

10447

HANDBOOK

OF THE

0.45-INCH 5-BARREL NORDENFELT GUNS,

MARKS I. AND II.

 1888.



By Command of the Lords Commissioners of the Admiralty.

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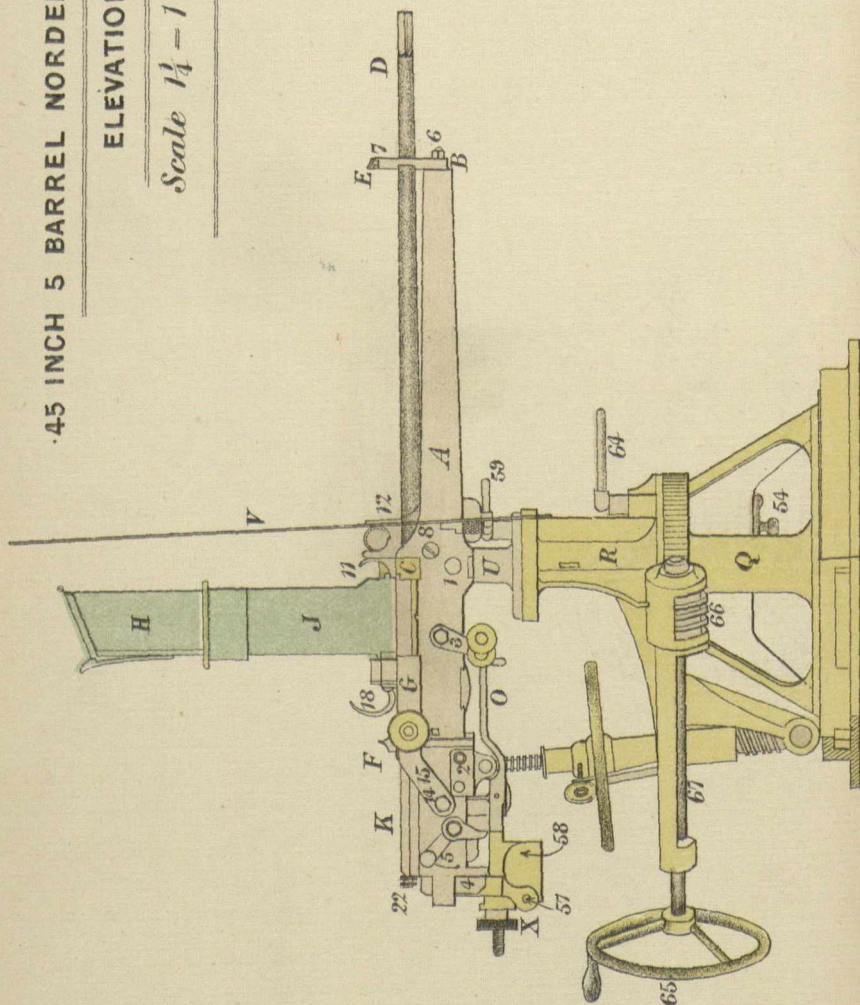
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G. 864/88.

·45 INCH 5 BARREL NORDENFELT GUN. MARK I.

ELEVATION.

Scale $1\frac{1}{4}$ - 1 Foot.



(The letters and figures within brackets refer to the Plates.)

0.45-INCH 5-BARREL NORDENFELT GUN, MARK I.

NOMENCLATURE.

- FRAME (A) - - - Joint pin (1) ; elevating bracket (2) with fixing screws, and hole for axis pin of hand and action levers ; hand lever catch (3) with screw ; cotters (4) ; drill stop (5) ; action block guide lugs (9) ; shield holders (12).
- FRONT CROSS-PIECE (B) - Bolts and nuts (6) for ditto ; foresight slots (7).
- CENTRE CROSS-PIECE (C) Fixing screws for ditto (8) ; distributor strip (10) ; cover lock (11) with screw.
- BARRELS (D) - - - Breech ; bore ; muzzle ; chamber ; recess for cartridge rim ; extractor slots ; feathers on fore end for locking barrel.
- FORESIGHTS (E) - - Right and left ; fixing screws for ditto.
- TANGENT SIGHTS (F) - Spring ; pinion ; milled head with taper pin.
- COVER (G) - - - Pivot screws (14) ; cover arm (15) ; action block guides (16) ; extractor guides ; cartridge guides (17) ; hopper catch (18) with screw ; distributor strip (19) ; distributor stop (20).
- DISTRIBUTOR (J) - - Cut-off lever and protecting arc ; sighting hole.
- HOPPER (H) - - - Cut-off lever and protecting arc ; lid ; spring for lid with fixing screws.
- ACTION BLOCK (K) - Spring bar (21) with pivot screw, and thumb screw (22) for ditto ; lock springs (23) ; hammers (24) ; firing pins (25) ; breech plugs (26) with set screws (27) ; extractors (28) with fixing screws (29) ; guide slots (30) ; triangular cocking piece (32) ; studs for link bar (33) ; holes (34) for studs on link bar.
- CARTRIDGE CARRIER (L) Lever slot (40) ; lever (41) ; guide slots.
- TRIGGER COMB (M) - Cocking cam (42) ; hammer studs (43) ; guide strips (44) ; firing piece (45).

- REAR CROSS-PIECE (N) - Trigger comb rests (46); trigger comb spring (47); screws (49) for trigger comb; number plate with scattering gear.
- HAND LEVER (O) - - Handle.
- ACTION LEVER (P) - Friction roller (51) with stud and cross pin; axis pin (52) with taper pin; trigger finger (53).
- TOOTHED QUADRANTS (S) Joint pins (100) with keeper screws; link pins (101); links with locking projections (102).
- LINK BAR (T) - - Studs (103); stud holes (104); friction roller (105) with stud and fixing screw.
- SHIELD (V) - - - Fixing bolts, right and left.

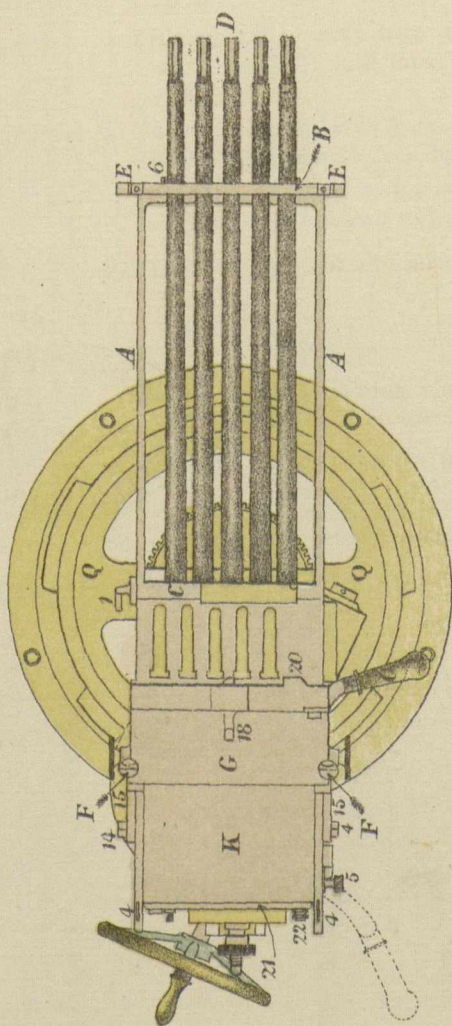
MOUNTING.

- CONE (Q) - - - Worm wheel; locking ring; catch pin (54); undercut circular groove.
- HEADSTOCK (R) - - Traversing and elevating gear; training wheel (65); worm (66); spindle (67); elevating wheel; elevating screws; clamp (64) undercut circular groove; steady pin.
- T JOINT-PIECE (U) - Clamping screw and hand nut (59).
-

·45 INCH 5 BARREL NORDENFELT GUN MARK I.

PLAN.

Scale $1\frac{1}{4}'' = 1 \text{ Foot}$



DESCRIPTION.

The gun consists of a rectangular steel framework, A, the sides of which are connected by three cross-pieces, B, C, and N. Frame.

The five barrels, D, are placed side by side in the frame, their muzzle ends passing through the front cross-piece, B, while the breech ends are screwed into the centre cross-piece, C. Barrels.

Each barrel is furnished at its fore end, on the underneath side, with a feather, which fits into a featherway in the front cross-piece ; this is to lock the barrel from turning.

The foresights are "right" and "left" ; they dovetail into slots on the front cross-piece, and are secured by a screw. Foresights.

The tangent sight on the right of the gun is graduated up to 1,600 yards, and is shorter than the one on the left, which is graduated to 2,000 yards. The shorter sight on the right is necessary, in order to keep it clear of the hand lever. The spare sight is marked up to 2,000 yards, and if required on the right of gun it must be cut to the same length as the existing right sight. Tangent sights.

The cover, G, is fitted with two arms (15) and pivot screws (14) near the rear end of the frame ; a lock spring (11) is provided to keep the cover down when it is closed. Cover.

The distributor, J, fixes on to the cover, and is held in place by the flanged strip (10) and the hopper catch (18). When in place, the five compartments of the distributor are immediately above the five cartridge guides (17) in the cover. Distributor.

The distributor is made broad enough at its base to cover the cartridge guides, but tapers towards the top where the base of the hopper (H) fits ; by this arrangement it is possible to make the hoppers smaller and lighter than they would be if each one had to fit on to the cover. Besides this, the distributor which holds 50 cartridges (10 in each compartment) serves to feed the gun and keep up an uninterrupted supply of ammunition whilst changing hoppers. A sighting hole is made on the left, which enables the man on the left to see when the level of the cartridge is falling, and thus when the hopper is empty.

The hopper is placed on the top of the distributor ; it holds 50 cartridges, which are put into it at the top, where a simple flap lid is fitted ; a spring lock on the back of the hopper secures the lid when it is shut down. Both the distributor and hopper are fitted with a locking slide at the bottom, which, when turned in one direction, prevents the fall of the cartridges through the base. Hopper.

The action block, K, works in rear of the centre cross-piece, and between the sides of the frame, A, with a backward and forward movement. On its front side there are the five breech plugs (26), which are screwed in and fixed by a set screw. Action block.

Each of the breech plugs is pierced with a channel within which the firing pin works ; on the outside and on top of the breech plugs are the extractors, which are held in place by screws.

On the underneath side of the action block are five hammers, each placed in rear of a firing pin, and behind each hammer is a long, powerful, helical spring. The hammers (24) and springs (23) are placed in their channels by removing the spring bar (21). The hammers are provided with tenons which project downwards and fit behind studs (43) on the trigger comb when the spring is compressed ready for firing. A triangular cocking piece (32) is fitted for working the trigger-comb, if the trigger-comb spring (48) should fail. The two studs (33) project downwards, and fit into corresponding holes in the link bar, T, and from this link bar two other studs (103) project upwards and fit into the holes (34) in the action block. These four studs serve to connect the action block with the link bar which drives it to and fro, and also holds it in position at the moment of firing. There are also two guide slots (30) cut on the sides of the action block which fit over two corresponding lugs (9) on the frame, A, to prevent any possibility of the front end of the block from lifting when it is pushed forward.

Toothed
quadrants.

Two toothed quadrants, S, are pivoted about the axis pins (100), and by means of the link pins (101), connect with the links (102) for working the link bar, T. The right quadrant is fitted with a cam opening within which the friction roller (51) on the end of the action lever, O, works and drives this quadrant about its axis pin. The movement of the right quadrant is communicated to the left one by the teeth shown on their circumferences.

Links.

The links (102) are each provided with locking projections, which fit into recesses in the frame, A, so that the back powder pressures on firing cannot drive the action block back.

Action lever.

The action lever, P, is fitted with an axis pin (52), which passes through a hole in the elevating bracket and on to the lower end of this axis pin the hand lever, O, is pinned, so that the movement of the latter works the former for driving the mechanism.

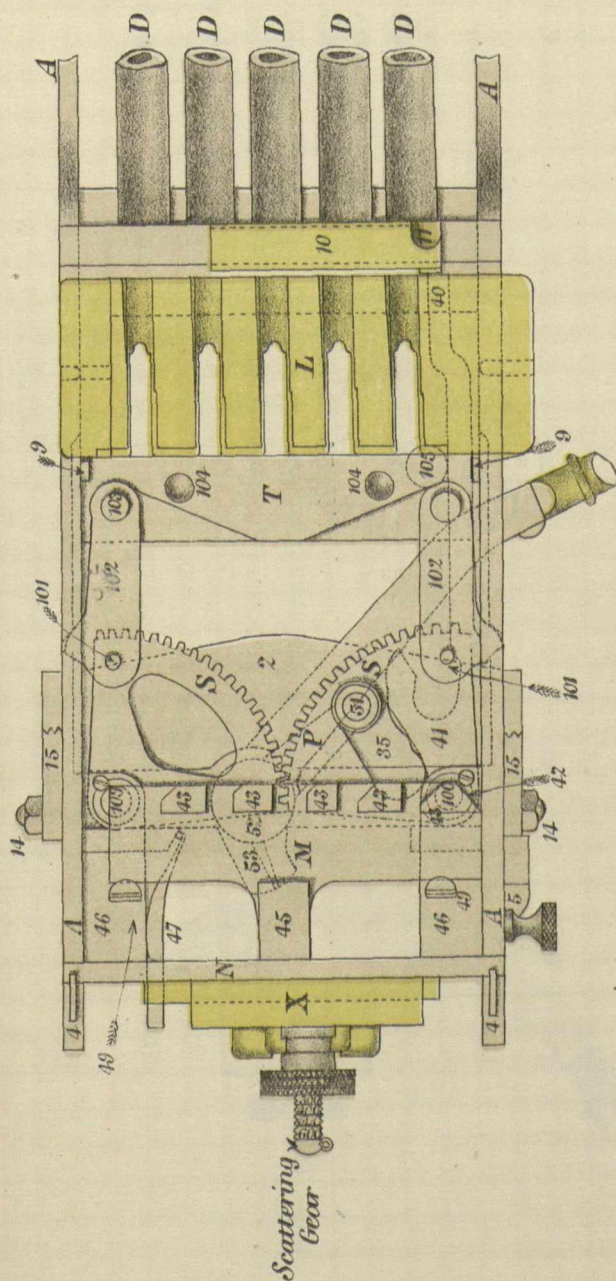
Link bar.
Cartridge
carrier
lever.

On the underneath side of the link bar a friction roller (105) is fitted for actuating the cartridge carrier lever (41) ; this lever is pivotted at its rear end, and a little in front of the pivot it is provided with a fork forming a cam into which the friction roller (105) on the link bar enters for working it. The front end fits into a slot formed under the cartridge carrier, thus the motions of the lever are communicated to the carrier.

Cartridge
carrier.

The cartridge carrier, L, is made of metal and provided with five open channels into which the cartridges are fed as required and through which the empty cartridge cases are extracted

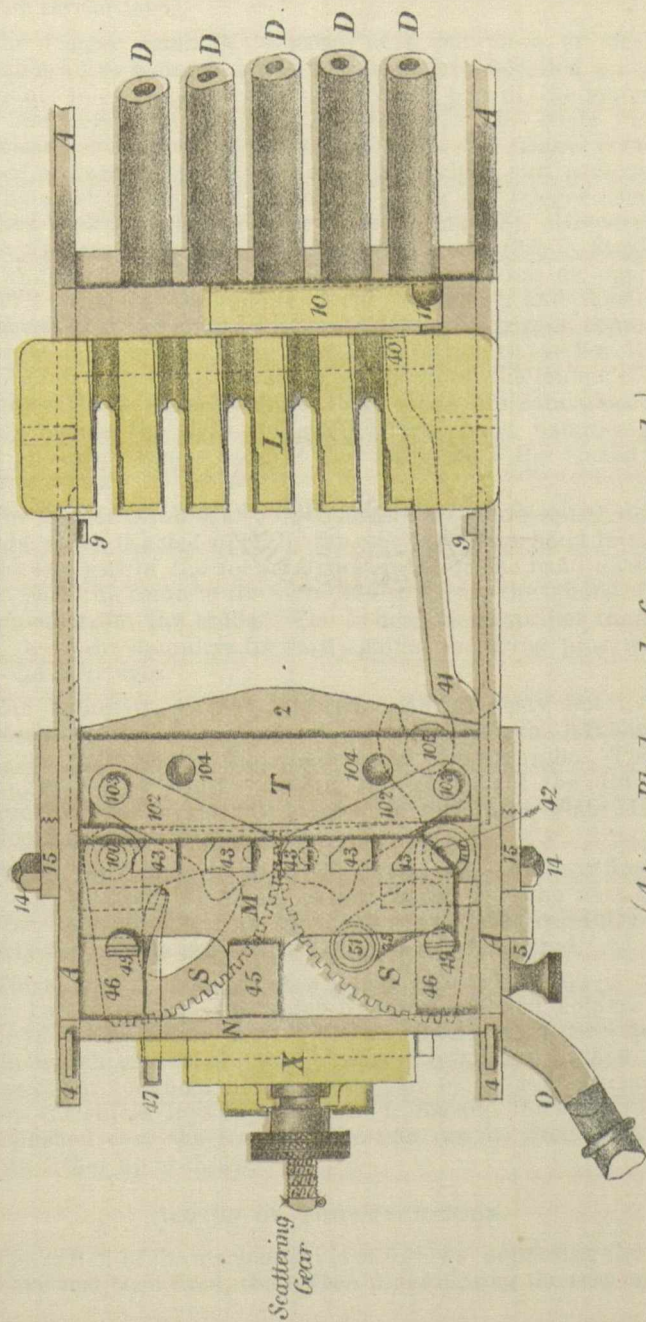
.45 INCH, 5 BARREL NORDENFELT GUN. MARK I.
PLAN OF MECHANISM FOR WORKING ACTION BLOCK.



(Action Block and Cover removed.)

Scale $\frac{1}{4}$ of Full Size.

.45 INCH 5 BARREL NORDENFELT GUN. MARK I.
PLAN OF MECHANISM FOR WORKING ACTION BLOCK.



(Action Block and Cover removed.)

Scale: $\frac{1}{4}$ of Full Size

after firing. The carrier has a slight lateral motion given to it by the carrier lever.

The trigger comb (M) consists of a flat piece of steel on which are five hammer studs (43), these are bevelled on their left sides to correspond with the bevelled part of the tenons of the hammers; when the hammers strike the studs in the backward movement of the action block the trigger comb is forced against its spring (48) over to the right, and as soon as the hammer tenons have passed the studs the trigger comb is pushed back to its left position by the spring (48). However, to meet the case of damage to this spring, a cam (32) is fitted on the underneath side of the action block, which has an opposite bevel to that on the tenons of the hammers; and it will be observed that the right hammer stud on the trigger comb has its right side bevelled in an opposite direction to the bevellings on the left sides of all the studs, so that after the tenons of the hammers have passed behind their studs this cam piece (32) acting against the right side of the right hand hammer stud will push the trigger comb to the left even if the spring (48) fails to do so.

Trigger
comb.

The trigger comb is also fitted with a piece projecting downwards which is acted upon by the rear end of the hand lever, O, at the last part of the forward movement of the hand lever, so as to push the comb to the right and so release the tenons of the hammers from the studs. The helical main springs then act and drive the hammers forward against the firing pins which fire the cartridges.

The hammers are not released simultaneously but in the following order; 1st, the centre hammer; 2nd, the left centre; 3rd, the right centre, 4th, the left and 5th the right. This is arranged for by simply making the lengths of the different hammer studs vary, as will be seen by examining Plate III., or by looking at the trigger comb.

With a rapid movement of the hand lever, O, the difference in time between the firing of one barrel and the next is of course inappreciable, but by moving the lever carefully and slowly the barrels can be fired successively if desired.

The shield, V, consists of a $\frac{1}{4}$ -inch steel plate, and is fitted with two revolving pins which fit into the shield holders (12) secured to the frame, A. When the shield is up two spring bolts, which are fitted "right" and "left," are pushed into recesses cut for them in the lower part of the holders; when down the shield lays on top of the frame and the spring bolts are pushed over the frame. The gun can be fired with the shield either up or down.

Shield

ACTION OF THE MECHANISM.

The action of the mechanism is as follows: supposing the gun to have just been fired, the breech plugs closing the rear end of

the barrels and the action block still being secured in its place by the locking projections on the links.

1. The hand lever, O, begins to move to the rear and allows the trigger comb spring to push the trigger comb over to the left; the friction roller (51) of the action lever, P, traverses the concentric part of the action cam (35) and no motion of the breech block takes place.

2. The friction roller on the action lever next presses on the side of the action cam and moves the quadrants, this removes the locking projections on the links from their slots in the frame; then, by continuing the backward movement of the hand lever, the quadrants pull the link bar and action block to the rear, the extractors draw out the empty cartridge cases which fall through the openings of the cartridge carrier.

3. As soon as the breech block has moved far enough to the rear to remove the breech plugs clear of the cartridge carrier, the friction roller (105) underneath the link bar bears against the forked lever (41) and so pushes the cartridge carrier to the left, thus placing its recesses under the openings in the cover and allowing five fresh cartridges to fall into the carrier.

At the same time the bevelled side of the tenons of the hammers press against the bevelled side of the studs on the trigger comb and thus carry it to the right; as soon as the tenons of the hammers are past the studs the trigger comb is pushed back to the left by its spring or by the triangular cocking piece (32) in case of failure of the spring.

The handle next moves forward with the following effect:—

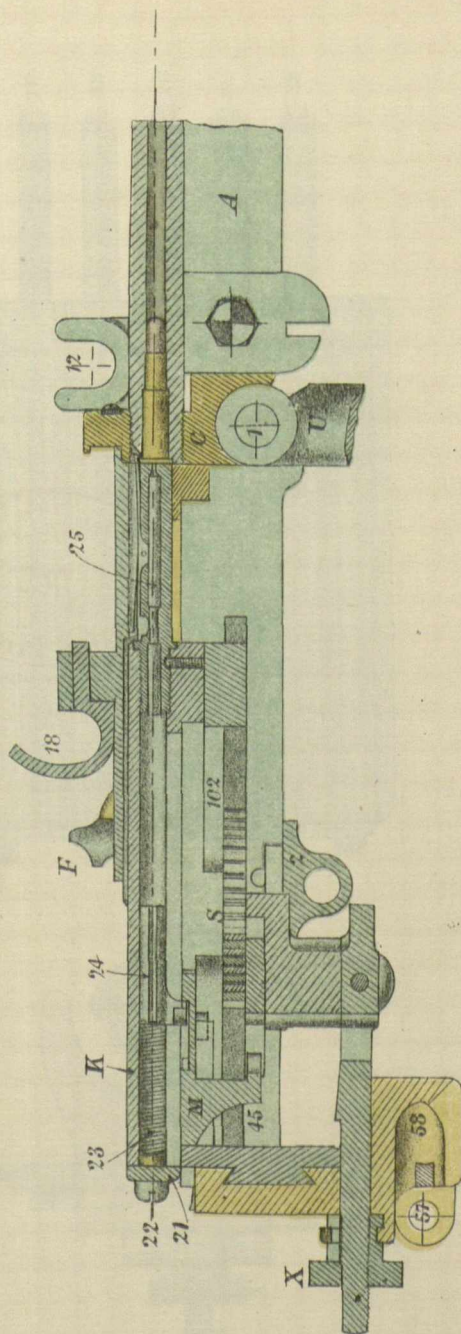
1. The action block moves forward by the action of the friction roller (51) on the action lever pressing against the opposite side of the action cam (35) and so working the quadrants; the tenons of the hammers are held by the studs on the trigger comb. The friction roller (105) underneath the link bar, T, bearing against the forked lever (41) pushes the cartridge carrier to the right, thus placing the cartridges in line with the barrels, into which they are pushed by the advancing breech plugs.

2. When the action block has been carried forward to its full extent, the quadrants continue to move until the projections on the links (102) have entered the slots in the frame for the purpose of locking the action block from rearward movement.

3. During the further forward movement of the hand lever the friction roller (51) moves in the concentric part of the action cam, so that the quadrant is unaffected; the trigger finger (53) takes against the firing piece and moves the trigger comb to the right and fires the cartridges successively in the order before mentioned.

.45 INCH 5 BARREL NORDENFELT GUN MARK I.

LONGITUDINAL SECTION, HAMMERS COCKED.

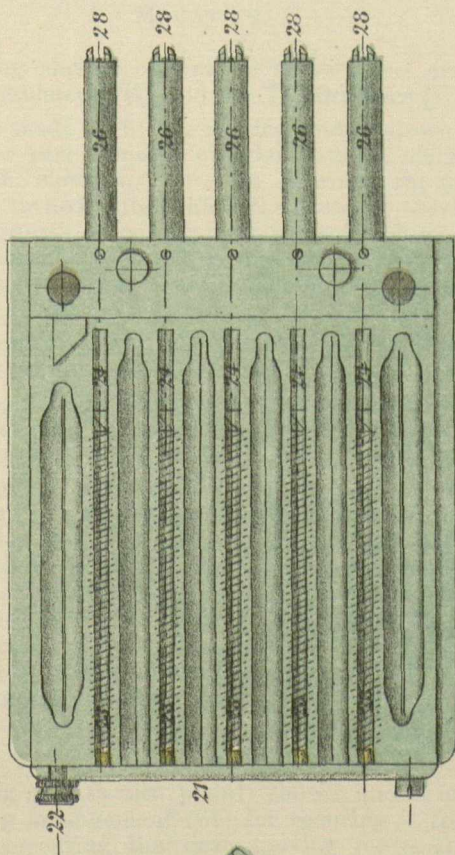
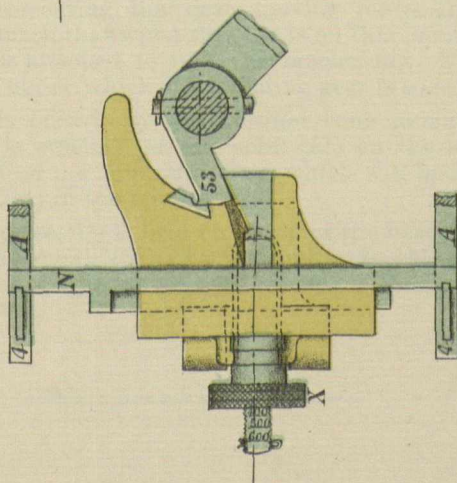


Scale 3" = 1 Foot.

.45 INCH 5 BARREL NORDENFELT GUN MARK I.

UNDER PLAN OF ACTION BLOCK.

For Scattering



Scale, 3"-1 Foot.

MOUNTING.

The mounting consists of three principal parts, namely, the cone (Q), the headstock (R), and the T-joint piece (U).

The cone is made to fit the service holding-down ring, and has at its lower part a smooth circular bearing, on which the lower part of the elevating gear rests. Through the axis of the cone a hole is turned, into which the stem of the headstock fits, and underneath a locking ring is provided to fit into a recessed ring turned on the end of this stem. When the locking ring is in place, it is held from movement by the spring bolt (54).

Round the upper edge of the cone the worm wheel (56) is formed for the training worm (66) to fit into.

The headstock, R, is a gunmetal casting, on to which are attached the elevating and training gear. In the top a hole is bored to receive the spindle of the T-joint piece (U).

The headstock can revolve on the top of the cone, but is held from lifting by the clamp screw (55). This clamp screw gears into a dovetailed piece of steel, which fits into an undercut circle on the top of the cone. The clamp screw can, of course, be tightened to prevent movement, if necessary; but, under ordinary conditions, it is slackened sufficiently to permit of training with ease. It will thus be seen that there are two arrangements to prevent the headstock from lifting, namely, the locking ring and the clamp screw (55).

The training gear is clearly shown in Plate I., and consists of the wheel (65), worm (66), and connecting shaft (67).

The elevating gear is also plainly shown, and it is supplied with a clamping arrangement (64) for securing it from movement, or for preventing the gear moving too easily. It is necessary to remark that when the gun is on this mounting the elevating gear is attached to it at the bracket (2). This is the only condition under which the elevating gear is so attached.

If the gun is placed on the Gardner cone mounting, the elevating gear is attached at the point (57) on the scattering piece, X, and if on the field mounting (which will be described in detail hereafter) in the recess (58).

The T-joint piece (U) is held on to top of the headstock by a clamping arrangement (59), exactly similar to the gear (55) before described, and, to prevent its turning, a steady pin (not shown) is inserted.

(The letters and figures within brackets refer to the Plates.)

0.45-INCH 5-BARREL NORDENFELT GUN. (MARK II.)

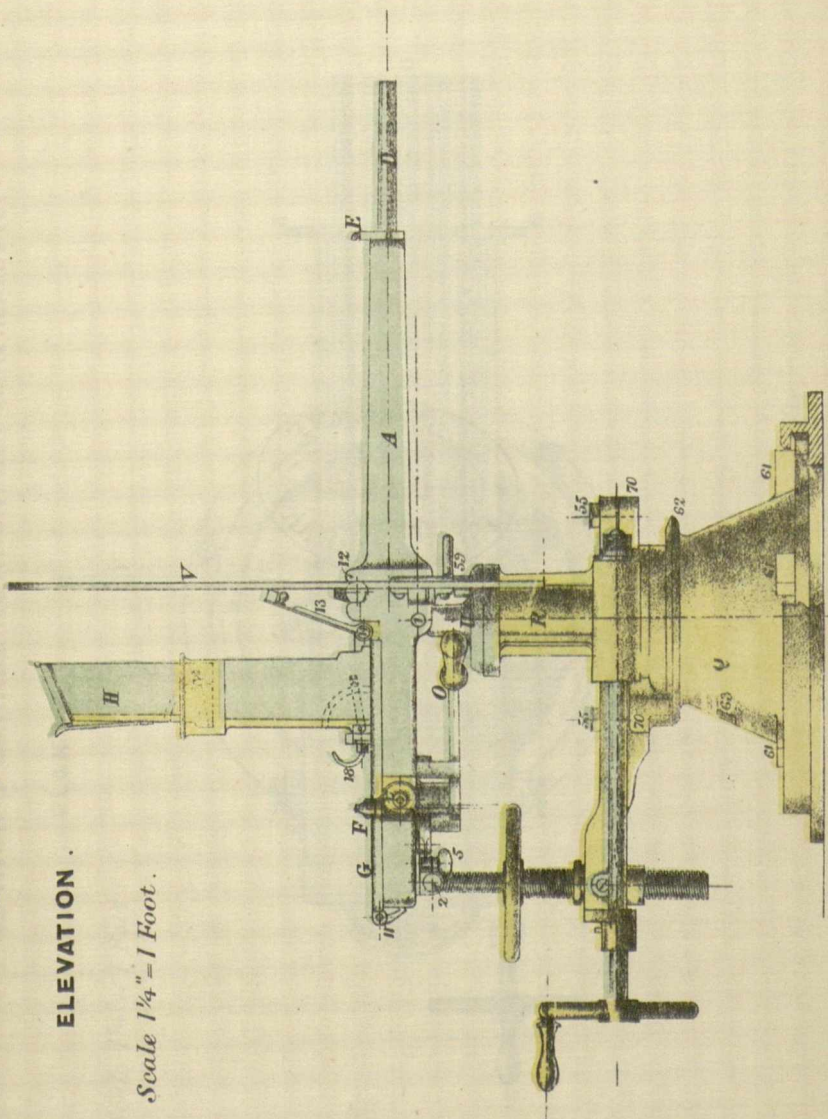
NOMENCLATURE.

- FRAME (A) - - - Joint pin (1); elevating bracket (2); chain and stud for hand lever; drill stop (5); shield holders (12); tangent sight brackets (4) with fixing screws.
- CENTRE CROSS-PIECE (C) Joint pin (14) for cover.
- BARRELS (D) - - - Breech; bore; muzzle; chamber; recess for cartridge rim; extractor slots; slot for securing.
- FORE SIGHTS (E) - - Right and left, with fixing screws.
- TANGENT SIGHTS (F) - Spring; pinion; milled head with taper pin.
- COVER (G) - - - Joint screw (14); hinge lugs (15); cover lock (11) with pivot screw and spring; cartridge guides (17); hopper catch (18) with screw; sand plate (13).
- DISTRIBUTOR (J) - - Cut-off lever and protecting arc; sighting hole.
- HOPPER (H) - - - Cut-off lever and protecting arc; lid; spring for lid with fixing screws.
- CARTRIDGE CARRIER (L) Guide slots.
- ACTION BLOCK (K) - Spring bar (21); trigger comb (M) with cocking cam (42); hammer studs; firing piece (45) and spring (48); lock springs (23); hammers (24); slot (27).
- BREECH BLOCK (B) - Breech plugs (26); firing pins (25); extractors (28) with fixing screws; bevelled cocking piece (32); cartridge carrier cams, right (41) and left (40); action cam (35).
- HAND LEVER (O) - - Handle.
- ACTION LEVER (P) - Friction roller (51) with stud and cross pin; trigger finger (53).
- SHIELD (V) - - - Fixing bolts, right and left.

·45 INCH 5 BARREL NORDENFELT GUN MARK II .

ELEVATION .

Scale $1\frac{1}{4}" = 1 \text{ Foot}$.



MOUNTING.

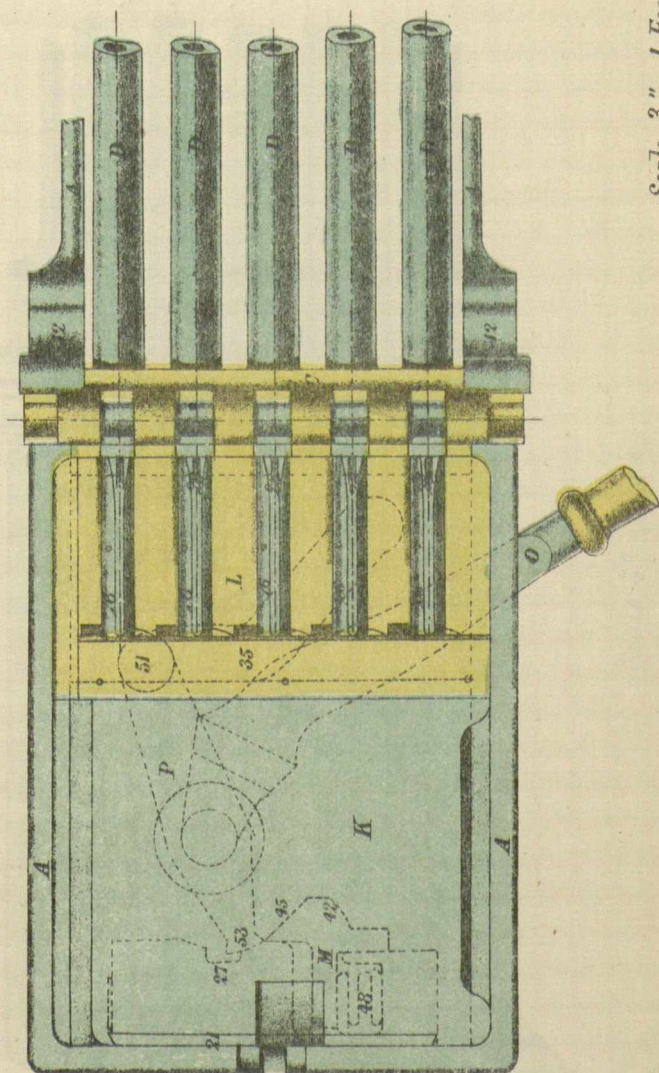
- CONE (Q) - - - Lugs (61); rim (62); locking bolt (63); worm wheel and spindle.
- HEADSTOCK (R) - - - Elevating and traversing gears; front and back clips (70); fixing screws for ditto (55); keeper plates and keeper pins—circular undercut groove.
- T-JOINT PIECE (U) - - - Clamping screw and hand nut (59).
-

DESCRIPTION.

- Frame.** The gun consists of a rectangular steel framework with the front and rear cross pieces and under plate in one piece. A centre cross piece (C) is fitted, into which the rear ends of the barrels pass.
- Barrels.** The five barrels, D, are placed side by side in the frame; their muzzle ends passing through the front cross piece fit into circular holes without any feathers.
- Each barrel is fitted with a projection at the rear end; across this projection a slot is formed for securing the barrel in place in the centre cross piece. The hinge lugs of the cover, G, fit into these slots, and when the hinge pin (14) is in place the cover and barrels are secured. It will be observed that this arrangement holds the barrels from either a backward or forward or twisting movement, and is quite different from the method adopted in the Mark I. guns.
- Foresights.** The foresights are "right" and "left," and are secured to the frame, A, at the front end by two screws.
- Tangent sights.** The tangent sights work in brackets, which are attached to the frame by screws; the right sight is graduated up to 1,600 yards, and is shorter than the left one, which is graduated to 2,000 yards. The shorter sight on the right is necessary in order to keep it clear of the hand lever.
- The spare sight is marked up to 2,000 yards, and if required on the right of the gun it must be cut to the same length as the existing right sight.
- Cover.** The cover, G, is fitted with five hinge lugs, which fit into the centre cross piece and into the slots in the rear ends of the barrels; a hinge pin (14), which is screwed in, forms an axis for the cover to move upon and secures the barrels.
- A lock (11) is fitted to secure the rear end of the cover to the rear cross piece.
- A dust plate is provided to cover the openings for the cartridges when the distributor is not in place or when the gun is not in use.
- Distributor** The distributor, J, fixes on the cover and is held in place by the locking catch (18). When in place the five compartments of the distributor are immediately above the five cartridge guides (17) in the cover. The same remarks as are made for the distributor in the Mark I. gun apply here.
- Hopper.** The hopper is identical with that for the Mark I. gun and is interchangeable.
- Action block.** The action block, K, (*see* Plate IX.) occupies the space between the cartridge carrier, L, and the rear cross piece, and exactly fills this space. Unlike the action block in the Mark I.

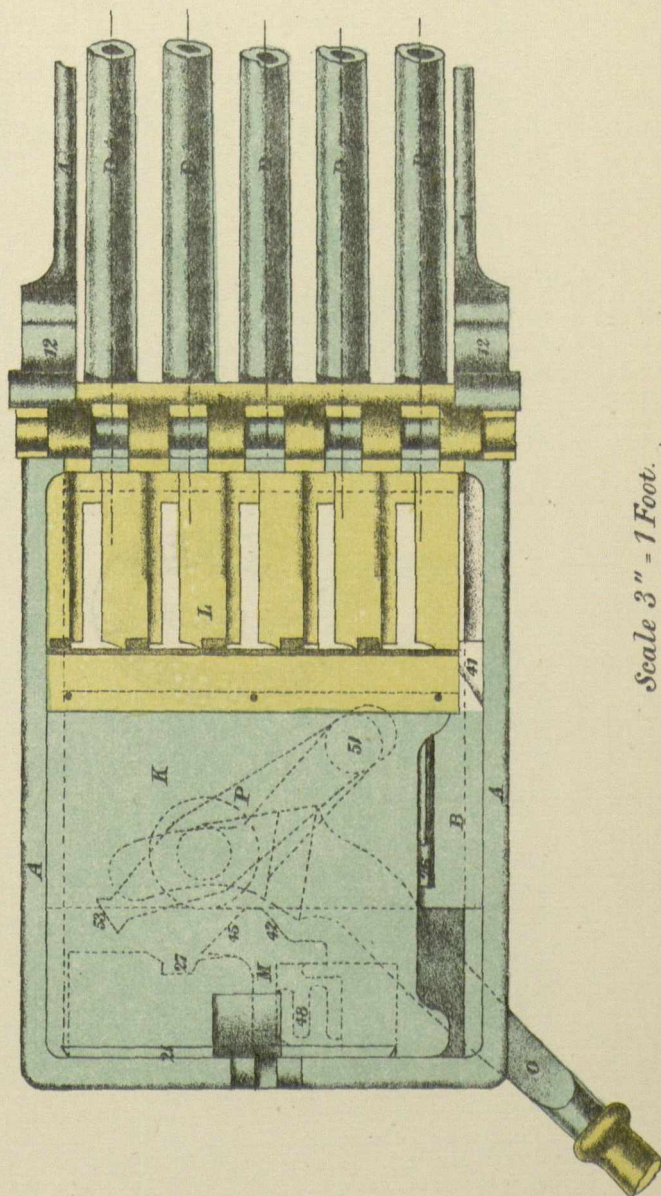
.45 INCH 5 BARREL NORDENFELT GUN MARK II.
POSITION OF ACTION FOR FIRING AND EXTRACTING

(COVER REMOVED.)



Scale 3" = 1 Foot.

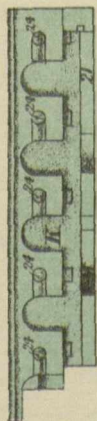
.45 INCH 5 BARREL NORDENFELT GUN MARK II.
POSITION OF ACTION FOR LOADING.
(COVER REMOVED)



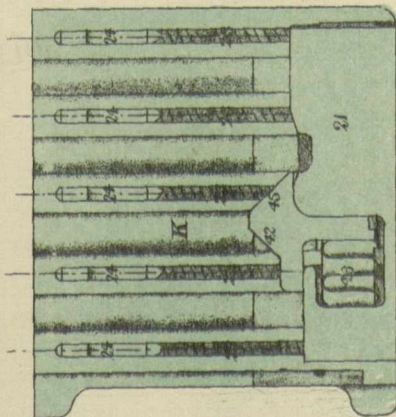
Scale 3" = 1 Foot.

·45 INCH 5 BARREL NORDENFELT GUN MARK II.

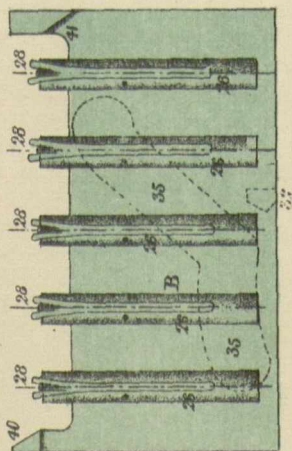
END VIEW OF ACTION BLOCK.



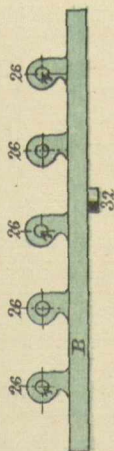
UNDER PLAN OF ACTION BLOCK.



PLAN OF BREECH BLOCK.



END VIEW OF BREECH BLOCK.



Scale 3" = 1 Foot.

gun, it has no backward or forward movement, but is made to move a slight distance to the right and left. This is in order to give support to the breech block at the moment of firing.

At the rear end of the action block the spring bar (21) is secured by being dove-tailed into the block; the spring bar holds the trigger comb, M, and the trigger comb spring (48). Within grooves in the action block the helical springs (23) and the hammers (24) are carried.

A slot (27) is fitted, into which the tail of the action lever, called the trigger finger (53), enters and carries the action block over to the right, just previously to firing the gun, by acting on the firing piece (45). This movement of the action block to the right places it behind the breech block, to which support is thus given against the back thrust exerted by the explosion of the powder. The trigger comb acts in precisely the same manner as in the Mark I. gun, but the cocking cam (42) is provided on the firing piece (45); this is to ensure the movement of the trigger comb to the left, in case of failure of the spring (48).

The breech block consists of a plate of steel, on which the breech plugs are carried. These breech plugs are fitted with extractors (28) and firing pins (25), as previously described. A small bevelled cocking piece (32) is fitted to act on the cam (42) of the trigger comb, to push it to the left. Breech block.

The action cam (35) is cut out of the plate, and in this cam the friction roller (51) of the action lever travels to give the required motion to the breech block.

Two cams (41), on the right and (40) on the left, impart the requisite lateral motion to the cartridge carrier, L.

The cam (41) moves the carrier to the left at the last part of the backward movement of the hand lever, O, and the cam (40) replaces it to the right on the commencement of the forward movement.

The action lever, P, works on the upper side of the under plate and on the same axis as the hand lever, O. One end is provided with a friction roller (51), which works in the action cam (35), formed in the breech block; the other end is the trigger finger (53), which serves, first, to carry the action block to the right before firing; and, secondly, to actuate the trigger comb, and so release the tenons of the hammers. Action lever.

The barrels are fired in the same order as in the Mark I. gun.

The arrangement and fitting of the shield is the same as for the Mark I. gun. Shield.

ACTION OF THE MECHANISM.

The action of the mechanism is as follows:—Supposing the gun to have just been fired, the breech plugs closing the rear

end of the barrels and the action block to be over to the right.

1. The handle, O, begins to move to the rear, and allows the trigger comb spring to push the trigger comb over to the left; the friction roller (51) of the action lever, P, traverses the concentric part of the action cam (35), and no motion of the breech block takes place.

2. The trigger finger (53) then enters the slot (27) and carries the action block to the left. As soon as the action block has been moved over to its extreme position the friction roller on the action lever enters the straight part of the action cam, and the continued movement of the hand lever brings the breech block to the rear underneath the action block; the extractors draw out the empty cartridge cases, which fall through the openings in the cartridge carrier.

3. As soon as the breech block has moved far enough to the rear to remove the breech plugs clear of the cartridge carrier, the cam (41) acting on the latter moves it to the left, thus placing its recesses under the openings in the cover, and allowing five fresh cartridges to fall into the carrier. At the same time the rear edge of the breech block presses the hammers back, until the bevelled edges of the tenons acting against the bevelled edges of the hammer studs on the trigger comb move it over to the right until the tenons are behind the studs, when the spring drives the trigger comb back to the left.

Should the spring fail to act the trigger comb is pushed to the left by the cocking piece (32) acting on the cam (42).

The handle next moves forward with the following effect :—

1. The breech block moves forward by the action of the friction roller on the action lever, leaving the hammers held by the trigger comb. The cam (40) on the breech block drives the cartridge carrier to the right, thus placing the cartridges in line with the barrels, into which they are pushed by the advancing breech plugs.

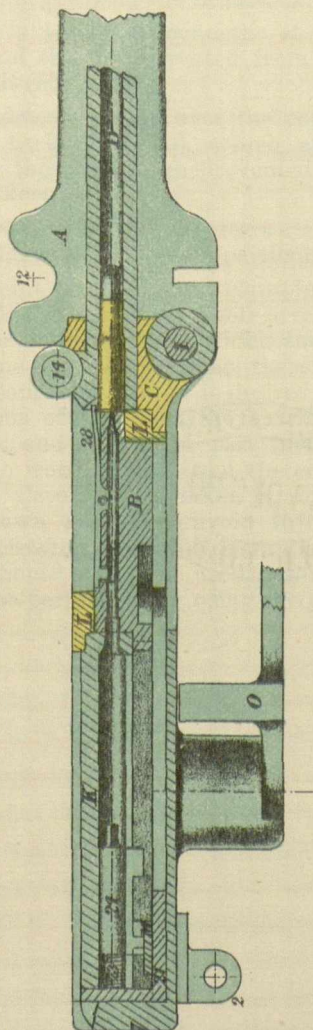
2. The breech block having been carried forward to its full extent, the friction roller enters the concentric part of the action cam, whilst the trigger finger engages in the slot on the action block and carries it to the right, thus placing the action block immediately behind the breech block to support it.

3. Next the trigger finger leaves the slot and comes into contact with the firing piece (45), and so carries the trigger comb to the right and fires the cartridges successively in the order before mentioned.

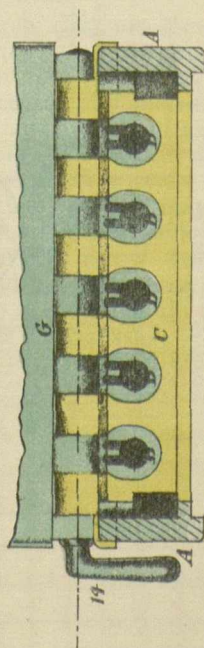
MOUNTING.

The mounting consists of three principal parts, namely, the cone, Q, the headstock, R, and the T-joint piece, U, *see* Plate VII.

·45 INCH 5 BARREL NORDENFELT GUN MARK II.
LONGITUDINAL SECTION, HAMMERS COCKED.



SECTION OF FRAME, SHEWING BREECH END OF BARRELS.



Scale 3" = 1 Foot.

The cone is made to fit the service holding-down ring, and has at its lower part a number of lugs (61), by which it may be turned either for screwing it up or unscrewing it from the ring.

A ring (62) is also provided to act as a support for the elevating bracket from the headstock.

Into the axis of the cone the stem of the worm wheel is screwed, and this is prevented from turning by means of the locking bolt (63).

The headstock, R, fits over the cone, and is provided with front and back clips (70), which are held in place by the bolts (55); these bolts are prevented from turning by locking plates and keep pins.

The elevating and training gears are sufficiently clearly shown in Plate VII. as to require no particular description.

The T-joint piece (U) and clamping screw (59), are similar to the Mark I. mounting in their arrangements, but the dimensions of the holes through which the joint pin (1) passes, are not the same for the two guns, therefore these joint pieces are not interchangeable. If it is desired to lift the gun and headstock, R, out of the cone, the locking bolt (63) must first be withdrawn, and the upper part turned, so as to unscrew the stem of the worm wheel from the cone, then the gun may be lifted out. Care must be taken in replacing this gear to lower the gun down gently, to avoid injury to the screw thread. When unscrewing the cone from the holding down ring, the lugs (61) should always be used, and on no account should this operation be performed by using the gun as a purchase.

INSTRUCTIONS TO BE OBSERVED WHEN WORKING THE GUN.

The gun is always to be examined before firing to ascertain:—

1. That the extractors are in working order and not broken.
2. That the ends of the firing pins are not broken, and that the pins themselves are not set fast by rust or other cause.
3. That the trigger comb works properly.

Extractors.—If an extractor is broken, it should be replaced by a spare one; this is done by pressing down on the extractor near the fixing screw and removing the screw.

The new extractor must be held down in a similar manner while replacing the fixing screw.

Care must be taken to see that the firing pin is forward before putting in a new extractor. Failure to extract an empty cartridge case may be due to any one or more of the following causes:—

- (a) Extractor claw broken, damaged or worn.
- (b) Extractor spring too weak.
- (c) Injury to the rim of the cartridge case.
- (d) Complete tearing off of the cartridge rim.

In the cases *a* and *b* the extractor must be shifted.

The test for the strength of the extractor spring is that it should require a pull of not less than 6 lbs., applied at the front end to lift the claw.

If *c* is the cause the empty cartridge case may be removed by forcing it out with the cleaning rod from the muzzle end. In the case of *d* it will be necessary to use the *clearing plug*; this is done as follows:—Remove the cartridge carrier and push the plug in at the breach until the barbed end springs out in front of the cartridge case, then tap it back with the cleaning rod from the muzzle end, or strike the handle of the plug *close down to the bend* with a hammer or screw-driver.

Failures to extract are generally found to be due to dirt or dryness of the chamber in the gun; therefore before commencing to fire, the chambers should be well oiled; verdigris on the cartridge case will tend to make the empty case stick.

If it is practicable it will be found a good plan to lightly oil the cartridges over before use; when this is done failures to extract rarely occur.

Whenever an opportunity presents itself during the practice the chambers should be re-oiled.

When firing, the lever must be drawn fully backwards and forwards until brought to a stop. The men should be taught to make a slight pause both at the end of the forward and

backward motion, so as to obviate the danger of hangfires, and give the springs time to act.

Firing pins.—These should be examined before firing to see that the ends are uninjured, and each one should be pressed in with the thumb to ascertain that it is not set fast.

If the end is injured the firing pin must be shifted, and in order to do this the extractor need not be removed.

With the Mark I. gun the spring bar (21) must be removed, and the brass drift used to push out the firing pin, hammer and helical spring; after which a new firing pin is inserted at the rear end, and pushed forward by the hammer and spring.

Mark I. gun.

With the Mark II. gun it is only necessary to take out the breech block, and force the firing pin out with the brass drift, when a new pin can be inserted.

Mark II. gun.

Trigger Comb.—The efficient working of the trigger comb can be ascertained by pulling the hand lever back to the full extent and then pushing it forward, releasing each hammer in succession. If the trigger comb spring is broken or weak it should be replaced when an opportunity offers but the gun should work efficiently even when this spring is absent. This has been previously explained.

Drill Stop.—Care must be taken to see that the drill stop does not fall down during practice, otherwise the hammers will not pass the trigger comb studs and the gun cannot be fired.

When the gun is being used for drill purposes the drill stop may be put up while the mechanism is being worked to explain the action and the method of examining the gun, but in the ordinary course of drill it is to be invariably kept down to save the springs, hammers, and firing pins from injury.

Hammers and Springs.—To remove a hammer or spring in the Mark I. gun, it is only necessary to throw back the spring bar and then pull out the spring, and push the hammer out by its tenon. The action block must be lifted out of the gun if a hammer has to be removed but not for a spring.

Mark I. gun.

With the Mark II. gun the action block must be removed, and the spring bar driven off by hammering it out of its dovetailed seat, care being taken to place a piece of wood between its edge and the hammer used for driving it out.

Mark II. gun.

Barrels.—To remove the barrels from the Mark I. gun the front cross piece must first be taken off, when any barrel can be unscrewed.

Mark I. gun.

With the Mark II. gun the hinge pin (14) of the cover G must be unscrewed and removed, the cartridge carrier, breech block and action block must be taken out, then any particular barrel can, by tapping at the muzzle with a piece of wood, be pushed out to the rear.

Mark II. gun.

WEIGHTS AND DIMENSIONS.

	Mark I.	Mark II.
Weight of gun - - - - - lbs.	154	133
" " cone mounting - - - - - "	143	160
" " shield - - - - - "	65	69
" " distributor, empty - - - - - "	10	10
" " hopper, empty - - - - - "	5	5
Total weight - - - - - "	377	377
Weight of distributor, filled - - - - - "	16	16
" " hopper - - - - - "	11	11
Barrels, number - - - - - "	5	5
" calibre - - - - - ins.	0.45	0.45
" extreme length - - - - - "	28.5	28.5
" length from base of } bullet to muzzle } - - - - - calibres	59.1	59.1
Rifling, description of - - - - - "	" Henry "	" Henry "
" number of grooves - - - - - "	7	7
" twist, uniform- - - - - "	1 in 22 ins.	1 in 22 ins.
Length of gun, hand lever forward - - - - - ins.	46	42.5
" " " back - - - - - "	50.5	42.5
Height from bottom of cone to centre of } barrels } - - - - - "	22	21.375
Elevation, extreme - - - - - "	16°	24°
Depression " - - - - - "	32°	48°

AMMUNITION (Gardner-Gatling).

Projectile, nature - - - - -	Lead.
" weight - - - - -	480 grains.
Charge " R.F.G. ² - - - - -	85 " "
Cartridges, number in box - - - - -	680.
Weight of box, filled - - - - -	92 lbs.

The following spare parts and implements are supplied with each gun :—

SPARE PARTS.	Mark I.	Mark II.
Barrels - - - - -	1	1
Distributors - - - - -	1	1
Extractors - - - - -	10	10
Hammers - - - - -	2	3
Hand levers - - - - -	1	1
Pins, firing - - - - -	10	10
Screws, extractor - - - - -	10	10
Sights, fore, with fixing screw, left - - - - -	1	1
" " " " right - - - - -	1	1
*Sights, tangent, with split pin (spare) - - - - -	2	2
Springs, sight, tangent - - - - -	2	2
" spiral, brake - - - - -	—	2
" lock - - - - -	10	10
" trigger comb - - - - -	2	2

The articles marked * are interchangeable for both Mark I. and Mark II. guns.

IMPLEMENTS.										Mark I.	Mark II.
*Cans, oil	-	-	-	-	-	-	-	-	-	1	1
*Drifts, brass wire	-	-	-	-	-	-	-	-	-	1	2
Driver, screw	-	-	-	-	-	-	-	-	-	1	1
*Key, " for extractor screw	-	-	-	-	-	-	-	-	-	1	1
Key, gib	-	-	-	-	-	-	-	-	-	—	1
*Plug, clearing	-	-	-	-	-	-	-	-	-	1	1
Punch, pin of traversing spindle	-	-	-	-	-	-	-	-	-	1	—
Rod, cleaning	-	-	-	-	-	-	-	-	-	1	1
Spanner	-	-	-	-	-	-	-	-	-	1	—
Tommies, small	-	-	-	-	-	-	-	-	-	—	2

The articles marked * are interchangeable for both Mark I. and Mark II guns.

TABLE OF ALLOWANCES OF AMMUNITION AND EQUIPMENT WEIGHTS FOR NORDENFELT 0.45-INCH 5-BARREL GUNS.

Number of Guns.	Boxes, Mark XI.		Cartridges.		Equipment Weights (approximate).	Proportion of Cone Mountings and Field Carriages.*
	Number for each Gun.	Total Number.	Number for each Gun.	Total Number.		
1	15	15	10,200	10,200	Guns, &c. - - 0 3 2 0 Ammunition - - 0 12 0 2 Total - - 0 15 2 2	One cone mounting only.
2	12	24	8,160	16,320	Guns, &c. - - 0 7 0 0 Ammunition - - 0 19 0 26 Total - - 1 6 0 26	Two cone mountings and one field carriage.
3	10	30	6,800	20,400	Guns, &c. - - 0 10 2 0 Ammunition - - 1 4 0 4 Total - - 1 14 2 4	Three cone mountings and one field carriage.
4	10	40	6,800	27,000	Guns, &c. - - 0 14 0 0 Ammunition - - 1 12 0 6 Total - - 2 6 0 6	Four cone mountings and two field carriages.

* Gun Vessels and Gun Boats have no Field Carriages.

FIELD CARRIAGE.

The Field carriage is constructed to carry either—

- (a) The 0.45-inch 5-barrel Nordenfelt gun, Mark I.
 or (b) " " " " " II.
 or (c) " " Gardner " "

The body of the carriage consists of a wrought iron frame, A, formed to support the two steel ammunition drawers, B, and a wooden under box, C, which is fitted with a steel cover. The frame is partly covered with a steel sloping top or shield, D, on the rear side of which two brackets, E, and a hasp are fitted to stow the cartridge feeder of the Gardner gun when that gun is mounted.

At the rear end of the body is fitted the wire net receptacle, F, which is suitable for carrying light stores such as drag ropes; but this net arrangement is primarily a prolongation of the carriage intended to prevent the mounting from tilting backwards if the shafts are lifted high and let go. The frame, A, is rivetted to the axletree, which is slightly cranked to lower the centre of gravity of the load.

The wheels are four feet in diameter and have 2-inch tyres; the naves are of metal.

Lynch pins and washers of the ordinary service type are fitted so that drag ropes can be used.

A loop is forged at each end of the axletree for the attachment of the shafts by means of joint pins, and the shafts are further secured to the frame by the bands, G.

Two slats are provided and fittings on the shafts permit of their being readily shipped or unshipped; by this means four men can be stationed for holding up the shafts and pulling in addition to the men on the drag ropes.

When the slats are not in use they can be stowed on the sides of the carriage and secured by the straps, K.

The shafts are cased on three sides with steel to strengthen and protect them.

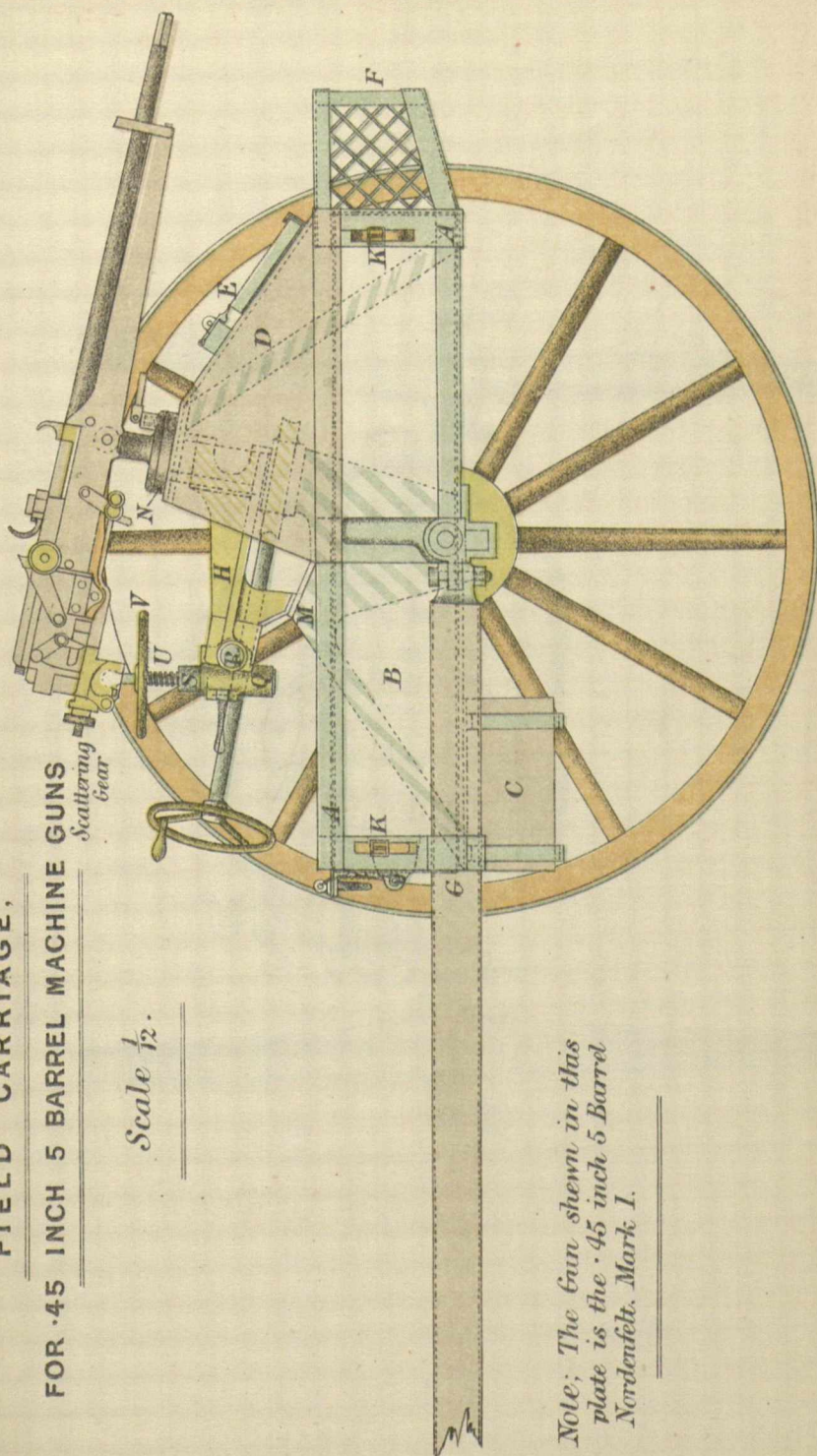
This field carriage is adapted to be drawn by horse power or by hand as required, and is provided with the means of carrying 1,200 rounds of ammunition ready placed in 24 Nordenfelt hoppers or Gardner holders.

The ammunition is carried in the two boxes or drawers, B, which are made "right" and "left"; each drawer contains 12 compartments for hoppers or holders and 3 additional compartments for tools and small stores. The front half of each drawer is fitted with a sliding lid which permits of access to half the quantity of ammunition carried (that is 600 rounds) without removing the drawer from the frame. When it is necessary to take ammunition from the rear half of the drawers

FIELD CARRIAGE,
FOR .45 INCH 5 BARREL MACHINE GUNS

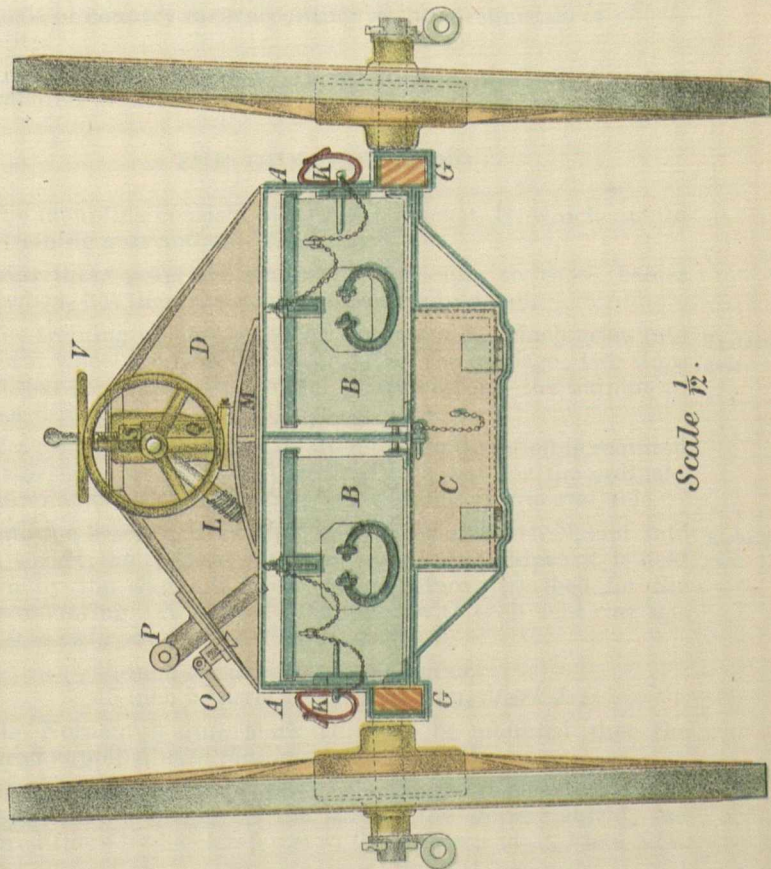
Scattering
Gear

Scale $\frac{1}{2}$.



Note; The Gun shown in this
plate is the .45 inch 5 Barrel
Nordenfält, Mark I.

FIELD CARRIAGE.
FOR .45 INCH, 5 BARREL, MACHINE GUNS.



Scale $\frac{1}{2}$.

they must be pulled out (and placed on the ground) as that portion is fitted with a hinged lid.

This arrangement of the ammunition stowage permits of an immediate supply being available with the least amount of delay and of getting at the whole of the hoppers by simply pulling out the drawers.

No limber is supplied for carrying extra ammunition as this can always be more conveniently done by means of pack animals or country carts according to the circumstances of the locality.

The wooden under-box, C, is intended for carrying two Nordenfelt distributors.

THE GUN MOUNTING.

The mounting consists of a metal bracket, H, which carries the training gear and elevating gear.

Both these gears are similar in principle to those before described, but there are some differences in detail.

The training is performed by the worm, L, which gears into a worm wheel arc fixed to a pedestal on the carriage; two stops are fitted on a supporting guide, M, which limit the training in either direction. Training gear.

If a considerable amount of alteration in direction is required the carriage must be turned by the shafts, but for the ordinary requirements of laying the gun the training gear is available.

Into the bracket, H, is fitted and keyed a socket, N, and into this socket the T-head for carrying the gun ships; it is held down by the clamp, O, precisely as before described for the cone mounting. A T-head is supplied with each field carriage, Elevating gear.
but it is only available for use with either

45-inch 5-barrel Gardner Gun, or

45-inch 5-barrel Nordenfelt Gun, *Mark I.*;

if the Nordenfelt gun, *Mark II.*, is to be mounted then the T-head supplied *with that gun* must be used.

In the latter case the T-head belonging to the carriage can be shipped into a fitting on the side of the sloping shield, and secured there by its clamp screw, O, as shown at P, Plate XIV.

The reason why one T-head will not suit all three guns is because the joint pin for the 5-barrel Gardner gun and Nordenfelt *Mark I.* gun is of a different diameter to that for the 5-barrel Nordenfelt *Mark II.* gun.

The elevating gear, K, consists of a sleeve, Q, hinged at R, into which the nut, S, fits; this nut is capable of being shifted up or down and clamped in any position within a travel of $5\frac{1}{2}$ inches; by this means the elevation can be rapidly altered when a considerable movement is necessary, instead of

having to run a screw up or down; within the nut, S, the elevating screw, U, works by the turning of the hand wheel, V. The screw is used for the final laying of the gun in a similar manner to the ordinary elevating gear at machine guns. It is important to note the method of attachment of the top end of the elevating screw to the gun.

This is different for each of the guns for which the carriage is designed.

1st.—For the **5-Barrel Nordenfelt Gun, Mark I.**, the end of the screw is spherical and fits into a recess in the scattering gear as shown in Plate XIII.; a pin is driven in behind the spherical head and the attachment forms a ball and socket joint.

2nd.—For the **5-Barrel Gardner Gun** the end of the elevating screw must be suitable for the pin and lugs with which that gun is fitted; therefore the spherical end of the screw is covered with an elevating socket *see* Fig. 1;

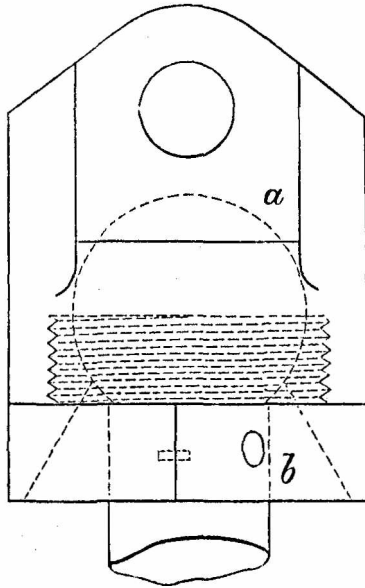


FIG. 1.

This elevating socket is made in two parts; the upper part *a* fits over the spherical end of the elevating screw, when, the lower part *b*, which is a screw nut (in halves) is screwed into it to complete the attachment. A keep screw (not shown) prevents the loosening of the nut *b*. The whole forms a ball and socket joint.

This fitting is always supplied, fitted in place, with the Field carriage, so that this particular adaptor *belongs to the carriage*.

3rd.—For the **5-Barrel Nordenfelt Gun, Mark II.** the elevating socket shewn in Fig. 2 is supplied *with the gun*, not with the carriage.

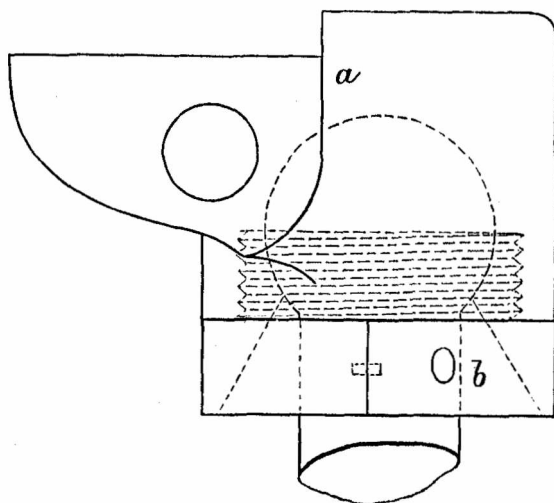


FIG. 2.

The fitting over the end of the elevating screw is exactly similar to that shewn in Fig. 1., but the exterior shape of the top piece, *a*, is made suitable to the requirements of the fittings on the Mark II. gun.

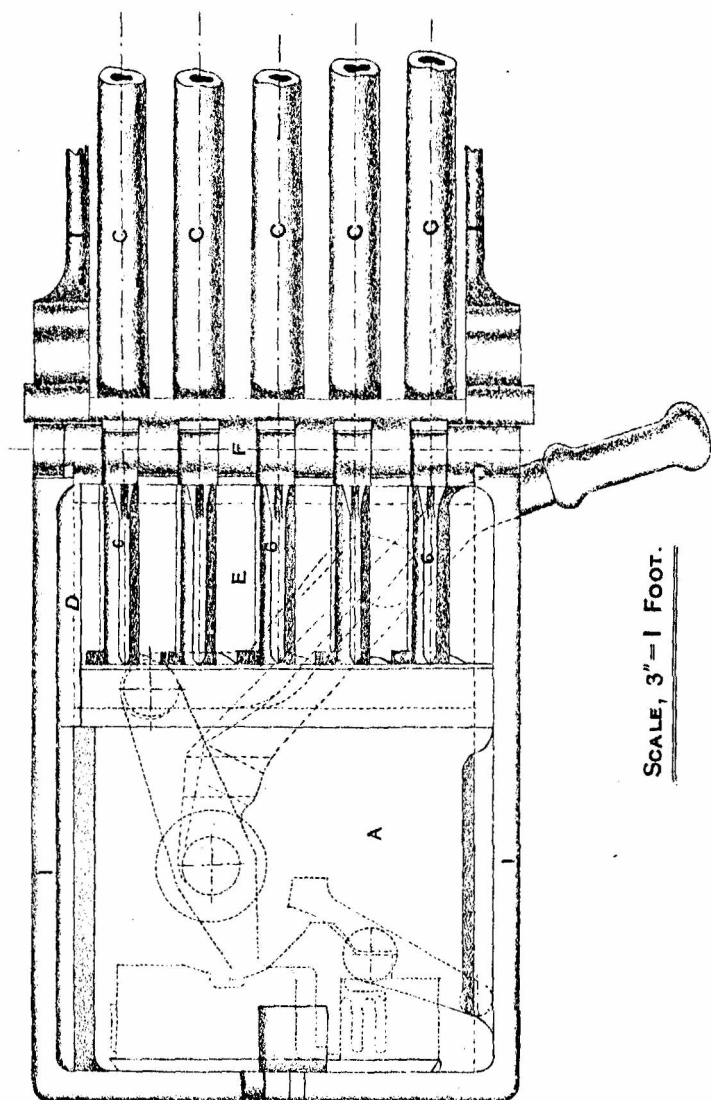
It may be observed that in the case of the Mark I. Nordenfelt gun, the elevating screw attaches to the scattering gear, since the use of this gear is undesirable, the nut, shown at the rear of the gun, should be screwed up to prevent its action.

WEIGHTS.					Gardner Gun.	Nordenfelt Gun.	
						Mark I.	Mark II.
Weight of Carriage (as supplied)	...	lbs.			812	812	812
Weight of Gun	...	...	...	...	290	154	133
" " Shield	...	...	...	...	77	65	69
" " 1,200 rounds of Ammunition in 24 hoppers or holders					210	264	264
" " 2 Distributors, empty	...	...			—	20	20
Total weight (equipped)	...	...	...	...	1,389	1,315	1,298

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MARK II.

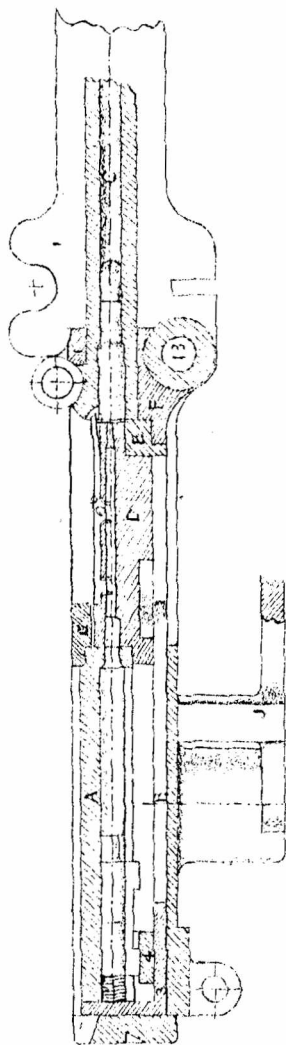
COVER REMOVED.



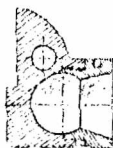
SCALE, 3" = 1 FOOT.

MARK II.

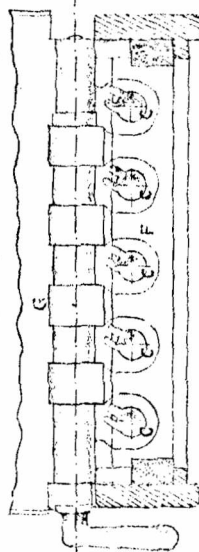
LONGITUDINAL SECTION, HAMMERS COCKED.



ELEVATING SOCKET



SECTION OF FRAME, SHEWING BREACH END OF BARRELS



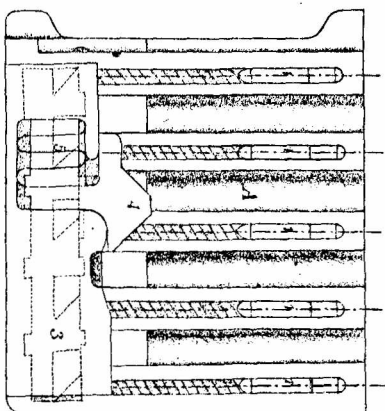
SCALE 3" = 1 FOOT.

MARK II.

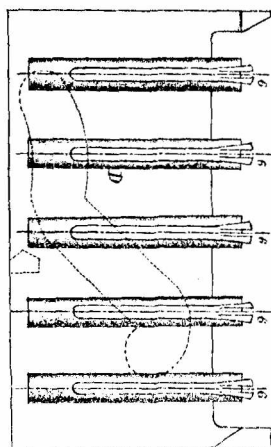
END VIEW OF ACTION BLOCK.



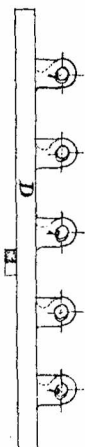
UNDER PLAN OF ACTION BLOCK.



PLAN OF BREACH BLOCK.



END VIEW OF BREACH BLOCK.

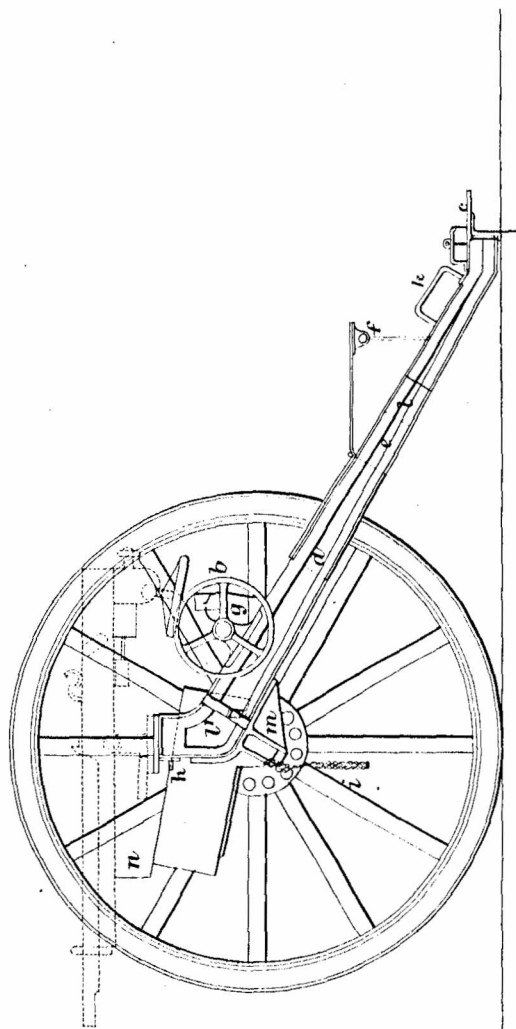


Scale 3" = 1 Foot.

CARRIAGE, LANDING, 0.45 INCH. NORDENFELT, 5 BARREL.

STEEL.

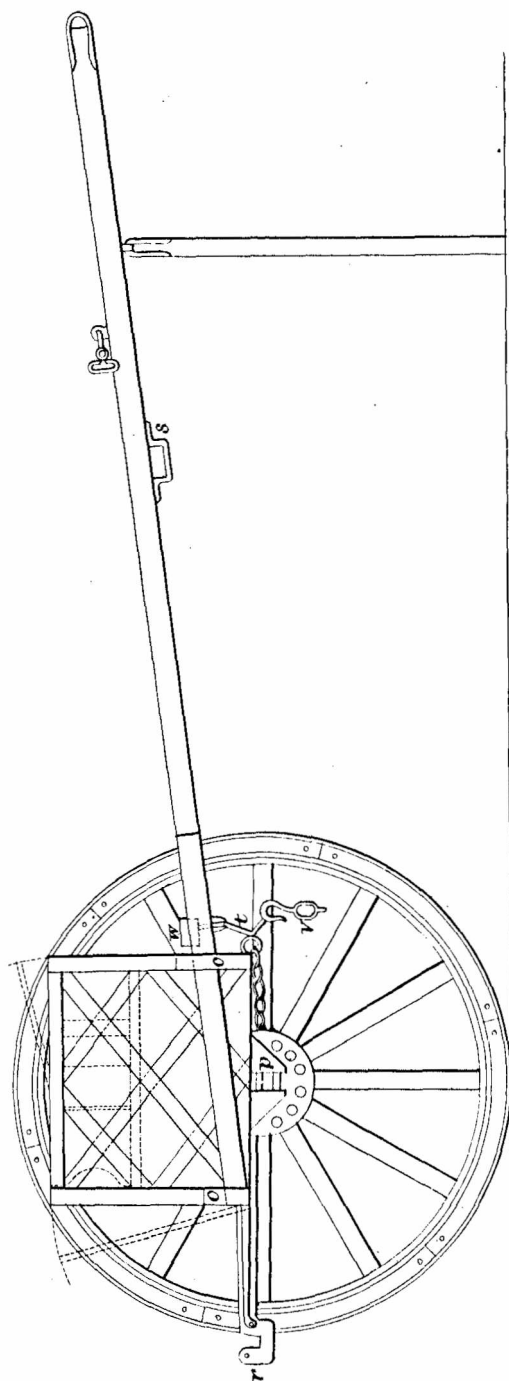
SCALE $\frac{1}{18}$ TH FULL SIZE,



LIMBER, LANDING, 0.45 INCH. NORDENFELT, 5 BARREL.

STEEL.

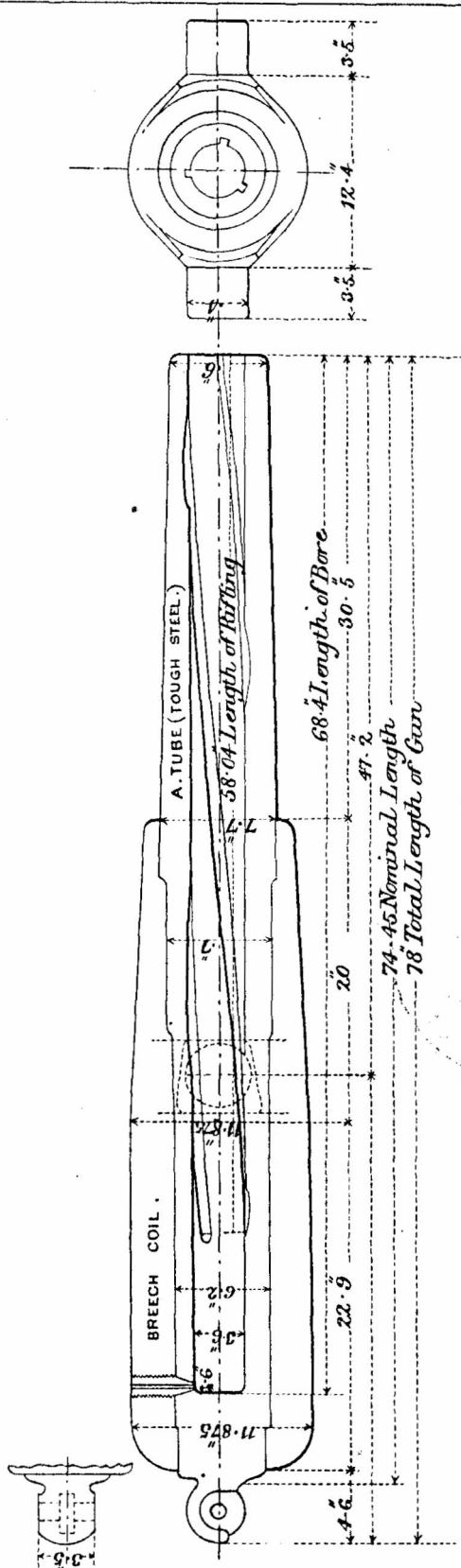
SCALE $\frac{1}{18}$ TH FULL SIZE.



Frontispiece.

ORDNANCE WROT IRON RIFLED MUZZLE LOADING GUN 16 PR 12 CWT MARK I.

WEIGHT..... 12 CWT. 0 QR. 11 LB.
PREPONDERANCE..... $7\frac{1}{2}$ LB.



Nº of Grooves 3.

Rifling an uniform twist of 1 turn in 30 Calibres.

SECTION OF GROOVE.

Full Size.