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# HANDBOOK

FOR THE

## 80-PR. RIFLED M.L. CONVERTED GUN OF 5 TONS, ON SLIDING CARRIAGE (LAND SERVICE).

1883.



LONDON:

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## MEMO.

This Handbook is correct up to 31 | 12 | 82.

## 80-PR. RIFLED MUZZLE-LOADING CONVERTED GUN.

### GUN AND SIGHTS.

#### Gun.

*See Frontispiece.*

Material	{	exterior	....	....	....	....	Cast iron.	
		tube	....	....	....	....	Wrought iron.	
Length	{	nominal	....	....	....	....	120 inches.	
		total	....	....	....	....	136.55 inches.	
Weight, nominal		....	....	....	....	....	5 tons.	
Preponderance		....	....	....	....	....	9.75 cwt.	
Bore	{	calibre	....	....	....	....	6.3 inches.	
		length	....	....	....	....	....	113.25 inches.
		capacity	....	....	....	....	....	3538 cubic ins.
Rifling	{	system	....	....	....	....	Woolwich.	
		twist	....	....	....	....	....	Uniform 1 in 401 calibres.
		length	....	....	....	....	....	106.25 ins.
		grooves	number	....	....	....	....	....
depth	....		....	....	....	....	0.145 inch.	
width	....		....	....	....	....	1.3 inch.	
Vent	{	material	....	....	....	....	Copper.	
		description	....	....	....	....	....	Radial.
		distance from end of bore	....	....	....	....	....	1.85 inches.

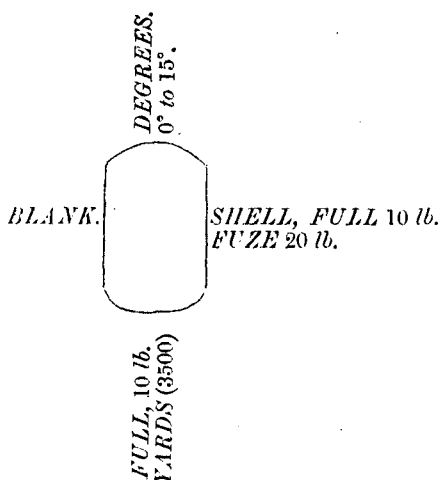
There is only one pattern of this gun, converted from the 68-pr. of 95 cwt. The system of conversion is the Palliser, and consists in boring out the cast iron gun to form a casing, and inserting therein a coiled wrought iron barrel, kept in position by an iron collar and a screw plug under the trunnions. This barrel is composed of a coiled wrought-iron A tube, upon the breech end of which is cut a spiral gas escape channel, over which a short coiled B tube is shrunk. The opening of this gas escape channel is to be found at the right top of the cascable.

The gun is vented in the original position with a through vent upset into an undercut recess, made to receive it.

#### Sights.

*Plate I.*

The gun is provided with two tangent scale sights, one on each side, graduated up to 15°, made of a rectangular steel bar, having a bronze cross-head fitted with a sliding leaf.



Mark II. or Mark I. altered to Mark II., tangent sights with deepened notch should be issued with this gun.

2 trunnion sights (one on each side), of the drop pattern, fit into gun-metal brackets attached to the gun over the trunnions by two screws.

## CARRIAGES, PLATFORMS, &C.

### Sliding Carriage.\*

The sliding carriage consists of two brackets of oak or teak, two African oak blocks to take the bearing on the platform, and a transom of oak or teak. An 8-inch metal roller to facilitate running up is secured in wrought-iron flanges, bolted upon the front of each bracket, an eye for the point of the handspike and a notch for a pawl is fixed in the rear of each bracket, to take a roller handspike for running up.

The weight of the carriages is as follows :—

Sliding casemate	....	....	15½ cwt.
Sliding dwarf	....	....	16½ "

The elevating screw is of the "ratchet head and lever" pattern.

### Traversing Platforms.

Traversing platforms are either casemate or dwarf, corresponding to sliding carriages, the difference being in the height to which the frame is raised. The same platform, dwarf or casemate, takes all natures of wood sliding carriages. The casemate platform weighs 27 cwt., the dwarf, 33½ cwt.

#### Casemate Platform.

It is made of teak, the casemate consisting of two sides, with cheeks, three transoms, one head block, four flanges and four trucks.

The sides are 16'×1'×1', placed 21 inches apart; the front trucks are 4½ inches in diameter, the rear trucks 12 inches; the platform is at a slope of 5°.

\* The wooden carriages are the same as those in use for the gun previous to conversion. Wrought Iron Carriages are not supplied.

*Dwarf Platform.*

The dwarf platform differs from the casemate in having a block which fits under the sides in rear. The front and rear trucks are 12 inches in diameter. A dwarf platform is readily converted into a casemate, or *vice versa*. The trucks can also be altered in position from one pivot to suit another.

*Compressor.*

The compressor supplied for use with wooden sliding carriages is termed the "wooden compressor," with the present service charges of the guns mounted on them the recoil is insufficient to necessitate its use.

## Pivots.

The pivots are as follows :—

Nature of Pivot.	Distance from Breast of Platform.	
	To front.	To rear.
	ft. ins.	ft. ins.
A. .. .. .	3 11½	..
B. .. .. .	0 2½	..
C. .. .. .	..	6 9
D. .. .. .	..	9 9
E. .. .. .	..	11 5½
F. .. .. .	..	13 8½

## PROJECTILES.\*

*Plate II.*

See List of Changes §§ 2925, 3899, 4083.

	WEIGHT.
	lb. oz.
Shells, common, Mark II. ....	{ empty.... .... 71 1
	{ filled, with 8 lb. 10 oz. burst- ing charge .... 80 0
Shells, Shrapnel, Mark IV. ....	{ filled, with 234 mixed metal bullets, 14 per lb., and 9 oz. bursting charge .... 79 6
Shot, case, Mark V.,† filled with 50 8-oz. sand shot, clay and sand ....	49 14½

N.B.—Spherical projectiles are not in future to be fired from rifled guns.

Common shells are used on land fronts against earthworks, buildings, &c. ; on sea fronts against shipping.

Shrapnel shells are used when the range is beyond the effective power of case shot ; on land fronts against bodies of troops, on sea fronts against boats.

Case shot is used for close quarters against troops or boats. Two can be used on emergencies at close quarters.

\* The projectiles of earlier Marks differ from the existing patterns in manufacturing details only.

† The Mark V. case shot is shown in Plate II ; the difference is slight.

## FUZES.\*

Plates III. and IV.

See Equipment Regulations.

Percussion,	{ Pettman, G.S. } { R.L., Mark II. }	} for use with common shells { sea fronts. } land fronts.
Wood, time,		

N.B.—Percussion fuzes can be used for Shrapnel, and time fuzes for common shells, in exceptional cases.

### INSTRUCTIONS FOR THE PREPARATION OF SHELLS AND FUZES, AND EXAMINATION OF FILLED SHELLS.

See Clause 160, Army Circulars, 1881.

#### Filling and Securing Shells. JUN 89

##### Common Shells.

Remove the plug from the fuze-hole, insert the leather funnel and pour in the bursting-charge; the shell should be tapped with a mallet or a piece of wood to ensure its being completely filled, just leaving room for the fuze if it is to be fuzed with a time-fuze, this can be ascertained by inserting a piece of wood the same size as the fuze; after filling the shell carefully wipe every portion of powder from the fuze-hole, then fix the fuze or plug as may be required.

In shells that are liable to be moved, or that are not required for immediate use, insert the wad, papier mâché, G.S., with the side on which the shallon is cemented downwards, *i.e.*, next the powder; drive it in with the "Drift, wood, G.S.," as far as the shoulder on the drift will allow, and then screw in the fuze or plug, as may be required.

##### Shrapnel Shells.

Remove the plug from the fuze-hole, and after seeing that the fuze-hole is clear of any dirt, &c., insert the leather funnel and pour in the bursting-charge. This must be done gradually, for if the whole of the powder is put in at once the tube will probably become choked. Shake the shell from side to side on its base, until the whole of the bursting-charge has passed down the tube, taking care that none of the powder is left at the bottom of the socket. Drop in the metal primer and, by means of the large diaphragm Shrapnel screwdriver, screw it tightly into the tube, and then screw in the fuze or plug as may be required.

\* See also List of Changes § 3740.

† A Mark II. fuze has been introduced; it differs from Mark I. in the method of marking the side-holes. See List of Changes, § 4045.

## Fixing Plugs and Fuzes.

When plugs or metal fuzes are screwed into shells they will be lubricated with Field's grease, No. 3, for stations at home and in B.N.A.; for other stations Price's composite grease is to be used.

Instances have occurred in which fuze-hole plugs of common shells have been so jammed in as to be immovable, in consequence of using the "Wrench, removing base plugs of Palliser shells." The "Key, iron, fuze and plug, G.S.," and the "Key, iron, plug, G.S." are the only implements which should be used for screwing in the G.S. plug.

## Distinguishing Marks.

All filled shells must be marked with the word "Filled" and date. The colour of the paint will be red on a black ground, or black on a red ground. At stations where means are available the monogram is to be painted.

## Storage of Filled Shells in charge of the Royal Artillery.

Filled shells will be piled.

## Preparing Wood Time Fuzes.

These fuzes are prepared for any desired time of flight by boring through the side-hole corresponding to the required time, into the composition.

When using the hook-borer place the fuze in the hook of the hook-borer in the proper position for boring the required hole: enter the bit into the side-hole, screwing up until the bit has entered as far as the borer will allow, taking care to press the fuze with the fingers so as to ensure its bedding fairly in the hook.

Unscrew, and, when the bit is quite clear, remove the fuze from the hook. The length of the bit is so regulated that, when placed in the handle, it will enter sufficiently far into the composition when screwed down to the shoulder. If the bit should become unserviceable, the handle must be detached from the shank and the tightening screw unscrewed, the square hole in the hook being made for that purpose. Care must be taken when substituting another bit that it is properly placed in the handle, and that the tightening-screw firmly presses upon it, for if any space be left between the handle and the head of the bit, the end will not enter a sufficient depth into the composition. The borer should be occasionally examined and cleaned. The operation of preparing the fuze and fixing it in the shell takes, on an average, about 15 seconds; with a little practice these operations may be performed in a shorter time. With the 30 sec. fuze, Mark I., a gimlet-borer must be used.

When using the gimlet-borer, hold the fuze in the hollow of the hand, insert the borer into the side-hole, pressing it in perpendicular to the axis of the fuze; when it has reached the bottom of the hole, use it as a gimlet to complete the communication with the composition, boring up to the handle, then pull the borer straight out.

## Fixing Fuzes.

*Fuzes, Percussion, Pettman, G.S.*

These fuzes require no preparation; they are simply screwed firmly into the fuze-hole by means of the "Key, iron, fuze and plug, G.S."

*Fuzes, Percussion, R.L.*

These fuzes require no preparation except the removal of the safety-pin; they are screwed firmly into the fuze-hole by means of the "Key, iron, plug, G.S."

The safety-pin will not be withdrawn until after entering the shell into the muzzle.

*Fuzes, Time, Wood, Boxer, Muzzle-Loading.*

These fuzes are fixed in the fuze-hole by screwing the fuze round by hand until it is held firmly in the fuze-hole, or by giving the head of the fuze two or three smart taps with a mallet, or suitable piece of wood; this operation should be performed fairly, and not so as to split or injure the top of the fuze: the fuze must not be uncapped until the shell is placed in the muzzle of the gun. These fuzes are "uncapped" by taking hold of the small end of the copper band, which is left exposed, and unwinding from left to right smartly, so as to thoroughly detach the band from the head of the fuze and to leave the priming fully exposed.

When firing at high angles of elevation with reduced charges, uncap the fuze as above, open out the priming, and wind about 10 inches of the guncotton round it, bringing the ends of the priming between the strands of guncotton; tie the two ends of the latter together leaving about two inches loose, then fix the whole firmly by tying over it a piece of silk.

**Extracting Wood Fuzes.**

Apply the fuze-extractor to the head of the fuze and unscrew.

**EXAMINATION OF FILLED SHELLS.**

Whenever it may be considered necessary to examine the interior of filled shells for rifled ordnance, and it is found that the powder is caked from the effects of damp, the shells, with the exception of the Shrapnel, will be emptied, cleaned out, and re-filled; the Shrapnel will be exchanged.

*Common Shells filled with Loose Powder without Bags.*

Remove the fuze-hole plug, pass the "metal hook for removing wads" through the hole in the centre of the wad, and draw the wad out of the fuze-hole; if the powder charge is in a serviceable condition insert a new papier mâché wad, and replug the shell as directed in instructions for filling. If the powder charge is found to be caked from the effects of damp, empty the shell and clean it out, using a "copper scraper for shells" to remove any grains of powder that may be adhering to the sides of the shell, and refill with serviceable powder.

*Shrapnel Shells.*

Remove the fuze-hole plug, unscrew the primer with the "large screw-driver," and lift out the primer with the "metal pincers for removing primers;" turn the shell nose downwards, and if the powder charge flows out and is serviceable, refill and replace primer and plug; the shell should be well shaken if the powder does not come out quite freely, as a portion of the powder may possibly be jammed in the tube; if the powder cannot be extracted as above, being caked from the effects of damp, &c., the primer and plug will be replaced, and steps taken for the exchange of the shell.



## CHARGES.

See List of Changes, §§ 2281, 3795.

Silk cloth,\* full or service, 12 lb. P. or 10 lb. R.L.G. or L.G. powder.  
Silk cloth, saluting 5 lb. Blank L.G. or R.L.G.

## DIRECTIONS FOR FILLING CARTRIDGES.

See Army Circulars, Clause 287 of 1879, and Clause 224 of 1880.

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 Filling.

Care will be taken to see that the cartridge bags are properly dry before being filled, and the proper charge will be carefully weighed out, and inserted in the bag by means of the "Funnel, copper, cartridge." Cartridges will be choked by drawing together the mouth of the cartridge into several pleats with a brass needle, threaded with three strands of worsted for serge cartridges, or with silk twist for silk cloth cartridges. After drawing together the mouth of the cartridge, three turns will be taken round the pleats, and the choke thus formed will be further secured by passing the needle five times through it, alternately above and below the turns, thereby stitching down the turns round the choke at four points equidistant from each other.

The cartridges will be made up to their proper lengths and diameters by means of the hoops, which should be drawn tight so as to make a firm cartridge.

## Hooping—

1st. With braid hoops.—Draw the braid through the serge or silk cloth until the knot of the loop comes home to the serge or silk cloth, the single end being already passed through the loop from underneath, pass the single end to one side of and under the loop, then draw the loop tight and keep it so by placing the forefinger of the left hand firmly on the loop; bring the running end between itself and the loop, and draw tight the single bend thus formed, *taking care that the bend bites on the loop and not on the single end*, otherwise the knot will slip. The maintenance of the proper form of the cartridge depends on the hooping being thus secured.

2nd. With worsted or silk twist.—After making the last stitch in choking, the needle will be turned downwards and carried through the powder and out at the seam in the line for the front hoop, the worsted or silk twist will then be carried tightly round the cartridge so as to form a hoop, and will be stitched to the cartridge at two or three points in the same way as the turns at the choke were secured, and the remainder of the hoops will then be similarly formed.

Cartridges will, when filled, be brought to their proper length by having the hoops drawn in very tightly; the ribs formed in those parts where the hoops are in the interior of the cartridge will, however, be found to project to about the regulated diameter.

## Finished Cartridges.

All cartridges will be very carefully examined and gauged as to length and diameter previous to packing.

## Drill Cartridges.

Drill cartridges are a special manufacture and issued complete. They are made of wood covered with raw hide.

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\* Present store of serge cartridges will be used up before issue of silk cloth.

## RANGE TABLE.

Charge .. .. . 12 lb. P.  
 Projectile .. .. . common or Shrapnel shell.  
 Muzzle velocity .. .. . 1,240 f. s.

Range.	Elevation.	Fuze Scale.	Range.	Elevation.	Fuze Scale.
yards.	deg. min.		yards.	deg. min.	
150	0·15	1·	2440	5·50	16·
230	0·26	1·5	2510	6·9	16·5
310	0·36	2·	2570	6·21	17·
390	0·46	2·5	2640	6·34	17·5
470	0·56	3·	2700	6·46	18·
550	1·6	3·5	2770	7·0	18·5
630	1·16	4·	2830	7·13	19·
710	1·27	4·5	2890	7·26	19·5
790	1·38	5·	2960	7·40	20·
870	1·49	5·5	3020	7·53	20·5
950	2·0	6·	3090	8·8	21·
1030	2·11	6·5	3150	8·22	21·5
1110	2·22	7·	3210	8·36	22·
1190	2·33	7·5	3270	8·50	22·5
1270	2·44	8·	3330	9·4	23·
1350	2·55	8·5	3390	9·18	23·5
1420	3·6	9·	3450	9·32	24·
1500	3·18	9·5	3500	9·46	24·5
1580	3·30	10·	3560	10·0	25·
1650	3·42	10·5	3610	10·14	25·5
1720	3·54	11·	3670	10·28	26·
1800	4·6	11·5	3720	10·42	26·5
1870	4·18	12·	3780	11·0	27·
1950	4·30	12·5	3830	11·14	27·5
2020	4·42	13·	3890	11·30	28·
2090	4·54	13·5	3940	11·44	28·5
2160	5·6	14·	3990	12·0	29·
2230	5·18	14·5	4040	12·16	29·5
2300	5·30	15·	4080	12·32	30·
2370	5·43	15·5			

This range table gives the average shooting of the gun, but the ranges may often be found to differ from those given, owing to one or other of the following causes :—

- (a.) Variability of the effect of the charge due to—
1. Incorrect weighing.
  2. Variation in the strength of the powder.
  3. State of the atmosphere, especially as regards moisture.
- (b.) Variability of space occupied by the cartridge in the bore.
- (c.) Force and direction of wind.\*

## DRILL.

[Extracted from "Manual of Artillery Exercises for 1879." Page 202.]

The detachment consists of nine numbers and falls in two deep.

## To Tell Off.

Officer.

No. 1.

Tell off.

\* See "Manual of Siege and Garrison Artillery Exercises, 1879," p. 21.

At "*Tell off*," No. 1 (who is on the left of the detachment) takes a pace to his front, turns to his right, and numbers himself 1, the right-hand man of the rear rank numbers 2, the right-hand man front rank 3, the second man from the right of the rear rank 4, the man in his front 5, and so on; after the detachment is told off No. 1 falls in again on the left of the front rank.

The detachment is marched into the battery and halted in line facing the parapet and to the left rear of the platform. The detachment is now in position of "detachment rear."

### To Take Post under Cover.

<i>Officer.</i>		<i>No. 1.</i>
<i>Take post under cover.</i>		<i>Right turn.</i> <i>Double march.</i>

The detachment stepping off wheels to its left at the left corner of the platform; the front rank filing to the left of the gun, the rear rank to the right, 2 and 3 halting close to the parapet and near the embrasure; 4 and 5 forming upon their right and left and the whole turning to the right-about together. No. 1 follows in rear of the detachment keeping under cover as much as possible; 6 and 8 go to the cartridge store (6 outside) and 7 and 9 to the shell store (7 outside).

### General Duties.

No. 1 commands, directs or superintends boring and fixing fuzes, holds on to the preventer rope and lays.

No. 2 searches, sponges, assists to load, rams home, runs up, elevates and traverses.

No. 3 loads, uncaps or removes safety pin from fuze when in the bore, rams home, runs up, elevates, and traverses.

No. 4 attends to side arms and supplies them to 2, runs up, attends to the elevating screw and coin in laying.

No. 5 attends to vent, supplies wedge wads, runs up, holds on to preventer rope, makes ready, and fires.

No. 6 supplies 3 with cartridges and brings up projectile.

No. 7 attends to fuzes and brings up projectile.

No. 8 attends to cartridge store and serves out cartridges to 6.

No. 9 attends to shell store and issues shells, tubes, and fuzes.

### To Prepare for Action.

"*Prepare for action*."—No. 1 provides and fixes sights and preventer rope which he attaches to the carriage, assisted by 3 (if necessary), takes two turns with it round the bollard, the running end coming off to the left at the top.

No. 2, handspike, truck lever, iron shod lever, and assists 4 with side arms.\*

No. 3, handspike, truck lever, iron shod lever, and elevating screw. Removes muzzle tampon.

No. 4, side arms and support.

No. 5, wedge wads, tubes in box, lanyard, pricker and vent server.

No. 6, two cartridge cases (which he takes to the cartridge store), bucket filled and brush, two drill cartridges for drill purposes.

No. 7, fuzes, fuze and shell implements, one set of tackle and a shell bearer.

No. 8 prepares to issue cartridges.

No. 9, one set of tackle and a brush for cleaning projectiles. Prepares to issue shell, tubes, and fuzes.

The handspikes and iron shod levers are laid down bevelled sides upper-

\* 7-foot handspikes are used with this gun; see § 3718, List of Changes, for information regarding sponge, &c., of guns having different shaped chambers.

most ; the handspikes next the gun, the truck levers between them, the whole with their points to the front.

The standing blocks are hooked by 7 and 9 to the rear eye-bolts of the platform, the tackles rounded in, and the ends of the falls coiled down.

"*Examine gun.*"—No. 5 drifts the vent, replacing the pricker and vent server, 4 and 5 take a purchase with their handspikes over the cheeks and under the breech, and bear down, 2 double mans 4's handspike ; the coin is withdrawn and the elevating screw put in by 3, No. 1 holding up the stool bed with an iron shod lever applied over the bottom step of the carriage. No. 1 gives "*Lower*" when 4 and 5 withdraw their handspikes and lay them down ; 2 supplies himself with the wad hook, searches the gun, after the pricker is withdrawn, and replaces the wad hook.

### To Load.

<i>Officer.</i>	<i>No. 1.</i>
<i>Range—yards.</i>	<i>With—load.</i>
<i>With—load.</i>	

"*Load.*"—No. 1 gives 7 the nature of shell and fuze required, and during the loading fixes his tangent scale at the required elevation.

No. 2 mounts up on the side piece, places himself in a convenient position for sponging. He places his left foot in line with the muzzle, steps to his right with his right foot, and looks to his left rear, takes the sponge in a horizontal position from 4, left hand back down, right hand back up, brings it in line with the axis of the gun, enters the head into the bore, being careful to observe that the vent server is in the vent, slides his hands along the stave to his right as far as he can reach, sends the sponge up the bore, slides his hands out again, and forces the sponge hard home, gives it two half turns, pressing it against the bottom of the bore, withdraws the sponge hand over hand, turning it from him, cleaning the bore well. When the sponge arrives near the muzzle, he jerks it out ; his hands then should be in position they were in when he introduced the sponge into the bore. He then hands the sponge to 4, and after No. 3 has put in the cartridge, he assists him in putting in the projectile, and receives the rammer, right hand about the centre, back down, left hand as near the head as possible, back up ; he enters the head into the bore, and forces the charge home hand over hand ; he then springs the rammer, and retains it in his hand while a wedge wad is being put in, which with 3 he will press steadily home, jamming it under the head of the projectile by two smart taps. He then springs the rammer, hands it to 4, steps down, and goes under cover.

No. 3, as soon as the sponge is withdrawn, mounts up on the step to put in the cartridge, and on the platform to put in the projectile, withdraws the safety pin, or uncaps the fuze, places himself in a corresponding position to 2, and assists him to ram home ; when the cartridge and projectile are home he quits the stave, and puts in a wedge wad, and with 2 presses it steadily home, jamming it under the head of the projectile by two smart taps ; then steps down, and goes under cover.

No. 4 doubles out, halts in line with the sponge head, turns to his left, picks up the stave with his right hand back under, six inches from the head, turns three-quarters left about, and in doing so lifts the sponge over his head, allowing the end of the stave to rest on the ground, his left hand meets the stave close to the sponge, his right hand is slipped up the stave about two feet. He then moves towards the muzzle and passes the stave into the embrasure in such a manner that 2 can conveniently lay hold of it, waiting at the left rear of 2, facing the gun to receive the sponge. When he receives the sponge from 2, he allows the end of the stave to fall on the platform, steps to his left, turns three-quarters right about, passing the sponge over his head, lays it down, takes up the rammer as before detailed for the sponge, and hands it to 2. He then remains in position to receive the rammer, which he does as soon as 2 has sprung it. He lays it down as he did the sponge and goes under cover.

No. 5 provides 3 with a wedge wad when the charge has been rammed home.

No. 6 brings up a cartridge case in his right hand, and places it on the ground on 3's right front; after the sponge is withdrawn he uncovers it, and as soon as 3 has withdrawn the cartridge, he goes back to the cartridge store.

Nos. 6 and 7 bring up a shell, in a bearer, having fixed the fuze according to No. 1's directions. The bearer is placed on the front of the platform, and 7 removes it, when the shell has been placed in the bore.

No. 8 issues a cartridge to 6.\*

No. 9 issues a shell to 7.

### To run up.

*Officer.*

*No. 1.*

*Run up.*  
*Halt.*

Directly the gun is loaded, No. 1 gives "*Run up.*"

No. 1 takes in the slack, and holds on the preventer rope; 2, 3, 4, and 5 take up the truck levers: 2 and 3 raising the small ends to enable 4 and 5 to hook the points to the eye-bolts. When this is done, 2 and 3 haul down the small ends by means of the ropes; 4 and 5 place the pawls; 4 goes under cover; 5 holds on to the preventer rope behind 1; 2 and 3 guide the levers whilst the carriage is in motion. Nos. 1 and 5 ease off, hand over hand, and hold on when the mark on the preventer rope comes over the bollard.

When the gun is in its proper position, No. 1 gives "*Halt.*" when 2 and 3 heave down the small ends of the levers; 4 and 5 throw back the pawls; 2 and 3 allow the small ends of the levers to rise gently, manning the ropes when the levers are above their reach.

When the rear of the carriage rests upon the platform, the levers are unhooked, withdrawn, and laid down outside the handspikes by 2, 3, 4, and 5; 4 tightening the compressor, if the carriage is fitted with one; 2 and 3 pick up their handspikes, and stand ready to elevate; 4 attending to the coils and elevating screw; 5 unhooks and takes the slack of preventer rope.

### To lay the Gun.

*Officer.*

*No. 1.*

*Elevate.*  
*Lower.*  
*Coin.*  
*With screw, Elevate. Halt.*  
*Depress, Halt.*  
*Trail (right). Halt.*  
*Trail (left). Halt.*

No. 1, looking over his sights, gives "*Elevate.*" then "*Lower.*" and when the gun is at the required elevation "*Coin.*" If a slight amount of elevation or depression is required, he gives "*With Screw.*" "*Elevate.*" or "*Depress.*"

"*Elevate.*" 2 and 3 step forward in line with the breech, place their handspikes, bevels down, over the steps and under the breech, and bear down, No. 5 double manning No. 3's handspike; at "*Lower.*" they allow the small ends to rise gently; at "*Coin.*" they withdraw their handspikes and step outwards; 4 withdraws the coin as soon as 2 and 3 elevate, and at "*Coin.*" forces it sharply home. If the order is "*With Screw.*" "*Elevate.*" or "*Depress.*" 4 works the screw until "*Halt.*" is given. The other numbers stand fast.

On No. 1 giving the word "*Coin.*" 2 and 3 lay down their handspikes, and take up the iron-shod levers to traverse; 5 prepares a tube.

As these platforms are pivoted in front, in rear, or in the centre, the position taken up by 2 and 3 differs according to the manner in which the platform is pivoted.

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\* In loading, the cartridge cylinder should be kept closed till the sponge is out of the bore.

*Nature of Pivot.**Position of Nos. 2 and 3.  
"Trail right."*

Pivot "A" (under the muzzle of the gun when run up).	} 2 stands facing to the rear with the point of his lever resting on the rear racer; at "Halt" he scotches the rear truck on his own side with the lever. 3 stands facing to the rear and applies the point of his lever under the left rear truck of the platform, both hands back up, and heaves the platform over to the right, taking short quick purchases. <i>"Trail left."</i> The numbers work in the opposite directions.
Pivot "B" (under the front part of the platform).	} As with "A" pivot. <i>"Trail right."</i> 3 works as with pivot "A": 2 takes up his position at the front truck on his own side, and works over the front of the platform to the left. At "Halt" 2 withdraws his lever, and with it scotches the rear truck. <i>"Trail left."</i> 3 works the front truck, and 2 the rear; 3 scotches the rear truck at "Halt."
Pivot "C" (in the centre of the platform).	} <i>"Trail right or left."</i> 2 and 3 work the front truck, 2 heaving the front of the platform over to the left in the first case, 3 the front to the right in the second.
Pivot "D" (at an intermediate point between the centre of the platform and the rear truck).	} As with "D" pivot.
Pivot "E" (in front of the rear block).	} As with "D" pivot.
Pivot "F" (in the rear of the rear block).	} As with "D" pivot.

With platforms pivoted at "A" or "B" at "Extreme right" (or "Left"), 2, 3, 4 and 5 push over the rear of the platform in the direction ordered.

When traversing tackle is used, at "Hook traversing tackles," 4 and 5 hook the blocks to the rings or holdfasts prepared for them; 2, 4, and 3, 5, haul on the tackle, or ease off at "Trail right" (or "Left"), so as to move the platform in the direction required.

If the tackle when hooked hinders the service of the gun, the blocks are removed by 4 and 5.

### To Make Ready and Fire.

*Officer.*  
Fire—rounds.

*No. 1.*  
No.—Ready.  
No.—Fire.

No. 1 lowers his tangent scale, except when firing at a moving object, and gives "Ready."

At "Ready," 2 and 3 withdraw their levers, and replace them, bevels up, as scotches under the trucks, 2, 3, and 4, then go under cover. No. 5 presses the tube into the vent, descends from the platform, and stands ready to fire facing the gun; immediately after firing he drifts the vent, replacing the vent server and pricker, coiling up the lanyard and placing it under his belt, and hooks the preventer rope except at drill.

No. 1 does not again give "Load" until 5 has replaced the vent server.

## To Run Back and Unload.

Officer.

No. 1.

*Run back.*

*Halt.*

*Unload.*

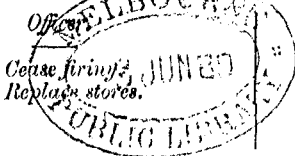
When the vent has been drifted and the vent server placed in the vent, at "Run back," 4 slackens the compressor if the carriage is fitted with one.

The truck levers are applied as in running up; No. 1, standing between the cheeks, holds the small ends of the truck levers and guides them; 4 and 5 overhaul the tackle and hook the front blocks to the front eye-bolts on the carriage. All the numbers, except No. 1, man the falls on their respective sides, and at "Heave," haul the gun back.

When the gun is run far enough back, No. 1 hauls down the levers by the ropes till the pawls fall; the levers are then allowed to come up, No. 1 rising with them. The front blocks are unhooked by 4 and 5, who carry them to the rear, overhaul them, lay them down clear of the racers, and coil down the end of the falls; 2, 3, 4, and 5 unhook the truck levers and lay them down. No. 5 hooks the preventer rope.

At "Unload," 2 and 3 withdraw the charge, 4 supplying the necessary side arms.

## To Cease Firing and Replace Stores.



No. 1.

*Elevate.*

*Lower.*

*Coin.*

*Replace stores.*

"Cease firing," "Replace stores," No. 1 gives "Elevate," and the gun is laid under metal by 4 and 5, he then gives "Replace stores" and the stores are replaced by the numbers who brought them up.

## To Form Detachment Rear.

Officer.

No. 1.

*Detachment rear.*

*Outwards turn.*

*Double march.*

*Halt.*

*Front.*

"Detachment rear," No. 1 doubles to the left rear of the platform, faces to the left, and gives the order "Outwards turn;" 2 and 4 turn to their left, 3 and 5 to their right.

"Double march," 4 and 5 followed by 2 and 3 wheel to the right and left, and when clear of the platform to the right, and round No. 1's left shoulder, 6, 7, 8, and 9 coming up into their places; when 2 and 3 have passed him No. 1 gives "Halt," "Front," and changes his flank by the rear.

## To Change Rounds.

Officer.

No. 1.

*Change Rounds.*

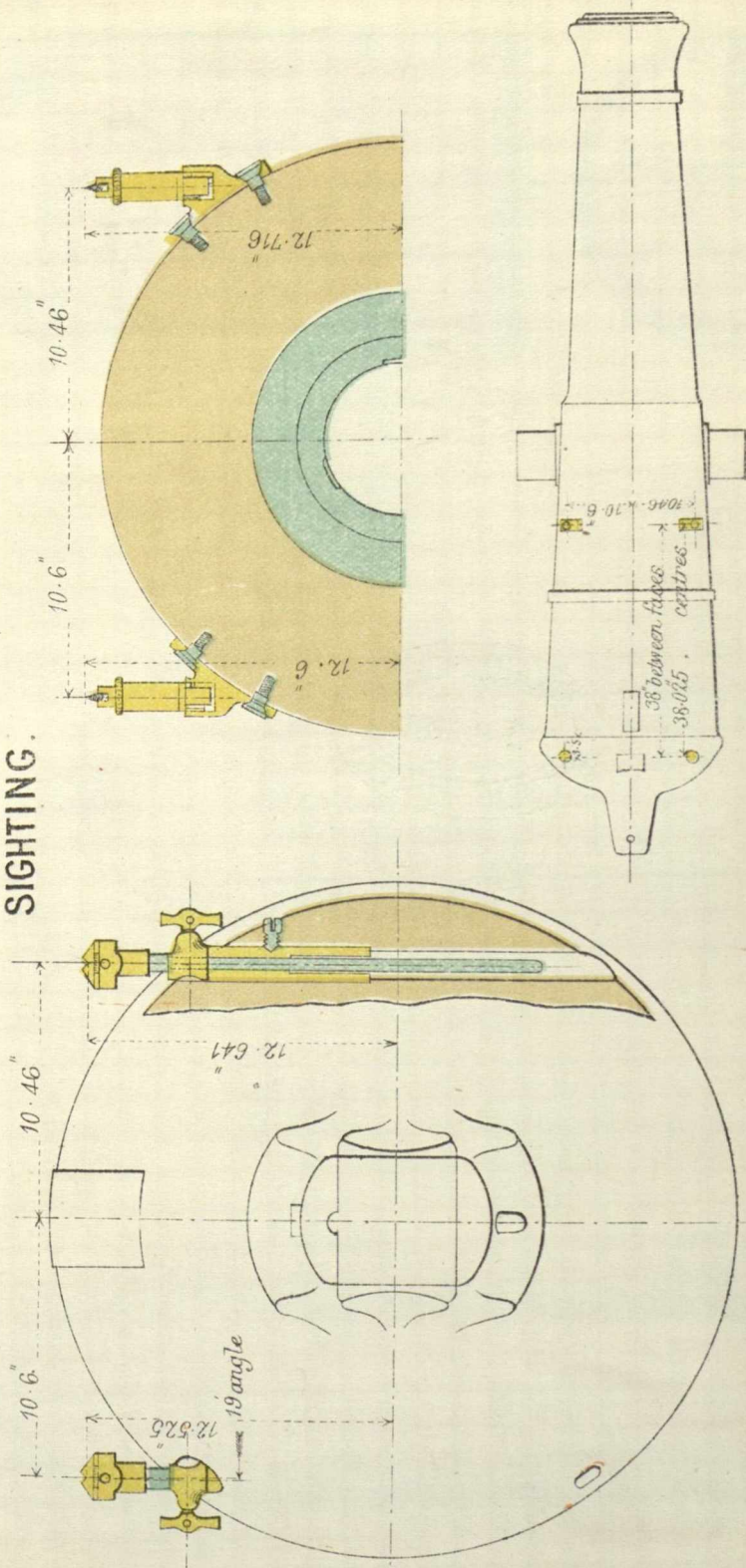
*Change Rounds.*

In changing rounds No. 2 becomes 4; 4, 1; 1, 9; 9, 8; 8, 7; 7, 6; 6, 5; 5, 3; 3, 2.

# ORDNANCE CONVERTED RIFLED 80 PR 5 TONS. MARK I.

FROM 68 PR 95 CWT.

## SIGHTING.

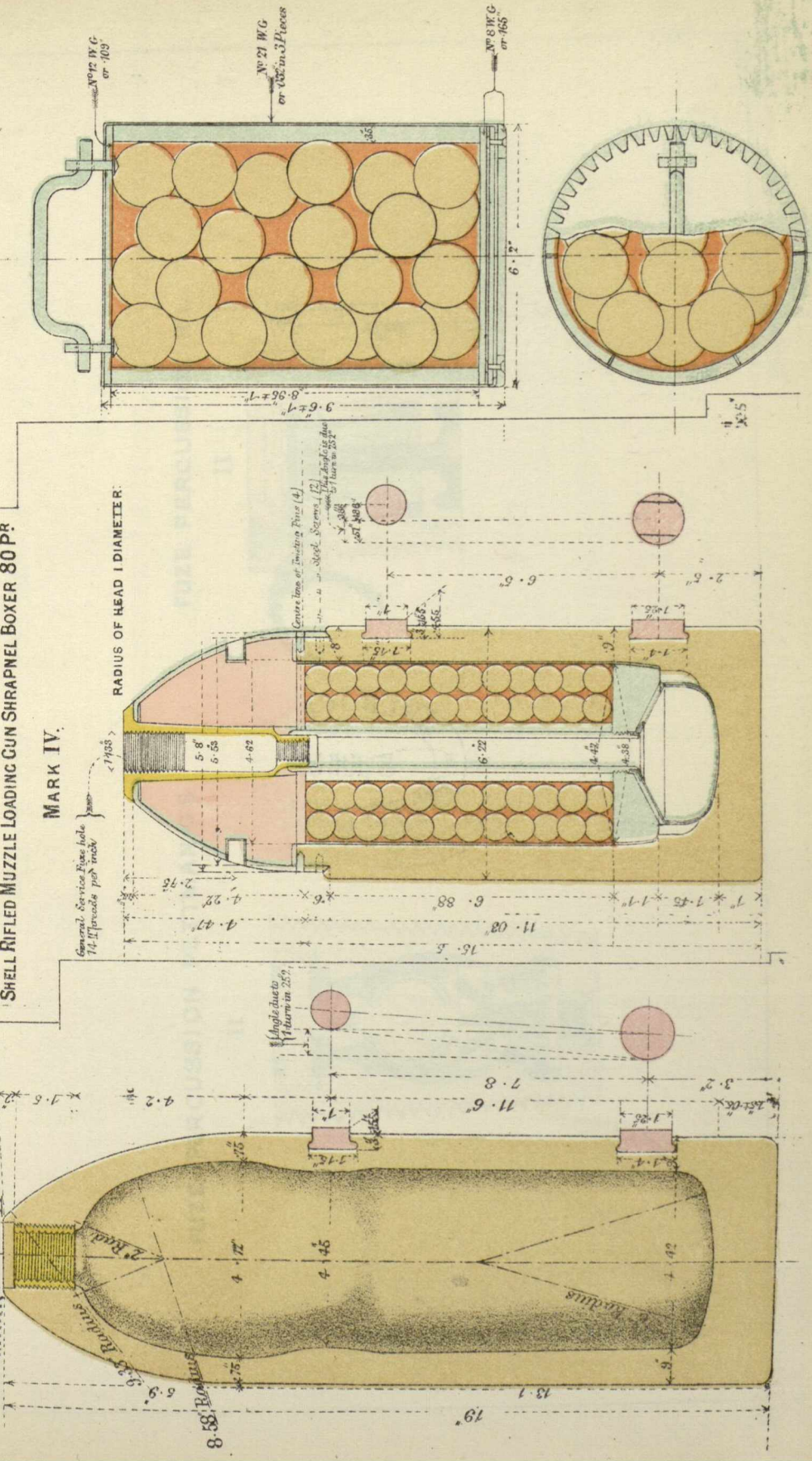




SHELL R. M. L. COMMON 80 PR. MARK II

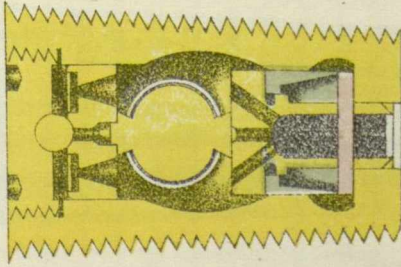
SHELL RIFLED MUZZLE LOADING GUN SHRAPNEL BOXER 80 PR. MARK IV.

SHOT R. M. L. GUN CASE 80 OR 64 PR. OR HOWITZER 6.3 INCH. MARK IV



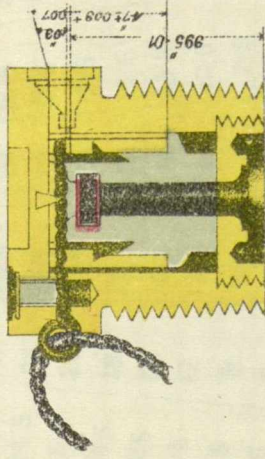
FUZE PERCUSSION PETTMAN G.S.

II



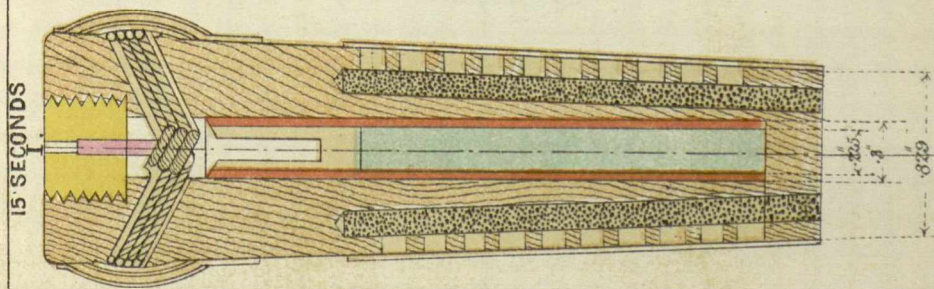
FUZE PERCUSSION R.L.

II





FUZE TIME, WOOD BOXER . M. L. ORDNANCE .



30	29.5	29	28.5	28
27.5	26.5	26	25.5	25
24.5	23.5	23	22.5	22
21.5	20.5	20	19.5	19
18.5	17.5	17	16.5	16
15.5	14.5	14	13.5	13
12.5	11.5	11	10.5	10
9.5	8.5	8	7.5	7
6.5	5.5	5	4.5	4
3.5	2.5	2	1.5	1

DEVELOPMENT OF INDEX PAPER.

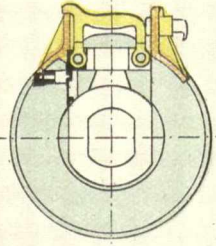
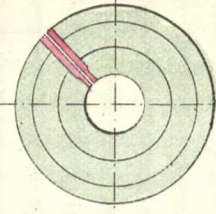
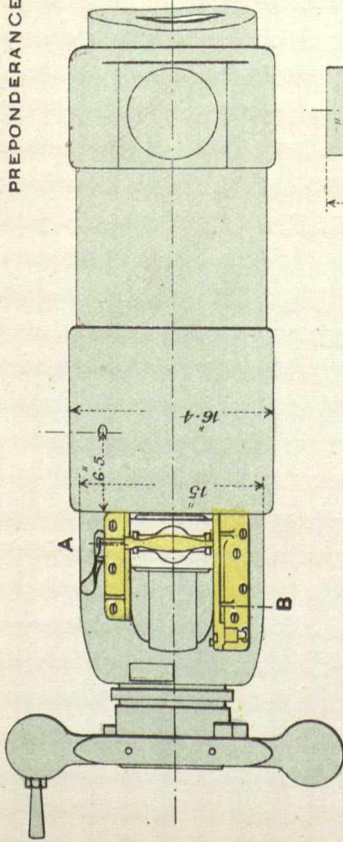
Frontispiece.

ORDNANCE R. B.-L. 40 P. R. SIDE CLOSING.

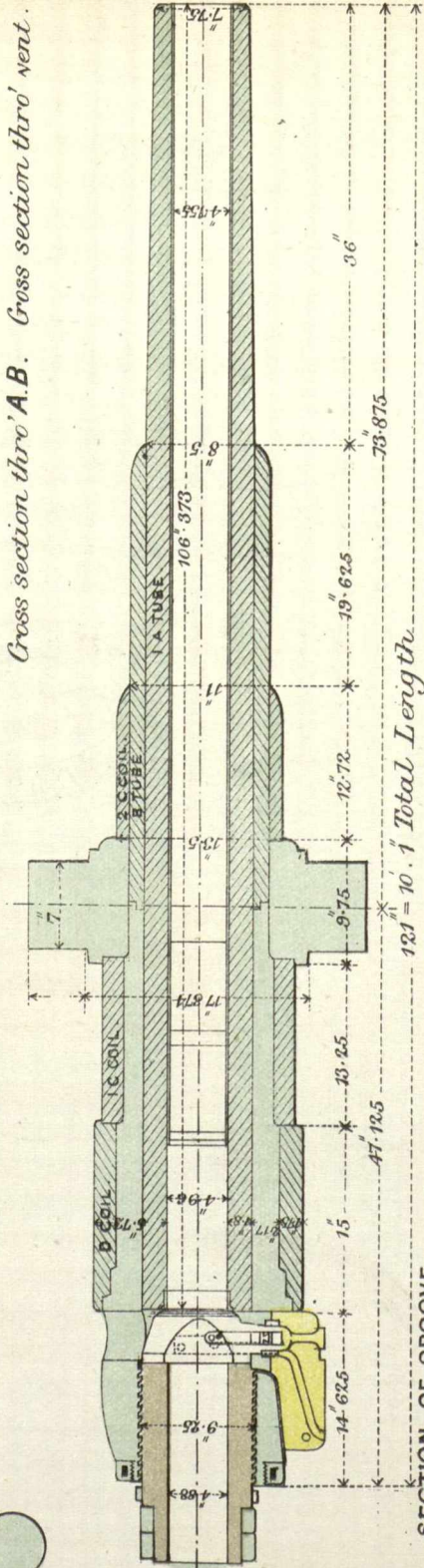
CONVERTED 35 CWT SCREW GUN.

WEIGHT  $\frac{\text{QRS.}}{\text{CWT.}}$  35 . 3 . 10

PREPONDERANCE ..... 4 . 3 . 24



*Gross section thro' A.B. Cross section thro' vent.*



SECTION OF GROOVE.

Full size.

1/15" x 1/15" x 1/15"

Number of Grooves 56.

*Rifling an uniform twist of 1 turn in 36.5 Calibres.*