

ARTICLE IV.

BASIS DEFLECTION.

95. At the command:

MARK DEFLECTION,

the gunner writes with chalk on the left shield the deflection then registered on the sight. The deflection is called the "Basis deflection."

When the gunner has a new Basis deflection to mark, he erases the one previously written.

96. At the command:

BASIS DEFLECTION,

the gunner sets the sight at the basis deflection. The gun is then again laid for direction, and if not in abatage the wheel brakes are hooked up; the gun cradle is put in the middle of the traverses and the cradle is brought on its cushion.

ARTICLE VII.

FIRING COMMANDS.

The firing, the rules governing which are set forth in the *School of the Battery Commander*, is executed at the following commands:

97. At the commands:

1. *Corrcction so much* or *Percussion*, or *Shell*,
2. *3 rounds* (or any number),
3. RANGE 3135 (or some other range).

No. 3 follows instructions in par. 29, 31; No. 1 sets the range indicated and the number of shots indicated are fired, No. 1 firing the round at the "Ready" of the gunner.

This procedure is repeated at each new range.

98. At the commands:

1. *Corrector so much*, or *Percussion*, or *Shell*,
2. *5 rounds sweeping*,
3. RANGE 3775.

Proceed as prescribed in par. 97, except that the gunner does not lay for direction after the first shot; instead, he gives the traversing wheel three turns to the left after firing each shot, except the last.

When a new range is ordered this sweeping fire is renewed, but this time the gunner sweeps from left to right. If a third sweep is made, the gunner will sweep towards the left and so alternately.

99. At the commands:

1. *Corrector 19*, or *Percussion*, or *Shell*,
2. *4 rounds double sweeping*,
3. RANGE 2450.

Firing is executed as in par. 98, but the gunner gives six turns to the traversing wheel instead of three between each shot.

100. At the commands:

1. *Corrector 21*,
2. *Progressive fire*,
3. RANGE, 2400, 2500, 2600, 2700 (four ranges differing by 100 yards).

Two rounds are fired at each range as prescribed in par. 97.

101. At the commands:

1. *Corrector 25*,
2. *Progressive and sweeping fire*, or *Progressive double sweeping fire*,
3. RANGE, 1850, 1950, 2050, 2150 (four ranges differing by meters, starting with the nearest).

At each range three shots are fired as indicated in par. 98 or 99.

ARTICLE VIII.

SPECIAL METHODS OF FIRE.

102. Direct fire.—The target is pointed out to the gunner:

1. *Plateau: zero—drum so and so,*

2. *By the sights,*

3. *Abatage* (or *without abatage*).

The gun is laid and put in abatage if necessary, on the actual target. In this case the elevation is determined as prescribed in par. 63.

103. Moving targets.—On a rapidly moving target visible to the gunner, for example, at the command:

1. *Moving target—that squadron of cavalry.*

2. *Plateau: zero—drum so and so,*

the firing is executed without abatage. The chief of the section aided by No. 4 or 5 lays the piece by the open sights moving the trail when necessary. He estimates after each shot whether or not a movement of the trail spade is needed. In moving the trail spade Nos. 1 and 2 are at the wheels.

The gunner having laid for direction, lays for elevation with the sight alone. He follows the target by turning the two laying wheels.

If the command gives no plateau and drum figures (where the target is a large one) the laying for direction is given by shifting the trail only, the gunner using only the elevating wheel.

104. Fire in case of attack at short range.—When the target advances or appears at less than 500 meters the chief of section commands:

TARGET:

1. *Approaching cavalry* or (*other target*),

2. *Fire at will.*

At this command the cannoneers lift the wheel brakes if they are not already lifted, but do not hold them up. No. 3 turns the hand wheel in the decreasing distance direction as far as it will go, and sets fuses without interruption.

No. 1 turns the range scale in the direction of diminishing ranges, as far as it will go. The chief of section aims the piece with his eye by moving the trail. The gunner keeps the horizontal axis line of the sight at the foot of the target.

Firing is begun at the command of the chief of section as soon as the gunner calls out "Ready."

The number of rounds is not fixed. The chief of section stops the fire when the circumstances which necessitated this kind of fire cease to exist.

105. Fire control by the chief of section.—In certain circumstances the chief of section may have to take the fire control of his piece, in firing at variable rates of speed on a given length of front, and fixed by the captain.

The chief of section will give the firing commands at the prescribed rates and cover a front equal to the indicated number of mils (by full turns of the traversing wheel to right or left from the center of the traverse) first at one range, and then at another. The lay of the piece must be changed at each shot, by means of the traversing wheel, as indicated in par. 61, so that successive shots fall indiscriminately all over the assigned front.(1)

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(1) If the position of the gun on its axle does not permit its reaching the entire width of front indicated, the chief of section must take a new abatage before commencing fire.

ARTICLE IX.

DIFFICULTIES MOST OFTEN MET WITH AND ORDINARY METHODS OF OVERCOMING THEM.

I. Difficulties in introducing or extracting a shell.

106. A. Shell refuses to fully enter the chamber. —Extract the shell by means of the rammer.

The first time this happens examine the rotating band of the shell for irregularities, and see that the front edge of the shell case has not been dented. If this is the cause, file down the projections and try to load again. If the shell still refuses to be fully seated, set it aside.

B. Extractor unable to eject empty cartridge case. —Extract it with the rammer after making sure that the extractor tang is in its place.

If this happens again, examine extractor and tang and change them if necessary.

II. Misfires.

107. After three unsuccessful attempts to fire the shell, examine the striker. If it seems to be all right, open the breech gently and extract the shell with the rammer (par. 43) and set it aside.

Replace the striker if it is broken or if its point is damaged or if the piece continue to misfire. If a misfire occurs again with a new striker, change the striker spring.

The shells which missed fire will be tried again in another gun as soon as this can be done without inconvenience. Such a shell should be loaded gently so as to be pushed fully in by the sloping face of the breech block.

In no case must a shell having its fuse set ever be replaced in the chests.

III. Breaking of the lanyard.

108. If the rope of the hook of the lanyard breaks during fire No. 1 seizes the hammer and releases it. The lanyard and hammer are only replaced when the firing is over.

IV. Failure of pawl to work.

109. If the pawl is not set by the recoil of firing, set it by hand.

The pawl is not indispensable for shooting. In case it fails to work properly it may be temporarily suppressed. When firing without pawl it is only necessary to instruct No. 1,

1. To close the breech gently but completely, and

2. To fire by pulling the lanyard handle in the direction of the lanyard; that is, downward, rather than up. Failure to do this might start opening the breech, which would be enough to cause misfires, the striker no longer hitting the center of the primer.

V. Incomplete return to battery.

110. When the gun is in battery the rear index of the breech hoop is opposite the cradle index.

The chief of section should constantly verify the complete return of the gun to battery.

If the return is incomplete, firing may be continued as long as the front index of the breech hoop is not to the rear of the cradle index.

111. As soon as the return of the gun to battery is insufficient for the continuance of fire, the chief of section looks at the gauge.

He should also examine this gauge at every interruption of fire.

If the gauge is as far as it can go (the coupler can then be moved with the hand) try to adjust the recoil apparatus. (See *Care of materiel*).

If this movement has begun, continue till the gauge is just level and the gun will generally come back to the battery.

If the gauge is level and the gun does not return completely to battery, or if the return functions irregularly by jerks and jumps, cease firing and look for the cause of it. See especially there is no foreign matter on the slides, particularly bits of the sweeper piece.[1]

If the cause of the irregularity can not be found, and the barrel of the piece is 50 or 60 c/m from its normal point, try to push it to battery by hand before limbering.

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[1] The sweeper plate is not indispensable for firing, and if it is scored and can not be replaced it should be removed.

VI. Sticking of range scale.

112. Strike the crank lightly in the right direction, while holding the range crank spur out of the plate notches.

VII. Fuse setter trouble.

113. It is strictly forbidden to use damaged punch blades. No. 3 should very frequently examine the blades to see that they are in good condition.

To examine the blades, take the shrapnels out of the fuse setter and push down the levers so as to make the blades appear in the cups.

To change a blade, lift the punch lever all the way up and pull out the blade holder by pushing on the spring catch.

Remove the broken blade by sliding the "T" out of its groove.

Take a new blade from the lid of the fuse setter and put it in place in the blade holder. Lift the hand lever again all the way up; start the blade holder in with the milled head of the catch spring down, and only let go the lever when the catch is in contact with the side wall of the fuse setter.

To take a blade from the lid, pull out the scraper which keeps the extra blades in the case and take out a blade, by sliding the "T" along the case. Then put back the scraper, nose down, engaging the catch in the groove.

If a cartridge which has had its fuse set can not be withdrawn from the cup, draw out the blade holder and examine the blade. If it is broken and the cartridge still remains stuck, even with the blade holder removed,

change the blade and set the fuse again, pushing gently on the lever so as to drive the end of the broken blade into the fuse.

VIII. Divers accidents.

114. In battery, officers should on their own initiative try to prevent accidents for which these regulations give no solution. They should be guided by the following principles:

1. Suppress all the parts not needed for the shooting.

2. Replace the worn or weakened parts when the changes are being made to the carriages, but do not change parts the dismounting of which is forbidden. (See *Care of materiel.*)

CHAPTER III.

BATTERY DRILL.

ARTICLE I.

PRELIMINARY INSTRUCTIONS.

115. The battery is made up and commanded as indicated in the *Firing Battery*—Book VI.

The rear carriages are arranged in *Battery order* as indicated in the same book (par. 48).

Formation for falling in.

116. The men fall in, in line, with the sections on line; from right to left, the sections being arranged by number, each chief of section on the right of his section and on line with its front rank; each platoon commander to the right of and on line with his right hand chief of section.

Post of personnel in battery.

117. The cannoneers and the chiefs of sections occupy the posts indicated in par. 73.

The platoon commander stands behind No. 3 of the section nearest the captain, the executive being back of one of the caissons.

The captain goes to his observation post. If he has to stand on a caisson to make his observation, the brake is set, and all possibilities of his falling forward are prevented by seating a man on the fuse setter, which has been pulled down.

118. *Under fire.*—The officers and the N. C. O.'s of the battery must take cover as do cannoneers so far as the performance of their duty permits.

When a battery is not in action and when the captain thinks it necessary to guard his men from a possible surprise fire, he gives the command *Under cover.* At this command, the gunner and No. 1 get as close as possible to the shields; No. 2 and the chief of section crouch behind the caisson with Nos. 3, 4 and 5. The personnel of the 5th section get behind the caissons of the 5th section.

120. At the command:

FALL IN,

all the personnel fall in, in line, facing the captain and 3 meters away from him.

121. At the command:

CANNONEERS POST,

each goes to his post at a double time.

122. *Duties of the executive.*—The executive helps in getting the battery in position and in preparation for firing, under the captain's directions. During the course of fire, he helps him in the general supervisions of the working of the battery, which as a rule he must not leave. He holds himself in readiness to replace the captain.

Duties of platoon commander.—The platoon commander repeats the commands or transforms them in individual unit commands and sees that they are executed.

They correct for the difference in level of the wheels if necessary.(1)

Duties of chief of section.—The chief of section superintends the working of his piece and controls the operations of the cannoneers when necessary.

In progressive fire, he indicates the successive ranges.

ARTICLE II.

PREPARATION FOR FIRE.

123. The preparation for fire of a battery consists in the following:

1. Make the line of fire of the first piece pass through the right edge of the target or through a determined point called the *Mark.*

2. Make the *sheaf* of trajectories pass through the same point.

The laying of the first piece and the formation of the sheaf may go on at the same time or may be distinct.

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(1) The difference in level of the wheels results in the shot falling off in the direction of the lower wheel. The correction is 5 mils for 15 c/m difference of level between the wheels.

I. Simultaneous operations.

124. The captain points out to the four gunners a common aiming point, with the proper deflection.

To do this he calls the chief of platoon and the gunners (or only the chief of platoon if the gunners are engaged). He points out the aiming point (point de pointage) and then calls out:

1st piece "Plateau and drum, deflection difference" (échelonnez de tant). The gunners, if they have been called up (or the chief of the platoon if the gunners have not been called) call out, under the captain's instructions from right to left, the deflections of their respective pieces.

The gunners of the first piece call out the given deflections. The gunners of each succeeding piece (2, 3 and 4) call out this same deflection increased or diminished by the deflection difference.

II. Separate operations.

125. The first piece is laid for direction according to the captain's instructions (par. 155).

126. Formation of the sheaf.—The piece on which is based the calculation of the sheaf (usually the 1st piece) is called the directing piece.

a. *Marking and laying by an aiming point.*—In this process the directing piece is used to give the other guns the proper deflection from the chosen aiming point.

1. Mark the deflection of the directing piece to the aiming point (par. 59) and announce it.

2. Give this deflection to the other pieces with a proper increment, if needed, and lay them on the aiming point.

b. *Reciprocal sighting.*—This process permits the lines of fire of the other pieces to be made parallel to that of the directing piece.

1. Set the angle of sight at zero for all the pieces and the bubble between its marks, and put up the sight extension bars.

2. Place the other pieces approximately parallel to the directing piece.

3. Mark the directing piece successively on the sight column of each of the other pieces, beginning with the most distant and call out the marking deflections as they are determined for each piece.

4. Give each of the pieces its corresponding deflection and lay it on the sight column of the directing piece, turning the piece, in laying it, as much as possible, on the axis of the sight.

If any doubt exists about the resulting sheaf, it may be advantageous to repeat above operations 3 and 4, and use only the traversing wheel in pointing.

127. Changes of sheaf.—At the command:

Open (or *close*)

by 5 (or any number), the platoon commander changes this command for each of their pieces by an increase (decrease) of deflection, by ordering *left* or *right*, so and so.

Example:

1st platoon

No. 1 gun unchanged.
No. 2 gun left 5 (or right 5).

2nd platoon

No. 3 gun — — 10.
No. 4 gun — — 15.

In the absence of a platoon chief, the gunners themselves make these changes of deflection.

ARTICLE III.

128. The captain commands, if necessary, the changes of deflection and the proper increments for the sheaf, then:

With abatage, or *Without abatage.*

The pieces execute the movements prescribed in par. 83 and 85 (or 88).

The angle of sight is set, if required, when the captain gives the command.

129. As soon as a piece is ready, the chief of section raises his arm and turns facing the captain.

ARTICLE IV.

EXECUTION OF FIRE.

I. Definition.

130. Firing is usually executed by all the pieces in the battery. In certain cases, however, it may also be done by only one platoon or even by one piece alone.

A salvo is the name given to an orderly succession of shots fired by a battery or platoon, all guns firing at the same range and in a prearranged order, one shot per piece.

A volley is a number of shots fired by a battery at a given range. It is fired without any prescribed order and may be one or more shots per piece.

All fire consists in general of fire for adjustment and fire for effect.

Fire for adjustment is usually conducted by salvos. Fire for effect is usually conducted according to one of the methods described in Chapter II, Article VII.

II. Fire for adjustment.

131. The battery being ready, at the command:

1. *Corrector so much* or *Percussion fire,*

followed by:

2. *Battery right* (or *left*), followed by,

3. RANGE SO MUCH.

each piece follows directions laid down in Par. 89 and 90.

The chiefs of section give in turn the command "Fire" to their pieces beginning at the right (left) and in such a way that the time between shots will be two or three seconds.

132. If the captain gives the command:

1. *At my command,*

2. RANGE SO MUCH,

the chiefs of sections only order "Fire" when their number (1, 2, etc.) is called by the captain.

III. Changes in direction.

133. Changes in direction are executed in the manner prescribed in section drill; that is, by changes in deflection or by turns of the traversing wheel.

Changes of deflection ordered after a salvo may include:

1. A general change of deflection for all the pieces of the battery.

2. A change in the sheaf.

3. Individual correction for each piece.

The gunner executes all the changes ordered, one after another, then lays again with the final deflection resulting from these changes.

IV. Fire for effect.

134. Each piece executes the various kinds of fire as commanded without reference to any other piece.

As soon as a piece has finished the required number of rounds the chief of section raises his arm and turns towards the captain.

V. Special cases.

135. Individual laying.—In case of individual laying the object to be hit having been pointed out to the gunner, each piece takes as the target that portion of the object which corresponds to its place in the sheaf and then follows the rules prescribed in par. 102.

136. Close range attack.—The pieces each fire the number called for (par. 104) or continue firing as long as they can. If the battery is invaded, all the cannoneers take cover behind the wheels of the gun or caisson and defend themselves with their side arms.

ARTICLE V.

USE OF BASIS DEFLECTION.

137. The commands and execution are the same as those for the individual piece.

ARTICLE VI.

REPLACING THE PERSONNEL—SUPPLIES.

Replacing casualties.

138. The usual manœuvres require six cannoneers per piece, but firing may be conducted with fewer. When it is only a question of keeping up the fire of a piece which has already been fired, one man can do it if necessary.

But in actual practice, it is preferable to leave one or more pieces without any servers so as to have never less than four men (including chief of section) with each piece which can and should still continue to fire.

The replacing is done in the following way: As soon as one or several of the cannoneers are lacking, the

chief of section appoints nominally those who are to replace them, taking into account their skill and degree of instruction.

The chief of section, while still retaining command of this piece, takes, if necessary, one of the vacant posts.

As soon as it becomes necessary, the platoon commander calls on the extra men who are on the caissons of the combat train.

Ammunition supplies.

139. At the command "Supply train" the chief of section and all the cannoneers except the gunners, who remain at their seats and face the front, go straight to the caissons of the fifth section. Men of the first platoon go to the right caisson; those of the second to the left caisson, and in each platoon the men of the right piece go to the right chest and those of the left piece to the left chest.

The chief of section pulls out the ammunition, giving two cartridges to each cannoneer as far as the number permits. The cannoneers carry the cartridges to their respective caissons.

In case the fifth section is loaded with explosive shells, each No. 3 takes with him the fuse box from his caisson and has it refilled with detonating fuses.

The chiefs of section verify the number of fuses taken away and make sure, before leaving the fifth section, that the number of fuses distributed corresponds to the shells taken to the pieces.

ANNEX

CHAPTER II.

HOW TO LOOK AFTER THE MATERIEL.

FIRST PART.

For the Use of the Men.

ARTICLE I.

GENERAL INSTRUCTIONS.

1. The captains are authorized to replace, with the aid of the personnel assigned to them, equipment rendered useless, by the spare parts included in the supplies of the vehicles; but only if the replacement in question does not involve any of the following operations:

Readjustment of sights;
Fitting with the file;
Forging and riveting;
Unauthorized dismounting.

They can also have small repairs effected by the saddler on leather parts (sight cases, aprons, and flaps of the kit holder, etc.) which must always be kept in perfect state of cleanliness and of suppleness.

2. The only parts of the materiel which can be dismounted by the regiment are those specified in paragraphs nos 8 to 26 hereafter given, and exceptionally; under the responsibility of the sergeant in charge of the regimental park and in his presence, those figuring in the second part of paragraphs nos 35 to 64.

It is strictly forbidden to carry on other dismounting or to proceed with the dismounting and remounting in any other way than that prescribed by the present regulations.

All work which it is impossible to execute in the present manner should be done by the Repair squad.

3. The daily care does not require the services of mechanics. Any gunner able to execute the dismounting described in Article II and particularly the master gunner should be able to keep the materiel in good order.

The ingredients used are those provided with the vehicles; solid grease, mineral oil and kerosene, excluding all others, such as brick dust, emery powder, etc., the use of which is strictly forbidden.

4. The operations relating to thorough cleaning and lubrication of the materiel are performed once every fifteen days, and are, as a rule, under the responsibility of an officer, entrusted to the sergeant of the regimental park, who is assisted by the chief master mechanic and the mechanics.

At the same time, a detailed inspection of the materiel is carried on in the manner prescribed in Article III, Chapter III (How to care for the materiel, second part) once per month; this inspection is made under the supervision of an officer.

5. The polishing of any part of the materiel is strictly forbidden.

6. The verification of the sights is, in principle, made once a month, and always under the direct control of an officer.

If the materiel is to be used in actual firing, this verification must be made more often, and particularly every time when the observations made while firing might lead to indicate a lack of adjustment.

7. The care and verification of the field microtelephonic apparatus, 1908 model[1] are made under the direct control of an officer; by the sergeant in charge of the regimental park, or by the personnel making the installation on the premises.

ARTICLE II.

DISMOUNTING AND ASSEMBLING.

I. Breechblock mechanism.

8. The dismounting of the breechblock mechanism comprises the removing of the block and the extractor, and the dismounting of a certain number of parts attached to the breechblock screw.

Breechblock.

9. The breechblock being closed, pull upwards the hinged stop *until it butts, after having turned it so as to bring the lug in front of its recess;* turn the hinged stop around its axis and bring it back against the breech hoop.

To remove the extractor tang.—Bring down the handle of the extractor spindle just enough so that in pressing on the tang the latter will fall out of its seat; pull out the tang. Push home completely the extractor spindle, raise the handle and set it in its usual position without replacing the hinged stop.[1]

N. B.—The extractor tang should never be mounted in place when the breechblock is unscrewed.

[1] See the provisional instruction of June 12, 1909, on this subject.

To unscrew the breechblock.—The operator should place himself facing the breech, astride on the carriage; cock the pawl; unscrew the breechblock, taking care to recock the pawl as soon as it has been tripped by passing over the rear open sight; during the seventh turn, as soon as the breechblock handle is about to reach its lowest point, grasp it securely with the right hand passing under the breech hoop, maintaining at the same time the breechblock with the left hand engaged in the loading recess. Complete the unscrewing in this way.

To assemble the breechblock.(1)

10. Set up in their places the extractor and its spindle, the latter placed as has been explained for the dismounting.

The operator should place himself in line with the axis of the gun, astride on the carriage, holding the breechblock with the two hands as when terminating the unscrewing, the handle under the breech hoop; the left hand should support the screw and press it against the breech recess whilst the right hand holds it in position. Screw in completely the breechblock, taking care to push back the extractor arms during the penultimate turn.

Replace the extractor tang after having disengaged the spindle, as much as necessary; put back said spindle and secure it by means of the hinged stop and of its pin. No effort should be necessary to replace the hinged stop when the handle of the extractor spindle is pushed away up and the pin of the hinged stop should fall freely into its place.

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(1) In case the handle should not have enough elasticity to maintain its position have it rest on the catch of the breech cover and see that it is not allowed to drop and to be found to be bent when it is desired to dismount and assemble the breechblock.

Extractor.

11. The breechb'ock being removed, pull out the extractor spindle, take off the extractor.

It is strictly forbidden to remove the extractor spindle when the breechblock is not taken off.

The assembling is executed in reverse order; set the handle of the spindle as directed in paragraph 10.

Parts belonging to the breechblock.

12. For operations nos 15 to 17 it is more convenient not to completely separate *the block from the gun.*

Safety piece and striker.

13. The safety piece in the firing position: Hold back the hammer by means of the lanyard; unscrew the safety piece by pulling backwards the safety bolt milled head; withdraw the striker.

The assembling is executed in the reverse order; grasp firmly the safety piece to engage the first thread and be careful to set it back to the firing position before releasing the hammer.

Lanyard, strike hammer and hammer spindle.

14. The safety piece and the striker being removed, press on the hammer spindle whilst bringing down the hammer to the indent provided to this effect in the screw block so as to find the position in which the spindle goes down without difficulty. Take off the hammer. Disengage the lanyard from the link and remove it.

To assemble, introduce the lanyard into the breechblock arm eye and then into the link of the hammer; insert the hammer in the loop formed by that part of the cord which is passed in the link and pull the cord on the link.

Place the toothed arc of the hammer in the teeth of the rack, the hammer down (a small lug provided on the

rack prevents taking the wrong tooth). Introduce the hammer spindle upwards from below, setting the lug conveniently; the parts should work freely.

Bring back the hammer and set in that position by means of the lanyard.

Spring assembling pin, striker spring and rack.

15. The plunger being completely inside the breech-block handle, disengage the lugs of the spring assembling pin from their recess by pushing the pin and turning it one quarter of a turn (with a screwdriver or a coin); pull out from their recesses the assembling pin and the striker spring; take off the rack.

To assemble: The rack being in place, replace the striker spring and the assembling pin by turning the latter one quarter of a turn in order to engage its lugs in their seats.

Pawl and pawl pin.

16. The breechblock being unscrewed about three turns, turn the pawl pin one-quarter of a turn backwards by pressing on the checkered cocking piece (if necessary, using a piece of hardwood), remove it whilst holding the pawl to prevent it from dropping out.

If necessary, let the pawl drop by pressing on the end of the plunger.

To assemble: The pawl spring being well in place, pull back the nose of the plunger until it butts; introduce the pawl, with the nose of the counter-pawl ahead, deep into its seat. Press with the first finger of the right hand on the shoulder of the counter-pawl in order to compress its spring, and with the left hand press on the pawl heel so as to force the pawl into its seat.

N. B.—The counter-pawl and its spring should never be separated from the pawl.

Hold the pawl with the same hand whilst replacing the pin by operating in the reverse dismounting order; the pin should go in without effort.

Pawl spring.

17. The pawl being removed, withdraw the spring. With this in view, if the rack is not in its place, insert the pawl pin into the dismounting hole; if it is in its place, pull it out by means of said pin or by means of a piece of hardwood introduced into one of the two holes provided for this purpose in the pawl seat.

To replace the pawl spring: Engage the tops of the "V" of the spring in its indent before introducing the arms in their seat.

II. Level.

18. Operate with the first finger of the left hand on the trigger to free the level. Grasp the latter with the right hand.

The assembling is made in reverse order. Care must be exercised to present the level in such a way that the hinge of the level cover is at the left.

III. Sight case.

19. Unbuckle the strap as in the case of opening the case; disengage it from the right mortise of the shield. Press on the "T" shaped portion of the locking catch, pulling it towards the operator so as to free the eye of the catch of the lower locking hook. Raise the case meanwhile turning it around the suspension hooks so as to free these hooks from the suspension rings.

To assemble: Pass the strap in the left mortise of the shield before securing the case by means of the catch.

IV. Fuse setter.

20. The caisson being in firing position:
To remove the fuse setter.—Unfasten it and lay it down the level, then raise it gently until it is freed from its carrying bar.

To replace the fuse setter.—Grasp it with the two hands placed on each side, under the cover; bring the socket between the two collars on the carrying bar; then raise the fuse setter until the bar enters freely into the socket; continue this movement to hook the fuse setter.

V. Wheels.

21. a. *To remove the wheels of the gun.*—The gun being in firing position, proceed after taking care to place a block (of wood or bronze) from 2 to 3 c/m thick, between the fork and the cup sleeve of the wheel to be removed.
By placing a block on both sides the two wheels can be removed simultaneously.
Untie the thong, remove the linchpin, the cup washer (and the leather washers) of the axle spindle; separate the wheel from the carriage.

b. *To remove the wheels of the caisson.*—The caisson being in firing position, turn it over its rests until the wheels are raised, and hold it in this position by drawing the trail nearer. Manipulate with care so as not to upset the caisson.

c. *To remove a wheel of any vehicle other than the 75 m/m gun carriages and caissons.*—Use the jack carried in the limber of the battery forge. Cock the wheel on the opposite side, raise the axle with the jack placed near the wheel to be removed, using thickness piece if necessary.

In case the height of the jack is too great to allow it to be placed under the axle, raise the vehicle by placing the jack under the end of the axle tree spindle, then let it rest on a wooden crutch of proper height.

In the case of the 75 limber: A crutch slightly longer than the spoke of the wheel can be used with advantage. Place the crutch obliquely between the ground and the cup washers and raise the limber by slightly turning it by means of the pole, having taken care to place chocks on both sides of the opposite wheel.

22. *Replacing of the wheels.*—Make sure that there is at least one leather washer between the hub and the shoulder washer or cup washer; place between the end of the hub and the axle spindle washer a number of leather washers sufficient so that after having replaced the linch pin the wheel will have very longitudinal play on the axle spindle, whilst being able to turn smoothly.

If the vehicle has cup washers with notches try to obtain the above result with the deepest notch of the washer, then reduce, if necessary, the longitudinal play by placing the linch pin in a less deep notch.

VI. Poles.

23. *No. 7 poles with metal socket.*—To dismount a pole, separate the two bodies of the vehicle; remove the key at the end of the pole after having, if necessary, loosened it by introducing edgewise between the two protruding lugs the handle of a monkey wrench or the metal part of a tool to separate the two pieces. Remove the thong securing the pole bolt and withdraw the latter. Pull on the pole, holding firmly the splinter bar. If the butt does not come out easily shake it and jerk it. If this is of no avail, loosen with the head of the pole key the nuts of the bolt straps.

To make use of the spare pole assemble together both parts;[1] drive in the bolt completely and turn it to keep the lug away from its slot. Fix on the spare pole equipped with a hole and leather washer, the metal pole head to be replaced; drive in the pin completely and set a thong to it.

To replace a pole: Drive it in squarely with one single stroke into the fork up to the stop. Loosen or tighten up, if necessary, the flange bolts by means of the pole key before putting the same in its place.

24. *Wooden pole.*—If the pole butt is swollen by dampness and too large, remove some of the wood on the sides or under. If on the contrary it is too small, use wooden splints to avoid wabbling, which might cause breakage.

25. It is strictly forbidden to remove the pole of a limber before separating the hind carriage and to have the limber rest on the splinter bar (after removing the pole) so as not to bend the Mogul spring or the limber prop.

VII. Luggage frame.

26. To remove the frame, withdraw the keys by opening the spring with the first finger of the right or left hand and drawing them out mildly if necessary with the copper mallet. Raise the frame to free it from the back and place on the ground.

For replacing it, make sure first that the thongs securing the back to the chest handles are tight and do not slide on the handle. Secure the frame to the back by means of its hooks, the arms of the batten engaging in the chest handles, the tenons penetrating in the mortises of the brackets; place the keys, driving them in if necessary with the copper mallet and making sure that their spring is engaged.

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[1] Back and middle part.

ARTICLE III.

CLEANING AND LUBRICATING.—SUMMARY EXAMINATION.

Daily care.

27. It is essential that the materiel in use in the troop units is taken care of every day according to the prescriptions of the present regulation.

The daily care comprises the following operations: Cleaning of the exterior parts of the sight support and of the socket at the foot of the column; lubricating with oil of the support (lubricating holes Nos. 20 to 24); cleaning of the base of the column of the sight; cleaning of the levels; lubrication with oil of the range mechanism (lubricating hole No. 2); of the rocker trunnion caps; rocker trunnions (lubricating holes Nos. 7 and 8); cleaning and lubrication of the exterior parts of the carriage axle.

Cleaning and lubrication of the parts of the breech of the bore and of the gun and of the slide[1] (if the gun has been fired).

Cleaning and lubrication of the breech and of the firing mechanism (if the gun has been used for drilling purposes).

The parts of the materiel are cleaned and greased according to the following prescriptions.

28. *Body of the gun.*—The breech, the extractor and its axis being removed, wash liberally with water the bore and the chamber of the gun, using the sponge, until the water comes out clear; wipe and dry; then grease with the grease muff. Oil the roller covers and the muzzle rollers, if necessary.

[1] This operation is carried under the supervision of the sergeant mechanic.

29. *Breech.*—Dismount the breech and its parts (Nos. 8 to 17) excepting the plunger and its nose; clean and grease slightly the threads of the breechblock and of the breech recess; wipe with a greased cloth the striker, the safety piece, the parts of the firing mechanism, the extractor tong, its spindle and the pawl; assemble all parts of the breech and place a drop of oil on the pawl pin. When the breechblock is in place pass the greased cloth on all exterior parts and on the back surface of the breech hoop. All these parts must be slightly greased but not covered up with a coating of grease.

30. *Carriage axle.*—Clean and lightly grease the visible parts of the axle by placing the carriage successively in the two extreme positions.

31. *Sight support.*—The sight support must be cleaned with the greatest care. Clean the interior of the socket of the foot of the column, using, if necessary, rag soaked in kerosene; then wipe with a dry cloth.

Wipe the exterior surfaces to remove the dirt or the dust.

Lubricate with oil, with the oil can, the holes Nos. 20, 21, 22, 23 and 24 of the support.

Remove the level and clean the level seats.

32. *Range level.*—Clean the feet of the range level; wipe the vials with a slightly damp cloth, but without kerosene.

33. *Sights.*—For each of the sights, apply a drop of oil on the column above the plateau, at the same time turning the column so as to distribute the oil in the interior. Clean the foot of the column, which should be free from dirt.

N. B.—Carefully avoid to pour or to let kerosene or oil remain on the optical apparatus of the sight, or on the vial of the level.

34. *Use of the oil can.*—Fill the oil can by drawing oil from the cover of the can which is used as a receptacle. To pour oil do not remove the stopper of the can; it is only necessary to unscrew it six or seven turns.

The aperture having been cleaned with the brass cleaner, the nose of the oil can is introduced so as to close it hermetically; the necessary quantity of oil is injected on each part, pressing firmly but not roughly on the end part of the oil can, and operating slowly to give the oil time to flow; operate at the same time the parts being oiled so as to spread the oil evenly.

35. It might be that the valve closing the aperture of an oiling hole adheres to its seat and does not allow the oil to pass; in this case release the valve by introducing a piece of wire of suitable diameter in the aperture.

36. *Use of the grease muff (new system).*—The grease muff, open at both ends, is used either with the hollow head rammer or with the old style rammer.

In the first case, fix the muff on the head of the rammer, passing it by the end of the rod until the ligature is up to the front part of the cylindrical portion.

Wind twice in reverse direction the two unused strips of the thong tightly against the rim. Then pass inside from the outside the two strips in the holes of the splay-mouthed portion and tie a knot in the hollowed part of the rammer. Secure the other end of the muff by means of the second ligature, pressing it against the rim of the socket.

In the second case, set the muff on the head of the rammer. Close the front opening by pulling tight the two strips of the thong which are free, and winding them in reverse directions around the extremity of the muff; then make a knot.

Then secure the other end of the muff above the head of the rammer.

SUMMARY EXAMINATION OF THE MATERIEL.

37. Before each marching or firing drill the head gunner, with his assistant, should pass a superficial inspection of the materiel entrusted to his care. Before each firing he should cause the grease to be removed from the bore of the gun (No. 68).

Each time after having been used, the materiel should undergo the daily cleaning operations, and a superficial inspection should be made by the sergeant mechanic.

The remarks made as a result of these inspections are verbally reported to the Commanding Officer of the unit, who immediately takes the necessary measures, according to the case, to have the materiel put in order.

I. Gun.

38. Actuate the breech mechanism; make sure of the regular action of the firing and safety parts. See that the gun has its coupling key in place; that the extractor is in place and that it is equipped with its tang.

(For the manœuvres the striker is equipped with a raw leather protecting ring; make sure, if firings are to be carried on, that this ring has been removed.)

39. Examine the action of the wheel brake and loosen it entirely.

40. Make sure that the right brake beam carrier securing pin works freely in its seat and that the slide block pawl responds to its lever and to its spring.

41. Make sure that the sight case and the pouch of the extension bar are secured and contain the articles which should be there; see that the shield keys are in place.

42. Make sure that the sight support is equipped with a level with vial unbroken, that the elevating wheel is set firmly by its bolt, and that the cradle rests on its cushion; if not, place it by means of the elevating crank.

II. Limber.

43. Make sure that the pintle latch works freely and responds to its spring.

See that the chest is well closed and that the luggage frame is held firmly by the keys.

III. Caisson.

44. Make sure that the wheel brake works properly. See that the fuse setter is held firmly by its carrying bar. See that the chests are closed.

Make sure on all vehicles that the different thongs are in place.

IV. Lubrication of the wheels.

45. The wheels should be periodically lubricated, at intervals varying according to circumstances.

After each lubrication the leather washer of the cup sleeve and cup washer should be examined.

ARTICLE IV.

DIRECTIONS FOR USING THE RECOIL APPARATUS.

46. The joints are not absolutely tight, the slight leakage which might take place when firing and even at rest is very small and presents no inconvenience.

In the normal firing conditions the recoil apparatus should contain a small additional quantity of liquid called "reserve." When the reserve is exhausted any loss is liable to reduce the strictly adequate quantity, and

the gun when firing may fail to recuperate sufficiently, or when marching it may slightly move back on the cradle.

The amount of reserve is indicated by the position of the gauge.

No reserve: The gauge finger is down deep in its recess.

Full reserve: The end of the gauge finger is level with the index.

Excess reserve: The gauge finger projects over the index.

No firing should be made with an excess reserve.

47. *To reduce or eliminate the reserve.*—Screw by means of the 17 mm. wrench the oil extractor at the filling hole, the plug of which has already been unscrewed by means of the bent screw driver. The liquid flows out through the central vent of the oil extractor.

Unscrew the oil extractor as soon as the gauge finger begins to recede or if it is desired to eliminate completely the reserve, wait until the flow stops.

48. *To fill the recoil apparatus.*—To introduce liquid in the apparatus make use of the battery portable pump or of the screw fillers of the gun limbers.

The battery portable pump must be used under all circumstances to fill the recoil apparatus; exception to this rule must only be made when for certain reasons (disability, bursting of a pipe, leakage at the top joint, etc.) the pump can not be used.

51. *Use of the battery portable pump.*[1]—Carefully carry on following operations:

Remove the box from its supports on the limber, withdraw the pump, grasping it by the lever and the milled

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[1] The directions for using the portable pump are summarily given on the German silver plate set on the inside of the cover of the box.

nut of the pipe; set the cup on the pump body by screwing completely the tightening ring.

Hang up the pump by the clip of its support on the right hand flask of the carriage head and near the ring of the elevating shaft, set the pump handle in the lever socket; tighten the clamp screw, raise the cover of the cup and ascertain that the sleeve is in perfect state.

Fill the cup with oil; start the pump by actuating slowly the lever handle until the liquid flows through the end of the pipe.

Loosen the clamp screw; pull towards oneself the connection cap pin and unscrew the cap (right axle bracket), engage the extremity of the pump pipe in the connection and screw in completely the milled nut by means of the 24 mm. wrench; then tighten up the clamp screw.

Pump at the rate of about one stroke per second, placing the finger on the gauge index; stop when the end of the gauge finger reaches the index.

In case of leakage of the pipe and pump connection tighten up the split nut, meanwhile holding the connection by means of the tightening wrench, the fork of which engages on the two flattened surfaces provided on this connection.

Remove the pump and replace it in its box, operating in the reverse order for mounting it in place, taking care to loosen the clamp screw before separating the pipe from the connection.

52. *Use of the screw filler.*—Fill up to three-quarters full, after having removed the leather sleeve protecting the threads at the end, and after having unscrewed completely the piston rod; close the filler, then give a few turns to the screw, holding the nozzle up so as to let out all the air contained in the apparatus.

Screw the filler in the filling hole of the recoil apparatus by means of the 42 mm. wrench, taking care to

hold it straight so that the threads will engage without friction;[2] move forward the piston by actuating the screw handle.

Watch at the same time the gauge finger so as to stop the operation when the index has been reached.

Remove the filler, using the 42 mm. wrench to unscrew it, and replace the plug of the filling hole after having verified the good condition of the threads.

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[2] This precaution is very important, as any deterioration of the threads of the filling hole would render it useless until repaired.

APPENDIX.

List of the accessories and spare parts carried by the battery vehicle.

DESCRIPTION.	GUN VEHICLES. LIMBER.	GUN VEHICLES. GUN.	CAISSON VEHICLES. LIMBER.	CAISSON VEHICLES. CAISSON.	BATTERY WAGON.	FORGE.
Slide ring of the pole yoke	1	"	"	"	1	1
Oil extractor	1	"	"	"	"	"
Sight	"	1	"	"	"	"
Extractor spindle	"	"	"	"	1	"
Striker hammer spindle	"	"	"	1	"	"
Oil can with pump, large	"	"	"	"	1	"
Oil can, small	"	"	"	1	"	"
Kerosene can with pump, large	"	"	"	"	1	"
Kerosene can with pump, small	"	"	"	1	"	"
Candle box	"	"	"	"	1	1
Nail and calk box	1	"	1	"	1	"
Grease box, 1897 M[1], large	"	"	"	"	1	"
Grease box, 1897 M[1], small	1	"	1	"	"	"
Box for small articles	"	"	1	"	"	1
Box for 24[m/m]-32[m/m] fuses	"	"	2/12	8/12	"	1
Candles (size 24 per kilog.)	1[2]	"	0[k]5	"	5[3]	1[k]5
Bolts for pole yoke branch	"	"	"	1	"	"
Front section of pole, 7 complete with yoke	"	"	"	"	1	"
Bolts (various sizes)	"	"	"	"	1	As-sort-ment.
Pole yoke branch (pair) with collar	"	"	"	"	2	"
Flush brush	"	"	"	1	"	"
Oil can	1	"	"	"	"	1
Padlock 1858 M[1]	3[3]	"	3[3]	1	2	3[3]
Compartment box for accessories	1	"	"	"	"	"
Coal	"	"	"	"	"	100[k]
Drift pin 1897 M[1] of 3[m/m]-8[(1)]	"	"	"	1	"	1
Pin for spoke tie	"	"	"	"	"	1
Cleaning rags	1[k]	"	1[k]5	0[k]5	10[k]4	1[k]5
Shield pin with chain and eyebolt	"	"	"	"	"	3
Pin for pole end	1	"	"	"	2	"
Coupling key with spring	"	"	"	"	1	"
Trunnion cap key with chain eyebolt	"	"	"	"	"	8
22/31 double action fuse key	"	"	"	"	"	1
32/31 detonator fuse key	"	"	"	"	"	1
Key of 42/24/17	1	"	"	"	"	1
Padlock keys, 1859 M[1]	"	2	"	2	"	1

(1) The two caissons with explosive shells are equipped each with two boxes; these with shells of different kinds are equipped each with one box (mounted batteries).
(2) One additional at the pump box.
(3) Two additional at the fuse box cases.
(4) There is also one drift each of 5[m/m] and 6[m/m] in the forge.
(5) These figures apply to mounted batteries.

DESCRIPTION.	GUN VEHICLES		CAISSON VEHICLES			
	LIMBER.	G.S.	LIMBER.	CAISSON.	BATTERY WAGON.	FORGE.
Adjustable wrench, medium, 1897 M¹	"	"	"	1	"	"
Nails (assorted)	"	"	"	"	"	Assortment.
Check with circular groove (1)	"	"	1/12	"	"	"
Assorted ropes	"	"	"	"	50m	"
Forage cord	"	"	"	"	"	"
Picket ropes, length 8 meters	2	"	2	"	"	"
Rope 40 meters long (diameter 27 to 30m/m) (1)	1	"	"	"	"	"
Muzzle cover	"	1	"	"	"	"
Breech cover	"	1	"	"	"	"
Field jack	"	"	"	1	"	1
Brass oil hole cleaner	"	"	"	1	"	"
Fuse setter (with scraper and 6 spare blades)	"	"	"	1	"	"
Rocker trunnion cap, right	"	"	"	"	1	"
Rocker trunnion cap, left	"	"	"	"	1	"
Ladder 1911 M¹ for caisson	"	"	"	2/12	"	"
Sponge	"	1	"	"	"	"
Hange drum nut	"	"	"	"	2	"
Assortment of nuts	"	"	"	"	"	1
Linchpin with ring No 10 (with thong)	"	"	"	2	2	1
Linchpin with step (with thong)	"	"	"	"	2	"
Extractor	"	"	"	"	1	"
Plumb line	"	"	"	1	"	"
Mild steel wire 1m/m diameter	0¹2	"	"	"	"	"
Extension bar pouch	"	1	(2)	"	"	"
Case for fuse boxes	"	"	2/12	"	"	"
Luggage frame	1(2)	"	1(2)	"	"	1
Leather fitting for end of pole No 7	"	"	"	"	"	"
Leather cup washer	"	"	"	6	"	"
Leather cup sleeve washer	"	"	"	8	"	"
Pawl pin	"	"	"	1	"	"
Hinged stop pin	"	"	"	"	"	1
Brake crank pin	"	"	"	2	"	4
Pin for brake gear support	"	"	"	"	"	8
Pins (assorted)	"	"	"	"	"	6
Split pins (set of 14)	"	"	"	1	"	"
Oil can	1	"	"	"	1	"
Solid grease	3¹	"	3¹	"	10¹	"
Oil	1¹	"	"	1¹	10¹	0¹3⁄4
Axe	"	"	"	"	2	1
Hatchet	1	"	1	"	"	"
List of composition and equipment of the battery of 75	"	"	"	"	"	2
Felloe for wheel No 7	"	"	"	"	6	"
Rope 4 meters long (1)	"	"	3/12	"	"	"
Field glass (with case and strap)	"	"	"	"	2	"

(1) Only for the 75m/m batteries operating in mountains.
(2) One figure applies to mounted batteries
(3) Only in the mounted batteries.

DESCRIPTION	GUN VEHICLES. LIMBER.	GUN VEHICLES. GUN.	CAISSON VEHICLES. LIMBER.	CAISSON VEHICLES. CAISSON.	BATTERY WAGON.	FORGE.
Leather thong	"	"	"	10	"	"
Lantern, 1891 M[1]	"	"	1	"	1	1
Manoeuvring lever	"	"	"	"	1	"
Reinforced manoeuvring lever 1^m36 long[1]	"	"	4/12	"	"	"
Spoke tie	"	"	"	"	"	1
Rope 75 meters long (diameter 9 to 10^m/^m)	"	"	"	"	1	"
Bastard 3 cornered file, 15^c/^m	1	"	"	"	"	"
Small file second cut	"	"	"	1	"	"
Complete pawl	"	"	"	"	"	"
Battery commander's telescope 1898 M[1] with tripod	"	"	"	1	1	"
File handle	"	"	"	1	"	12
Grease mud	"	"	"	"	"	"
Striker hammer, with link, spindle and burr	"	"	"	1	"	"
Copper mallet	"	"	"	1	"	"
Field iron mallet	"	"	"	"	1	"
Steel and iron bars	"	"	"	"	"	As sort ment.
Quadrant 1888-1900 M[1]	"	"	"	1	1	"
Range level 1901 M[1]	"	2	"	"	"	"
High range level	"	1	"	"	"	"
Cotton	"	"	"	0^k03	0^k01	"
Hand tools for battery workman	"	"	"	"	"	As sort ment.
Spade	1	"	1	"	"	"
Round shovel 1862 M[1]	"	"	"	"	1	1
Striker	"	"	"	1	"	"
Kerosene	"	"	"	1 lit.	1 lit.	"
Safety piece (with milled head bolt)	"	"	"	"	1	"
Flat nose pliers, polished 16^c/^m	1	"	"	"	"	"
Pick, 1862 M[1]	1	"	"	1	1	1
Iron picket, length 0^m80	"	"	"	"	10	"
Picket pin (diameter 5^c/^m)[10]	"	"	"	"	6	"
Spare rim plate for wheel 7	"	"	"	"	"	24
Chalk bag with three sticks	"	"	"	1	"	"
Portable battery pump	1/4	"	"	"	"	"
Holder and 13 sq. sheets mica	"	"	"	"	1	"
Snatch block[10]	"	"	"	"	"	"
Rear sight extension bar	"	1	"	"	"	"
Hammer	"	1	"	"	"	"
Spare spoke for No. 7 wheel	"	"	"	"	12	"
Battery commander's rule	"	"	"	1	"	"
Oil filler leather sleeve	1	"	"	"	"	"
Bronze drift	"	"	"	1	"	"
Resin	"	"	"	"	"	0^k150
Pawl spring	"	"	"	1	"	"
Rivets (steel and brass) different diameters	"	"	"	"	"	As sort ment.
Cup shaped washer for end of axle	"	"	"	"	"	2

[10] Only for the 75^m/^m battery operating in the mountains.

DESCRIPTION.	GUN VEHICLES.		CAISSON VEHICLES.		BATTERY WAGON.	FORGE
	limber.	gun.	limber.	caisson.		
Wheel No 7	•	•	•	•	2	•
Sight case	•	1	•	•	•	•
Sand bag of sulphated tissue	•	-	•	3	3	•
Battery bag with fastening rope	•	-	•	•	3	•
Small bag for articles, large size	•	•	•	1	•	•
Folding saw	•	•	•	1	•	•
Keyhole saw with wooden sheath	•	•	•	1	2	•
Watering bucket for 75^{m}/^{m} field artillery	•	•	•	1	•	1
Forge bucket	•	•	•	•	•	1
Canvas bucket	•	•	•	2	6	•
Billhook	•	•	•	1	•	•
Salt ammoniac	•	•	•	•	•	0^{k}40
Sitogoniometer 1911. M^{1} (with sheath)	•	•	•	•	1	•
Tin soldier	•	•	•	•	•	0^{k}40
Lantern bracket	•	•	1	•	•	•
Range tables for 75^{m}/^{m} gun 1897 M^{1}	•	•	•	•	•	•
Extractor tang	•	•	•	1	•	•
Range finder with case and sheath[1]	•	•	•	•	1	•
Firing spring assembling pin	•	•	•	•	1	•
Spare pole, rear and middle part[2]	1	•	2/12	•	•	•
Lanyard with handle	•	1	•	1	•	•
Waste drawer[1]	•	•	•	•	•	•
Drawer (large size)[1]	•	•	•	1	•	•
Bent screw driver	•	•	•	1	•	•
Ordinary screw driver with handle of 4 and 10^{m}/^{m}	•	•	1	•	•	•
Trace complete (with cover)	2	•	2	•	2	2
Canvas kit	•	•	•	2	•	•
Coupling key safety bolt	•	•	•	1	•	•
Wood screw with milled head (different diameters)	•	•	•	•	•	(Assortment.

(1) One per caisson with varied assortment.
(2) One per caisson with shrapnel.
(3) Mounted batteries only.
(4) In the horse batteries the gun limbers have no spare pole. Each caisson limber carries one.

CHAPTER III.

CARE OF THE MATERIEL.

SECOND PART.

(For the Use of Commissioned and Noncommissioned Officers.)

ARTICLE I.

EXCEPTIONAL DISMOUNTING AND ASSEMBLING.

I. Parts connecting the gun to the cradle.

53. *Important prescriptions.*—The operations prescribed in Nos. 54 to 59 should only be carried on in the presence of an officer or of a sergeant mechanic.

The coupling key of the coupler should never be removed unless the gun has completely returned to battery and the recoil apparatus is filled.

Before carrying on operations Nos. 54 to 59 separate the limber if this is not already done;[1] place the gun

[1] To avoid tilting over the limber during the recoil of the gun.

in a horizontal position;[2] make the trunnion cap keys fast; see that the thongs of the pins are in place;[3] open the breech.[4]

54. *To remove coupling key and push back the gun on the cradle.*—After observing prescriptions of paragraph No. 53 remove, by raising its spring, the coupling key of the coupler from right to left, as far as it will go.

In case it does not work freely, introduce in the two corresponding holes of the key and of its spring, raising the latter, a drift; hammer it softly with the copper mallet. Withdraw the drift when the key is more than half out. Never make use for this operation of a piece of wood or any other material liable to break in the hole and thus immobilize the spring.

With the hand pull the key as far as it will go.

As soon as the key is out push the gun back.[5]

With this in view, press on the face of the muzzle to push the gun back, taking care to place the hands on the upper part of the face of the muzzle, so as not to get the fingers caught between the muzzle rollers and the slide. In case of difficulty in getting the gun started one of the gunners should operate the breech arm and pull the gun backwards. The operation should not be performed too abruptly so as not to deteriorate the guide piece or the sweeper plate bolt; it must be stopped as soon as the guide-block is heard to strike the recoil stop.

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[2] If the breech were lower than the chase the gun would slide back too quick; the guide piece which limits the back motion might then be seriously damaged, or might even cause the gun to fall if the guide piece were badly placed or were not in place; it is forbidden for the troops to release the gun if the guide piece and the sweeper plate are not in place.

[3] To avoid tilting the cradle around the pin of the elevating screw during the recoil of the gun.

[4] If the breech is not open it is impossible to release the gun without shearing off the safety bolt.

[5] In case the safety bolt shall have been dismounted.

55. *To remove the coupling key.*—If it is desired to remove the coupling key it is only necessary, after having pulled it as far as it will go, to raise its spring so as to disengage it from the notch formed by the coupler. Let the key hang by its thong.

56. To bring the gun back, in battery, and to set the coupling key, the gun being in the recoil position.

Ascertain that the safety bolt is in place and that the breechblock is wide open;[1] see also that the coupling key is off or pulled completely back.

Bring the gun ahead without abruptness, should the coupler be out of line and prevent the operation set it back in place with a few strokes of the copper mallet. Set the coupling key immediately,[2] if necessary striking softly the key with the copper mallet.

The coupling key should slide easily; in general when it does not work easily it is an indication that the gun is not exactly in its place.

57. *To dismount the safety bolt.*—The breechblock and the coupling key being removed, as indicated in paragraphs 53 and 54, drive upwards the safety bolt with a drift, operating without abruptness; as soon as its head protrudes in the breech, grasp it and draw it upwards, at the same time pressing on the bolt so as to compress its spring with the finger introduced at the left in the key seat.

The assembling is done in the reverse order; with the hand on the head of the bolt press it as far as it will go, always pressing with the finger engaged in the seat of

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[1] In case the safety bolt shall have been dismounted.

[2] It is to be feared that in actuating inadvertently the range mechanism or the elevating mechanism the gun be made to slide back violently. This might result in a serious accident.

the key, as indicated for dismounting. Take care to replace the breechblock, leaving it in the open position before introducing the coupling key.

N. B.—Never endeavor to separate the spring from the safety bolt.

II. Sweeper plate.

58. The sweeper plate and its guide piece should only be dismounted when the gun has its coupling key in place.

Remove the bolt pin of the sweeper plate without trying to straighten it out; unscrew the bolt;[3] pull towards oneself the sweeper plate, if necessary forcing the blade of a screwdriver behind the body, pull towards oneself the guide piece, using if necessary a bent piece of wire (iron or copper) of suitable dimensions, engaged in the dismounting hole.

N. B.—If this operation presents any difficulty, leave the guide piece in place; simply take care to have the sweeper plate replaced and only if the guide piece can conveniently be placed as mentioned in paragraph 59.

It is strictly forbidden to dismount the detail parts of the sweeper plate and of the guide piece.

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[3] By means of the medium universal key and not with the wrench 42/24-17.

59. The guide piece is easily replaced;[1] it is only necessary to make sure that its threads agree perfectly with those of the jacket.

With this in view, screw in the sweeper plate bolt the length of a few threads, then unscrew it, taking care not to change the position of the guide piece.

To replace the sweeper plate, raise the inclined planes sweeper block, which must rest on the inclined planes, pressing the springs so that they will not interfere with the forward surface of the cradle; do not enter the sweeper plate far enough to touch the guide piece.

The final replacing operation will be done by the screwing of the sweeper plate bolt; to get this bolt started in, press down, if necessary, on the body as much as is necessary to place the bolt hole opposite the threaded seat. Take the same precaution as in the dismounting of the bolt and its pin; no effort should be made to curve the latter additionally. The pin must be introduced in the hole of the bolt placed farther up and on the left side of the gun.

III. Accessory parts of the recoil apparatus.

60. *Front plug.*—Unscrew the front plug, pressing on the spring plunger during the first turn, make use if necessary of 42/24-17 wrench.

To replace the plug screw it in until the spring plunger drops in the notch provided for this purpose in the plug.

61. *Filling hole plug.*—Unscrew the plug with the bent screw-driver.

Screw it in the same way, deeply, but without forcing it; make sure beforehand that the threads of the plug and of the hole are thoroughly clean and in good condition.

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[1] In assembling the guide piece it is important that this should not be interchanged with that of another gun, and that each sweeper plate bolt should remain attached to its friction piece.

IV. Elevating screw and pin.

62. *Pin of the elevating screw.*—The rocker being raised enough not to mesh with the elevating pin (suitably setting the range scale for this purpose, if necessary).

Remove the split pin, then the elevating screw pin, setting its lug conveniently (the handle of the pin is then about horizontal).

To replace the pin, place the cross head of the screw between the ears of the elevating rack, holding the screw with the hand to prevent it from turning. Cause the screw to go up or down by means of the elevating crank until the pin can be engaged, suitably setting its lug. Open the branches of the split pin as soon as it is in place.

63. *Elevating screw.*—The elevating screw pin being removed, move the range scale towards the indication "plus près" (nearer), holding the screw with the hand to prevent it from turning. Maintain the screw as the operation ends so as to prevent it from falling.

The assembling is carried on in the same manner, taking care to engage the first thread with the hand.

V. Rocker trunnion caps.

64. The elevating gear being lowered completely and the range scale placed at 3,000 meters: Remove the key ring thongs, then the keys of the trunnion caps, using if necessary a drift introduced in the oil hole.

To assemble, set the rocker trunnion caps, taking care not to interchange them (the right cap alone has an outside collar); set the trunnion caps and replace the thongs.

ARTICLE II.

THOROUGH CLEANING AND LUBRICATION OF THE MATERIEL.

65. The complete cleaning and lubrication of the materiel comprises besides the daily operations, a certain number of additional prescriptions described as follows.

66. *Slide.*—To clean the slide, uncouple the gun[1] and let it slide until it butts against the recoil stop, having beforehand ascertained that the sweeper plate is in place and held by its bolt. Clean thoroughly the slide, particularly the inclined planes and the roller paths, removing all grease and using, if necessary, a rag soaked in kerosene; then grease with the brush or the hand in the inaccessible places. Bring back the gun in battery and set the coupling key immediately after having greased it slightly. Advantage should be taken of the above operations to clean and then grease the rear rollers and ascertain that they rotate freely.

67. *Wheel brakes.*—To clean the grooves of the cup washers and the wheel brake stanchion forks. The grooves can only be kept so as to avoid rust. Place a drop of oil at the place where the fork enters in the fork socket of the stanchion. Clean and lightly grease the slide bar, the slide block and its pawl.

Place a few drops of oil at the place where the brake beam enters the right collar and the right socket.

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[1] For this operation separate the limber and the gun carriage, place the gun in a horizontal position; set the trunnion caps and open the breech. The omission of these prescriptions might cause serious accidents.

68. *Elevating gear.*—Grease lightly the elevating rack of the rocker.

Oil with care, after cleaning with kerosene if neces sary the rocker trunnion caps, the rocker trunnions and the trunnion caps.

Set the range scale at zero, clean and oil the elevating screw; place a few drops of oil on the upper part of the range rack, then work the range mechanism up and down as far as it will go.

69. *Oil holes.*—The holes provided for the oiling and arranged for use with the oil can are distributed around the carriages and numbered 1 to 27.[1] However, the holes Nos. 4, 6, 9, 10 and 11 apply to devices filled with solid grease. These holes are plugged with wooden stoppers and should only be removed by the repair squad. Said devices will therefore never have to be replenished by the troop units.

The numbers and the function of the holes are given hereafter (according to their position, turning around the carriage from right to left), as well as the quantity of oil to be placed in each; these quantities are only approximative.

No. 1: Range drum. Inject oil until it is seen oozing around the drum and the ring which is in the center.

No. 2: Range mechanism. Until the oil is seen oozing on the right hand flange behind the plate.

No. 25: Seat support shaft split bushing. Until the oil is seen oozing around the shaft.

No. 4: Elevating shaft (for repair squad).

No. 5: Seat support and brake beam carrier shafts. Until the oil is seen oozing around the seat support shaft.

No. 6: Brake gear. For repair squad.

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[1] Holes Nos. 3 and 5 have been suppressed when the materiel has been modified.

Nos. 7 and 8: Rocker trunnion caps and trunnion caps. Until the oil is seen oozing at the trunnion bedplates.

No. 9: Brake worm screw. For repair squad.

No. 10: Traversing gear. For repair squad.

No. 11: Elevating gear. For repair squad.

No. 12: Left trunnion of the oscillating support. Until the oil is seen oozing around the trunnion.

No. 26: Split bushing of the seat support shaft. Until the oil oozes around the shaft.

No. 27: Right brake beam socket (chassis 1907 model). Until the oil is seen oozing around the brake beam. (See below).

No. 13: Seat support and brake beam carrier shafts. Until the oil is seen oozing around the seat support shaft.

No. 14: Pintle ring. Until the oil is seen oozing at the shoulder of the ring.

No. 14 to 19:[2] Roller axles. The equivalent of one-fourth of the oil can.

No. 20: Sight support (column foot socket). Until the oil oozes at the lower part of the socket.

No. 21: Deflection drum. Until the oil oozes by the joints of the worm housing.

Nos. 22 to 24: Oil holes of the level holder. A few drops of oil for each hole.

70. *Limber.*—Place a drop of oil at the lid hinges and at the lid prop, in the holes of the limber chest locking bar bearings and at the turnbuckle.

Grease slightly the inside of the socket of the back of the spare pole, the inside of the pole end, as well as the

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[2] The oil holes Nos. 16 to 19 of the guns originally manufactured are closed by a removable cap, which is not arranged for the use of the oil can. Turn the cap one-quarter of a turn by means of the small screwdriver and oil with the can; replace the cap in a closed position.

end key and the pole bolt. Place a few drops of oil on the axis of the pintle latch pin.

Grease slightly the keys of the luggage frame.

Clean out if necessary the holes at the bottom of the chest and of the kit holders.

Wipe, if necessary, the leather parts with a sponge slightly wet, then rub them with a greasy cloth covered with Dubbing grease.[1]

71. *Caisson.*—Place a drop of oil at the hinges of the lids, in the holes of the chest locking bar bearings; in the holes of the bolt brackets, at the hinges and at the latch of the grain chest lid. Slightly oil the pusher and the spindle of the fuse setter hooking level. Oil the bearings of the trail locking bolt (this bolt must rest freely in its supports); wash it beforehand, if necessary, with kerosene, as well as the brake suspension knuckles.

Use the oil can for the two oil holes.

Brake handwheel; contents of half a can.

Pintle ring, until the oil oozes as far as the pintle ring shoulder.

Pass a greasy cloth on the fuse setter carrying bar.

Clean out if necessary the holes at the bottom of the chest, of the grain chest and of the lockers.

72. *Fuse setter.*—Clean the interior of the ogival cups and especially the recess of the fuse lug.

Place a few drops of oil in the mortises of the cups, operating the fuse setter in both directions and to its limits, place a few drops of oil in the hole placed under the division 20 of the corrector and in the hole of the crank cover which is protected by a cover.

Pass a greasy cloth on the blade holders.

Clean the range ring and the graduated arc of the corrector with a cloth soaked in kerosene.

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[1] Dubbing grease is composed of a mixture of ox foot oil and tallow in equal parts.

Then wipe carefully so that no oil or kerosene will be left at the exterior.

Clean out, if necessary, the water holes of the cover.

In case the mechanism should not operate with ease, wash with kerosene; the fuse setter being placed in an inclined position of about 45 degrees and the blade holders being removed, pour kerosene in the cups until it flows out of the entrances for the blade holder vents; meanwhile actuate the crank in both directions. Let the kerosene remain if a first cleaning is not sufficient, then carry on a second cleaning after a certain time. When the stiffness has disappeared, drain the kerosene by overturning the fuse setter, then oil as indicated above. If the stiffness in operation still persists change the apparatus.

ARTICLE III.

DETAILED INSPECTION OF THE MATERIEL.

I. Gun.

74. First examine the general working of the breech and of the firing and safety parts.

Dismount the breech, the extractor and its spindle, the breech mechanism and the safety bolt. Examine closely each piece taken apart.

75. Examine also the breech recess, the conditions of the chamber and of the bore of the gun, then assemble all parts.

The burrs, hammer marks or deteriorations found when examining should not call for a change of a part of the breech or the intervention of the repair squad unless they should hamper the good working.

N. B.—The striker spring should hold the hammer against the safety piece ramp whatever may be the elevation of the gun.

76. Remove the coupling key and slide the gun until it stops, to examine the condition of the slide and especially of the roller paths and the inclined planes. These surfaces must always be in perfect state of repair.

Examine the condition and the action of the coupling key and its spring.

Pull the gun back in firing position and set the coupling key.

77. Operate the range mechanism to make sure that there is no stiffness.

78. Remove the elevating screw pin, make sure that the cradle rocks freely and that when the breech is raised the rocker, although disengaged from pinion, is not drawn up with it. (For this verification place the range scale at about 5,500.)

Replace the elevating screw pin, then, the range scale set always at the above figure and the elevating rack being disengaged, tilt the whole mechanism—rocker, cradle and gun.

The range scale being set at 5,500, raise the breech as much as possible by means of the elevating wheel, so as to disengage the elevating rack of the rocker. Tilt the whole mechanism, rocker, cradle and gun, to make sure that the rocking is free.

When the parts are well kept the breech preponderance is sufficient to make the breech move downwards when the gun about in a horizontal position is released.

79. Ascertain that the pintle ring revolves with ease.

80. Examine the brake; verify its action by dropping it. Make sure when the brake is in firing position that the trail can easily be removed right or left until the shoulders of the compensating beam bear against the flasks. Raise the brake and make sure that it is latched on the carrier with the case.

81. Empty the reserve through the oil extractor, then fill the recoil apparatus by means of the battery portable pump, or in case of default, with the screw filler.

82. See that the sight case is not torn or ripped and that it is held firmly by the locking latch; that it contains all the articles intended to be there, and that the packing is properly covered up with leather. Make sure that the spare level is wrapped in a cloth; examine its condition. Examine the condition of the sights; make sure that the column of each one works properly at its foot.

83. Make sure that the brake gear works properly and without stiffness.

84. See that the shields are secure; that the keys are equipped with thongs and that the hinges of the apron shields are not loose.

85. Make sure, by raising the trunnion caps, of the good condition of the rocker trunnion caps and of the trunnions.

86. Ascertain that the front plug of the recoil apparatus can be removed and replaced easily (nº 62) and that it is properly stopped by its plunger. Make sure that the piston sweeper and the leather washer of the piston rod are in place and that they can not be shaken. If necessary, clean the empty space between the front plug and the piston with a rag.

87. Make sure that the sweeper plate is securely held by its bolt, which should be screwed entirely or almost entirely, and that the bolt is provided with a pin which presses hard in its seat.

88. See that the rammer staff and the sponge staff are in good condition; make sure that they can be removed, replaced and put together easily, and that they are securely held by the locking chain.

89. Actuate the traversing and elevating gears to the full limit of their stroke to see that they do not work with difficulty; ascertain that the handwheels are not strained; that the handle of the traversing wheel turns freely around its spindle. Make sure that the visible parts of the axle are in good state of repair.

90. Examine the parts of the sight support; make sure that they are clean and that the friction surfaces are sufficiently oiled; that the deflection drum offers no resistance and that the drum clamp works properly.

91. The gun being completely assembled and cleaned, examine it as a whole to make sure that no oversight has been made during the assemblage; see that no rivet or bolt is loose and that the thongs are in their place:

At the coupling key of the coupler;

At the filling hole plug of the recoil apparatus;

At the shield keys;

At the trunnion cap keys;

At the front plug of the recoil apparatus;

At the linchpins of the axle spindles.

92. Make sure that the wheels are in good condition and greased; that the cup sleeves and washers are equipped with at least one leather washer; for the vehicles equipped with notched washers, use the notch giving the least play.

II. Limber.

93. Examine the exterior metal mountings of splinter bar, mogul springs, limber prop, metal frame for the grease box, the tools, the picket ropes, the spare pole, and the fuse setter.

Do not allow a spare pole to remain on a limber when the pole holder linings are lost.

94. Open and close the chest to ascertain the good condition of the chest fastening, of the locking bar and of the turnbuckle. Examine the action of the hinges and of the lid prop; make sure that the latter is not strained and that its bracket is not being loosened up by the action of the lid.

Open and close the nail and calk box; make sure that the removable tray can easily be withdrawn.

Examine the condition of the lid; make sure that the chest handles and the movable back supports are not broken or bent, and that the thongs securing the movable back to the chest handles are in place and fastened; make sure that the accessory and ration compartments are in perfect state; that the equipments are complete and that each one can be removed or replaced easily.

Verify without dismounting the diaphragms that the chest packings are in place and are not broken; that the diaphragms are in good condition and secured by the stop bolts screwed tightly and pinned.

95. See that the kit holders are not deteriorated; that the drains are not stopped; that the aprons and the flaps are in good state; and that the aprons are equipped with their straps and their buttons.

96. Unlimber the caisson. Remove and then replace the pole and separate its two parts to make sure that this operation offers no difficulty.

Mount and replace likewise the spare pole.

Make sure especially that the interior of the pole end, the socket of the back part of the spare pole and the bolt of the pole end are greased. Examine the pole yoke branches and see that the bolt nuts of the yoke bands are tight.

Remove the spare trace cover; pull out the traces; see that the covers, the traces and the fastening straps of the cover are in good shape.

97. Make sure that the luggage frame is in good order and that it is really the one belonging to the limber; that the keys can be removed and replaced easily; that their springs are in working order, and that they are well secured to their chains.

98. For the wheels, proceed to examine them in the manner prescribed in N° 92.

III. Caisson.

99. Examine the outside metal mountings; pick and pick handle brackets; fastening straps.

Open and close the chests to ascertain the working order of the fastenings and of the bolts.

Examine the hinges of the lids and see that the diaphragms are in good order and tightly secured by their bolts and pinned. See that the chests do not contain sod, horse food, or foreign substances.

See that the drains are not filled up, particularly those of the grain chest.

100. Make sure that the fuse boxes are in good state and slide easily; that they have their handles and that the tool box contains all the articles with which they should be equipped. See that the spare parts are not deteriorated. Make sure that the fuse box frames are secure.

101. See that the caisson rests are not bent.

See that the compartments for cans are in good order, and secure; that the cans contain oil and kerosene; that they do not leak; that their straps are not out; that the waterproof tissue kits are in place and have their contents complete. Make sure that the drains are cleaned out.

102. Lower and raise the trail to make sure that this can be done without difficulty; actuate also the trail locking bolt, and make sure that the toggle chain is securely held. Turn the lunette to ascertain that it is free; see that the bucket is held fast by its supporting hooks and that its handle is held by the front hook latch.

103. For the wheels, verify as prescribed in No. 92.

IV. Fuse Setter.

104. Lower the fuse setter and ascertain that the carrying arm works properly and that the fuse setter can be separated from caisson and replaced easily.

Open the fuse setter; actuate the range ring from 0 to 5,500 and backwards to ascertain that it does not stick; actuate the corrector and its clamp bolt, the punch levers and the blade holders; make sure that the latter slide easily and are provided with a blade in perfect condition; see that the scraper and the spare blades are in place; that the drains of the lid are not filled in.

V. Optical Instruments.

105. Verify the working of the several instruments of the battery (battery telescopes, field glasses, etc.).

Clean the outside surfaces of the lenses by blowing on

them, to drive away the dust, and wipe afterwards with a soft white cloth which will leave no particles. A piece of dressed chamois leather can be used; rub very lightly. Never rub the lenses with the fingers, with cloth, with gloves, or any other material liable to scratch or grease them.

In regard to the prismatic field glasses, it is advisable to make the following additional observations.

Whatever may be the quality of the prismatic field glasses they will not keep in good order unless they are properly taken care of.

The first condition for their proper care is to handle them without abruptness and with caution, as is requisite for instruments equipped with lenses. It is therefore very important to avoid knocking them and particularly to drop them. The attention of the personnel handling them should be called to this point.

The good construction of the field glasses renders them impervious to dampness and dust, so that the interior parts rarely need cleaning. This interior cleaning can only be done by specialists.

The dismounting of the glasses is strictly forbidden in the troop units. It is particularly very important never to unscrew the object glass of the eye piece, as this would render the glasses pervious and the instruments might become inaccurate. Any instrument requiring interior cleaning should be sent to the workshop entrusted with the repairs.

The care in the troop units should be limited to the cleaning of exterior parts, which can be reached without dismounting, i. e., the body of the glasses and the outside surfaces of the object glasses and the eye piece.

106. The detailed inspection is followed by a report made to the commanding officer of the unit embodying a description of the defects of the mechanism as well as the losses or deteriorations discovered.

According to the case, the following measures should be taken:

1. Working defects due to lack of care. Clean immediately the parts badly taken care of. If by following the regular prescriptions the defect is not eliminated, proceed as indicated in No. 3 hereafter.

2. The lost or deteriorated article can be replaced by dismounting, providing the dismounting in question is authorized; if the spare part exists in the supplies of the vehicles in service in the battery, mount it; draw up a statement in the stub book No. 3 and make claims against presentation of the stub sheet and of the deteriorated article, or an official report of the loss, at the stores (repair squad) for an article in good condition to replace in the supplies of the battery the one used.

If the extra article does not exist in the supplies of the vehicles in service in the battery, draw up as above a stub sheet No. 3 and claim the article in good condition, in return for the deteriorated one.

3. Any defect discovered should not be repaired by means of an authorized dismounting. A report is immediately drawn up by the commanding officer of the unit and sent by the commander of the regiment to the director of the stores, who takes or causes to be taken the necessary measures so that the materiel can be inspected or repaired (Article 28 of the instruction on the inspection and care of the 75 mm. materiel.

It is advisable, in the case even of slight deterioration, that the material be submitted without delay to the repair squad. In this way in most cases serious deteriorations and long and costly repairs can be avoided.

ARTICLE IV.

VERIFICATION OF THE LINE OF SIGHT OF THE 75 M/M GUN.

107. The verification of the line of sight is of great importance since the accuracy of the firing depends precisely on the good adjustment of the line.

A defective assembling, an accidental damage, and particularly a lack of care, can compromise the adjustment and cause not only the guns of a battery to be unable to compare with each other, but also may cause a gun to be inconsistent itself, depending upon the conditions in which the laying is done.

108. This verification offers no difficulty, but it should be accomplished with a good deal of care and precision.

The chief gunner should have experience in the different operations relating to the adjustment of the sights, but this verification is always made in the presence of an officer.

109. Constructively, the bore of the gun and the line set by the rear open sight and the front sight are in parallel lines and also parallel to the plane of the level seats.

The verification of the sights consists in ascertaining:

1. That the optical axis of the collimator is parallel to the line of fixed sights, when the range scale and the plateau are at zero and the drum at 100; that the axis of the finder is in a plane parallel with the line of fire, in the same conditions.

2. That the range level gives exactly the angle formed by the axis of the gun and a horizontal line every time when the range level is at zero.(1)

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(1) The sight scale not being graduated according to the same units as the new 1888 model, this verfilication is always effected for the angle of site 0.

The operations necessary to make this verification are given below (Nos. 113 to 117). But it is necessary to ascertain beforehand that the gun can be considered as always consistent. With this in view, begin by measuring the trunnion friction angle.

TEST OF THE TRUNNION FRICTION ANGLE.

110. This operation consists in ascertaining that the trunnions are not prevented from running smoothly. If they should not work properly, the rocker may be strained slightly and the sight bracket will not follow the movements of the gun promptly.

111. The range scale being set at about 1,000 meters and the range level at about 0,[1] cause the bubble of the level to come within its line by actuating slowly the handwheel of the elevating gear in the direction necessary to raise the breech, taking care not to go above the desired position, so as not to be obliged to lower the breech (if by inadvertence the desired position should have been passed, lower the breech freely and begin the operation over).

Measure the quadrant angle of elevation by means of the 1888 model quadrant placed on the seat.

Leaving the quadrant in its place on its seat, turn the handwheel three or four turns so as to continue to raise the breech, then let it come down slowly so as to bring the air bubble between its lines, without going beyond.

Measure the new quadrant angle of elevation.

The difference of the angles read on the model 1888 quadrant is the value of the trunnion friction angle.

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[1] These conditions are not at all indispensable; the range scale and the range level can be at any division, as long as these divisions are not changed during the operation, but the conditions indicated render the operation easier.

Conditions are good if the friction angle is less than two minutes; they are acceptable if it does not exceed four minutes; it should never be above four.

If the friction angle is equal to or above four minutes a verification must immediately be made of the trunnion caps, of the rocker trunnion caps and trunnions, and an attempt made to remedy the defect as is prescribed for the thorough cleaning and oiling operations.

If it is impossible to bring the friction angle below four minutes it is useless to proceed further in these verifications. Notice should be given to the repair squad.

VERIFICATION OF THE SIGHTS.[2]

112. a. *Elevation.*—Place the range scale accurately at zero.

Lay the gun with the line of fixed sights on a well determined target, sufficiently distant (at least 1,000 meters).[3]

Determine the quadrant elevation of the gun by means of the 1888-1900 model quadrant placed on its seat (angle A).

Place the sight in the support and aim in elevation on the same target, once in raising the breech and a second time in lowering it.

Determine each time the quadrant elevation of the gun by means of the 1888 model quadrant; take the mean of the two readings.

Repeat the same operation with the spare sight of the gun.

If all parts are properly adjusted and in good condi-

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[2] Select for the emplacement of the gun a piece of ground as level as possible; if necessary raise one of the wheels with a block.

[3] Use can be made also of the special target employed by the repair squad.

tion, all the angles determined will be approximately equal.[1]

If any difference exists, the average obtained with each apparatus should not differ from angle A by more than 4 minutes.

113. b. *Direction.*—Place the gun in the middle of the slide.[2] Aim in direction by means of the line of fixed sights, on a well determined target, sufficiently distant. Aim in direction on said target with the collimator (the index of the sight being at the division 0 of the plateau) taking care to turn the drum only so as to increase the deflection; note the division indicated by the drum. Recommence the aiming by turning the drum so as to increase the deflection; note the new division.[3]

The difference between the two noted divisions must not exceed 5 mils and these divisions must be comprised between 95 and 104. Then repeat the same operation with the finder.

VERIFICATION OF THE LEVELS.

114. Verify first the 1888-1900 model quadrant, which is one to be used by reversing.

The range scale being set at 0 as stated above, set the site exactly at 0. Level the bubble, first by raising,

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[1] Introduce the screwdriver between the sweeping plate and the wall of the slide; force the gun to the opposite wall; make a fine vertical mark across the front part of the sweeper plate and the front part of the cradle. Force the gun on the opposite side with the screwdriver. If the mark on the sweeper plate does not agree with that of the cradle, move the gun towards the middle by half the distance between the two marks.

[2] In the annotations made with the 1888 model quadrant the results with a difference of less than one minute between themselves are considered as being equal. In addition, a result is considered as exact only when it has been obtained at least twice under the same conditions.

[3] In the first case start from the drum 0 and in the second case from the drum 200.

then a second time by lowering the breech by means of the elevating handwheel. Determine each time the position of the gun by taking the angle with the 1888 model tested quadrant placed on its seat; take the mean of the two figures.

Repeat the same operation after having replaced the range level with the spare range level.

If the gun is in normal condition and if the range levels are good all the angles noted will be close to 0. In no case should the average of the readings made for each range level exceed 4 minutes in absolute value.

115. Any sight or any range level not having proved true in the above tests should be considered as useless for firing purposes and sent to the repair squad.

116. Any gun without at least one sight and one range level fulfilling the necessary conditions should be considered as out of order and sent to the repair squad.

However, when it is impossible to immediately replace or adjust a gun it can be used temporarily by having recourse to an emergency procedure based on the fact that the scale of the elevating handwheel is divided in mils (1 thousandth is equal to about 3⅓ minutes) or by proceeding as follows.

Set at the same range the range scale of the gun under consideration and the rear sight of a gun properly adjusted; lay both guns at the same angle with the 1888 model quadrant, and by operating only on the elevating gear handwheels; compare the readings given by the range levels, the bubbles of which are brought beforehand between their marks by operating only the angle of sight screws; and during all the firing maintain between the angles of the two guns, the difference so determined.

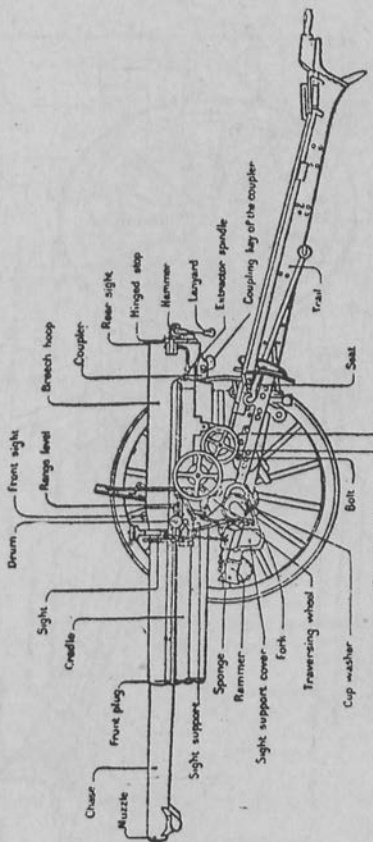

Fig. 1.—Gun (left side, left wheel removed).

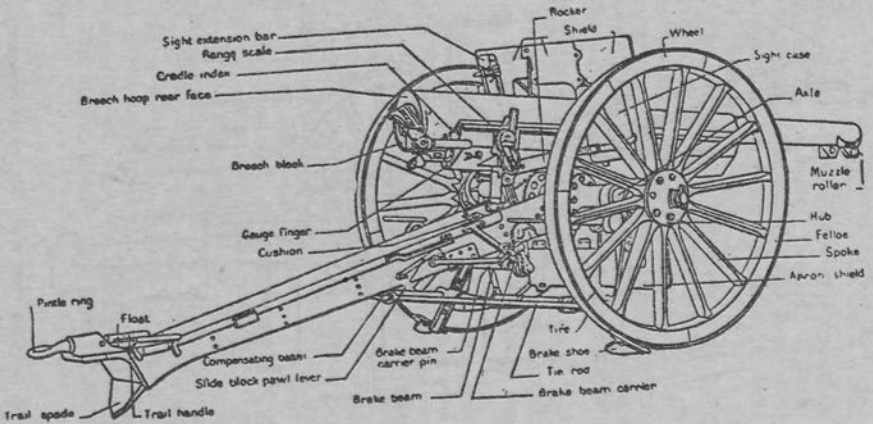

Fig. 2.—Gun, right side.

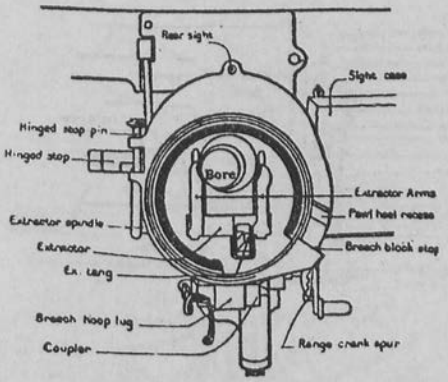

Fig. 3.—Breech and extractor.

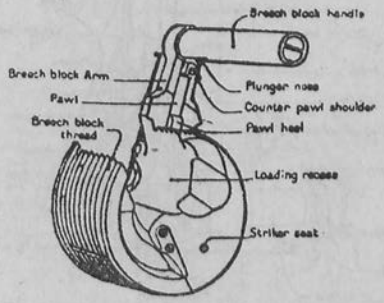

Fig. 4.—Breech block.

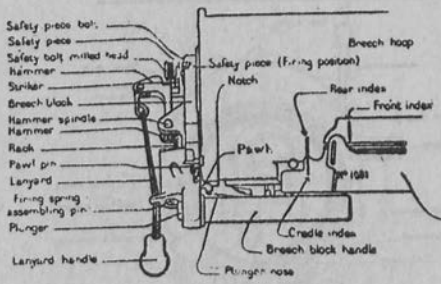

Fig. 5.—Firing mechanism.

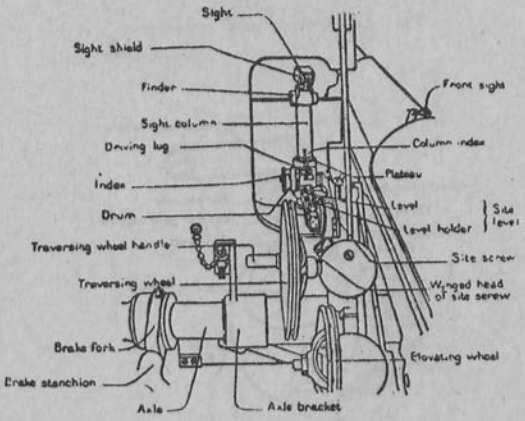

Fig. 6.—Aiming gear.

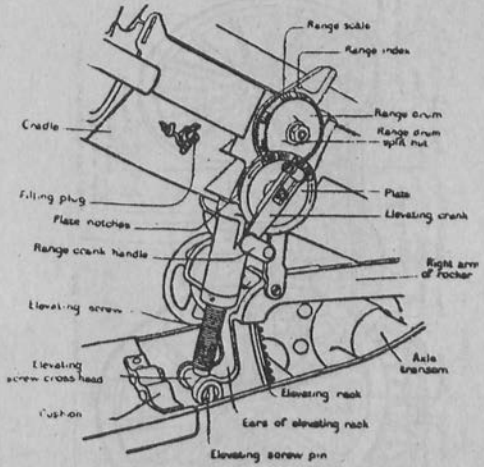

Fig. 7.—Range scale and cradle.

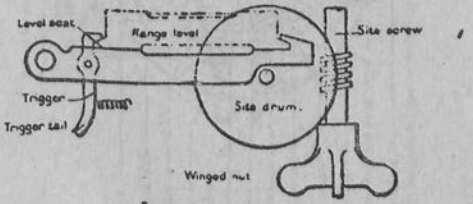

Fig. 8.—Range level.

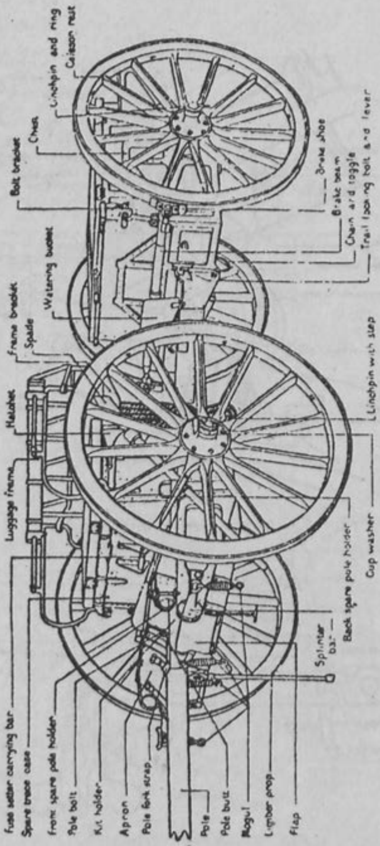

Fig. 9.—Caisson of 75 m/m gun, 1897 (front view).

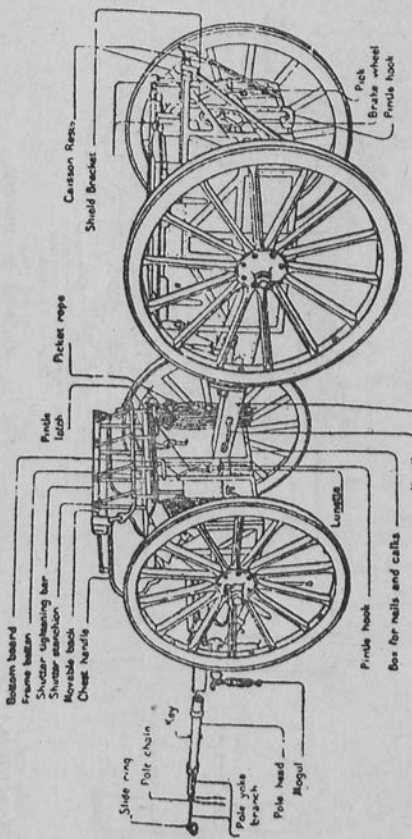

Fig. 10.—Caisson of 75 m/m gun, 1897 (rear view).

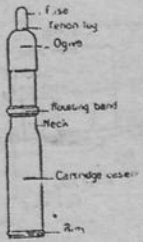

Fig. 12.
75 cartridge.

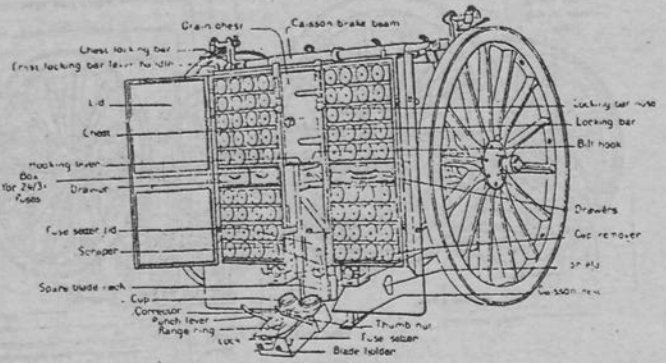

Fig. 11.—Caisson in battery.

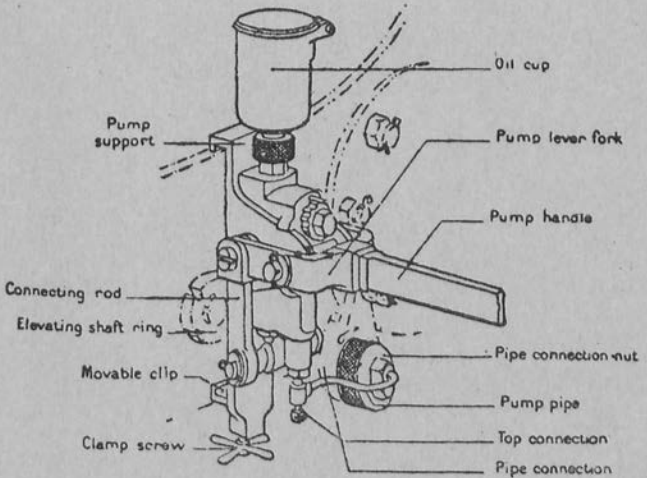

Fig. 13.—Battery hand pump.