HANDBOOK

FOR THE

20-Pr. R.B.L. of 16-cwt., on Garrison Sliding Carriage and on Travelling Carriage.

By Authority.

LONDON:

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CONTENTS.

PLATES.

(Correct to 19.8.86).

ORDNANCE 20-Pr. R.B.L.

THE GUN.

(*List of Changes*, § 998.)

(*Plate I*).

Weight		16 cwt.
Length	total nominal*	96 inches.
	bore	84 inches.
Calibre		3·75 inches.
Chamber	diameter	3·94 inches.
	length to base of projectile	12·0 inches.
	capacity	143 cubic inches.
Preponderance		2 cwt. 1 qr.
Rifling	system	polygrooved.
	twist, uniform	1 in 38 calibres.
Grooves	number	44.
	depth	0·06 inch.
	width	0·160 inch.
Vent, axial through vent-piece.		

The *Gun* consists of the barrel (or A tube), the breech-piece, the trunnion ring, and five coils, all of wrought-iron, except some guns which have been retubed with steel.

The *Slot* is made in the top of the breech-piece for the introduction and removal of the vent-piece, it is continued through the bottom of the breech in the form of a circular hole to facilitate cleaning ; it also equalises the strain on the vent-piece.

The *Vent-piece*, so called because the vent goes through it, is a block of wrought-iron, which closes the end of the breech before firing ; it is dropped down the slot into its position and is then tightened up by means of the breech-screw.

The *Breech-screw* fits the thread cut in the breech-piece, its use being for sending home and retaining the vent-piece in its proper position when the gun is fired.

The *Tappet ring* is fitted on the octagonal parts of the breech-screw, on which it acts as a wrench, the power being communicated through its projections from the tappets of the lever.

The *Lever* fits on the breech-screw behind the tappet ring : it is free to revolve round the breech-screw, but is prevented from falling off by two keep pins working in grooves.

The *Breech Bush* is a ring of copper screwed into the end of the powder chamber, and faced when in position by means of the facing implements.

The *Vent-piece Copper Ring* is a corresponding ring on the face of the vent-piece. The object of these rings is to secure a close fit, to prevent any escape of gas, as well as to facilitate the repair of the tube where there is greatest wear and expansion ; the rings are coned in opposite directions so as to fit closely into one another.

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* *I.e.* From face of muzzle to extreme end of breech, exclusive of breech screw.

Sighting.

The gun is sighted on both sides, to facilitate laying under certain circumstances, and to render the provision of spare sights unnecessary ; and is provided with four sights—two tangent sights and two trunnion sights.

The Mark I. tangent sights are barrel-headed with steel rectangular bars and are fitted into projections on a wrought-iron ring screwed on the breech of the gun furnished with clamping screws. The sockets are cut so that the tangent sights are inclined 2° 16″ to the left to compensate for permanent deflection. The tangent sights are marked with a scale of yards from 100 to 3,500 on the side towards the breech and with a scale of 12 degrees on the side towards the muzzle. They are graduated to a radius of 36·2 inches. A deflection leaf is provided, whereby ½° deflection right or left may be given. The Mark II. sight has a gun metal head and plain sliding leaf.

The tangent sights are interchangeable.

The trunnion sights are of the "drop" pattern, and consist of a pillar, collar, and socket of gun-metal, a leaf of steel, and screw for fixing the leaf. The socket is permanently fixed in the gun, and the pillar and collar each lock into it with a bayonet joint, so that when once the sight is in its true position it cannot be moved without first raising the collar and turning the pillar round a quarter of a circle.

CARRIAGE, GARRISON, SLIDING, MEDIUM, No. 5.

(*Iron, R.B.L. 20-Pr. for Platform No. 5.*)

PLATFORM, TRAVERSING, MEDIUM, No. 5.

(*Iron, R.B.L. 20-Pr. for Carriage No. 5.*)

(*List of Changes*, § 4211).

(*Plate II*).

This carriage and platform are intended for the armament of gorge casemates and are constructed to fire over a sill 2′ 3″ high with a depression of 15.°

The carriage consists of two double plate brackets, connected by two transoms and a bottom plate. It is supported on twelve steel rollers, which are always in action and run on steel axles resting in metal bearings attached to the brackets. Loops are formed on the outer ends of the front and rear axles.

The carriage is fitted with elevating gear on the right bracket, a hydraulic buffer in tension underneath the bottom plate, two buffer brackets, four clip plates, and two metal clamps with steel screws, to hold it when run back.

The elevating gear consists of a handwheel on the same spindle with a pinion which gears with an elevating arc attached to the gun. A metal bracket fixed on the right bracket of the carriage forms both a bearing for the spindle and a guide for the arc. The gear allows 10° elevation and 15° depression.

The cylinder of the hydraulic buffer is of wrought-iron. It is closed in rear by a wrought-iron screw cap, and in front by a metal cap attached to the bottom plate of the carriage. The piston rod is attached to the front of the platform by two nuts. The packing for the rod consists of a cup leather, a metal ring, three pieces of white cotton rope, and a metal screw gland.

Platform.

The platform consists of two sides of light girder iron, connected by two front plates, a centre cross bar, and a rear transom. It is fitted with two

rear buffer stops of felt and iron rings, four eye-bolts, and a pivot bar by which it is secured to a fixed pivot in the "sill" of the work.

The girders are supported on wrought-iron stays and block plates, to which are riveted the flanges for the trucks. The trucks are of steel, "hollow soled," and coned to suit the radii of racers.

The racers are of gun-metal, ribbed, and are secured to the wood floor of the works by gun-metal screws.

The pivot plate is of wrought-iron, and is formed with a screwed stud, on which the pivot bar is secured by a nut. The plate fits over the front of the sill, and is secured by six "lewis" bolts.

The platform can be traversed through an arc of 35°.

Slope of platform		4°	
		ft.	ins.
Length of platform		7	2
Height of Carriage (at centre of trunnion)....		1	4
Height of Platform		2	4·5
Total		3	8·5
Diameter of trucks front		6·5″	
Diameter of trucks rear		8″	
		ft.	ins.
Radii of racers front		1	5
Radii of racers rear		6	10

Instructions for Care and Preservation.

All bright parts must be kept clean and slightly oiled.

The bearing for spindle of elevating gear, and the roller axles must be kept lubricated through channels made for the purpose; care should be taken to replace the screws in these channels after use.

The axles of the trucks must be kept free from rust, and well greased.

The carriage must be "run up and back," the elevating gear worked, and the platform traversed at least once a week.

Before "practice" care must be taken to see that all bearings are lubricated, that the buffer contains the requisite quantity of oil and does not leak at the gland, and that the clip-plates, pivot-bar, and piston-rod are properly secured.

If the buffer leaks at the gland and tightening up the latter does not stop it, the packing must be renewed. For this purpose the gland must be unscrewed with the "spanner hydraulic buffer No. 4," the defective packing removed, and fresh packing, well greased, placed in the stuffing box.

If found necessary to renew the leather packing in consequence of excessive leakage during recoil, the carriage must be "run back," the piston-rod released from the platform, and the cotton and leather packing removed. Care must be taken not to damage the thin edge of the new leather when placing it on the rod, and it should be pressed well home in the stuffing-box before replacing the metal ring.

N.B.—The register number should be quoted in all reports and letters with reference to carriages and platforms.

CARRIAGE, FIELD, R.B.L., 20-Pr.

(*Wood, without limber*).

(*List of Changes*, § 614).

(*Plates III and IV*).

The carriage consists of a block trail and two brackets of wood, a wooden axletree bed, a wrought-iron axletree, and two wooden-naved "heavy 2nd class wheels, 5 ft. diameter and 3-inch tire." The axletree is housed in the bed, in which position it is secured by bolts, yoke bands, and coupling plates.

The carriage is fitted with an elevating gear and a traversing arrangement; also with a hook for securing the gun when travelling, head chains, single trail handles, locking and jack plates, and fittings for side arms, axletree boxes, a drag shoe, and small stores.

There is a ball and socket elevating screw, worked by an iron cross handle, fixed to a metal ball nut, which oscillates in a metal pan let into the trail.

The traversing arrangement consists of a saddle in which the gun rests, working in slots in the trunnion plates of the brackets. The saddle is traversed by a lever which is pivoted by a pin to the centre of the trail; one end of the lever fits in a recess in the saddle, the other is furnished with an iron nut for a horizontal screw, which rests in bearings let into the brackets, and is worked by a hand-wheel on the right side of the carriage. This traverse is limited by stops, which are fixed on either side of the centre of the trail.

LIMBER, FIELD, R.B.L., 20-PR.

Wood.

(Plates IV and V).

The limber consists of an axletree bed of elm, a splinter bar and three futchels of ash; an ash platform board and an elm footboard are, as well as an ash slat, fixed to the top of the futchels. There are two ammunition boxes and a centre box, the former containing 8 rounds each. The limber hook is bolted to an elm block on the back of the axletree bed. The axletree and wheels are the same as for the carriage.

The limber is furnished with "near" and "off" shafts, and with fittings for single, double, and treble draught; also with fittings for small stores and intrenching tools.

		Cwt.	qrs.	lbs.
Weight of	carriage	16	0	0
	limber	10	3	12

Instructions for Care and Preservation.

All bright metal work must be kept clean and slightly greased.

The elevating and traversing gear must be kept free from rust, and be properly lubricated.

The axletree and grease chambers of the wheels should be frequently cleared from clotted grease, and all dirt and grit removed before greasing.

The carriage should be occasionally examined for signs of decay, which generally show about the junction of the brackets and trail, at the waterway near the elevating screw, and at the trunnion plates. The decayed parts should be cut out and replaced by sound timber, and then painted.

Small shakes or cracks along the trail should be filled in with "stopping," the crack being first cleaned out and painted to make the "stopping" adhere.

Large cracks should be filled in with wood.

All bolts should be kept tightly screwed up, to follow the shrinking of the carriage. Ammunition boxes should be removed occasionally and examined underneath.

Care must be taken to prevent the lodgment of water on any part of the carriage or limber.

When carriages are parked or placed in a shed with the shafts exposed, the latter should be raised on the props, to keep the points dry.

Defects or damage should be made good without delay; if the paint becomes rubbed off at any part, it should be patched over as soon as possible.

When there is a register number, which will be found marked on the trail plate, it should be quoted in all correspondence referring to these carriages.

PROJECTILES.

(*List of Changes*, §§ 405, 754, 477, 341).
(*Plate VI*).

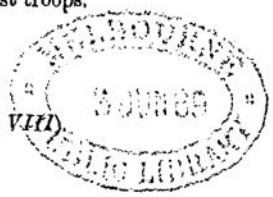
			Weight. lbs.	ozs.
Shell	Segment	empty about....	19	10
		bursting charge shell F.G., 700 grains		
	Common	empty about....	20	8
		bursting charge	1	2
Shot	Solid .... about		20	6½
	Case, filled with 239 mixed metal balls 16½ to the lb., packed in clay and sand. (See L. of C. § 2841)		20	5½
	Drill, a recovered common shell will be used with lead coating turned down so that the shell can pass freely through the bore.... .... about		20	8

All projectiles except the case are lead coated, and slightly larger than the bore of the gun. Occasionally blisters appear on the lead coat; these should be pricked and hammered down. A high ring gauge should be used occasionally to see that the lead coat has not set up or enlarged at the base of the projectile, so as to render loading difficult; the projectile can be reduced to the proper gauge by filing.

Segment shell are used against bodies of troops behind cover, or beyond the effective range of case shot.

Common shell are used against earthworks, buildings, &c.

Case shot is used for close quarters against troops.



FUZES.

(*Plates VII and VIII*).

Percussion, B.L. plain.
E Time-fuze.

Fuze, Percussion, B.L. Plain.

Used with field service B.L. common and segment shell. This is a modification of the Armstrong C. percussion, the improvement consisting in using cap composition pressed and varnished, as in gun caps, which experience has shown to stand damp climates well.

The body and top are made of gun-metal, and the body has a rim projecting at the top which ensures the fuze being placed in the correct position in the shell. In the centre of the top, on the inside, is fixed a steel needle, point down; the top is pierced with four holes to allow of the action of the Armstrong E. time fuze, which is still used in the Navy in conjunction with the B.L. plain fuze. A washer of thin sheet brass closes these holes (it is blown in by the action of the time fuze). The body is pierced with two holes for the safety pin.

The guard is made of gun-metal, and is pierced with two holes for the safety pin; it fits inside next the top, and is recessed inside to receive the head of the pellet; there is a slight undercut at the top of the recess into which the pellet expands when the guard sets back.

The pellet is cast of equal parts of lead and tin; it is hollowed out and receives in its top the copper cap, which is primed with cap composition (fulminate of mercury, sulphide of antimony, and chlorate of potash), pressed and varnished in the same way as in gun caps. The composition is further protected by a very thin disc of brass; this has been found necessary to prevent premature explosions; a disc of paper coated with shellac is stuck on the top of the pellet covering the cap.

The cap is pierced with three small holes, arranged in a triangular form round the centre; these holes allow the flash to pass down to the lower part

of the pellet, which is filled with a pellet of pressed powder pierced like a tube and roughened so as to ensure ignition.

On the exterior of the pellet are four feathers or flanges, and below the pellet a disc of paper is placed to prevent its adhering to the bottom of the fuze.

The bottom consists of a gun-metal disc which screws into the base of the fuze; in the centre is a small hole which contains pressed powder driven and pierced as usual. This hole is closed on the exterior by a thin brass disc.

The safety pin is made of twisted brass wire, and has a piece of braid attached to it to enable it to be withdrawn readily; a little beeswax is applied to seal the hole, and the braid is secured by a paper strip shellaced round the fuze.

Since 12/71 these fuzes have been painted with a black varnish similar to that used with friction tubes in order to exclude damp as much as possible.

Action.—When the safety pin is removed, the guard is supported by the feathers of the pellet. On the shock of discharge the guard sets back shearing off the feathers, and its shoulder is jammed into the undercut in the interior surface of the guard. When the shell strikes an opposing object, or grazes, the pellet and guard fly forward as one mass, the cap comes violently against the needle and is thereby fired. The flash is taken up by the powder pellet, the brass disc at the bottom is blown out, and the bursting charge exploded.

This fuze may be depended on to act on graze even on wet boggy ground or on water, and will act at 400 yards where case ceases to be effective. Before the addition of the safety pin the feathers of the pellet were found apt to give way under the jolting to which the fuze was exposed in limber boxes; but now the fuze is quite safe, as the pin takes the part of the lead feathers, which are only called into play when the pin is withdrawn.

Fuze, Time, Armstrong. "E" Mark III.

This fuze is used with segment shell.

The following is a short description of the fuze:—

Both body and nut of the last pattern (E. III.) are made of gun-metal, and the graduations for length of fuze in inches and tenths are marked on the metal rim instead of on paper, as in former patterns. The pellet which is supported by a brass cup is filled with R.F.G. powder, secured by thin paper fastened on its base; the detonator in the head consists of cap composition (fulminate of mercury, chlorate of potash, and sulphide of antimony), instead of the amorphous phosphorous composition which deteriorated in damp climates. In those lately made a disc of brass, ·001″ thick, covers the detonating composition. The word "cap" is stamped on the base of the fuze.

The channel by which the flash from the pellet reaches the ring of fuze composition is enlarged in this pattern, and a strand of quickmatch is placed in it; a little hole is bored in the ring of fuze composition to ensure its lighting. The fuze composition is pit mealed powder pressed into a ring or groove which runs round close to the exterior of the fuze body; this composition burns at the rate of 1 inch in two seconds, and, owing to a metal stop, can only burn in one direction, *i.e.*, from left to right.

A leather washer and movable gun-metal collar cover the ring of composition. At one part of the collar a channel, primed with mealed powder driven and pierced, and marked on the outside with an arrow, communicates with a groove round the neck of the fuze, which contains mealed powder; this groove is connected by a channel with the blowing chamber, which is primed with mealed powder, driven and pierced; a small brass disc closes the chamber.

The movable collar is kept in its place by a nut which screws on to the neck. The body has a small hole in the side to fit a projection in the Armstrong key used in screwing in the fuze.

Stress must be laid on the importance of screwing the nut tightly home when the fuze is adjusted, otherwise the washer will not be tightly pressed down on the ring of fuze composition, and a premature explosion may occur.

Action.—On firing the gun, the brass cup is crushed in, the pellet strikes the needle, which explodes the detonating composition, the ring of fuze composition is ignited by the flash and burns till it comes to the channel marked by the arrow head, leading to the groove in the neck primed with mealed powder, the flash is then instantaneously conveyed into the blowing chamber, and thence into the shell.

The changes recently introduced, particularly the cap composition, and the ensuring ignition by piercing a hole in the ring of fuze composition, have greatly improved this fuze.

Divide number of hundreds of yards in range by 6 for length in inches, thus for 1,200 yards, length of fuze=2 inches.

Instructions for the Preparation of Fuzes and Shells, and for the Examination of Filled Shells.

Vide clause 175, *A.C.* 1884.

Filling Shells.*

Common and Segment.

Remove the plug from the fuze-hole. Insert the leather funnel and carefully pour in the bursting charge through the small hole at the bottom of the socket until the shell is thoroughly filled, then (care being taken that no powder remains in the socket) place the papier-mâché wad, recessed part uppermost, in the hole at the bottom of the socket and drive it in flush; any flat-ended piece of wood larger in diameter than the wad can be used for this purpose, then fix the fuze or screw in the fuze-hole plug as may be required.

The object of this wad is to prevent the powder from working up into the socket after the shell has been filled.

It is not necessary to remove the wad when the shell is to be fired, as the explosion of the fuze is sufficient to force it into the shell.

Segment shells have iron bursters, a wood plug covered with serge being placed on top to secure them whilst travelling; this plug will be removed when the fuze is inserted.

Fixing Fuzes.

Fuzes, Percussion, B.L., Plain.

These fuzes require no preparation, except the removal of the safety-pin, which is to be taken out just before dropping the fuze into the shell; care must be taken to insert it properly; the part with the rim round it is the top of the fuze; it should be firmly held in its place by the fuze hole plug or E. time fuze.

Fuzes, Time, Metal, Armstrong, E.

These fuzes are prepared for the desired time of flight after they have been screwed into the shell.

Loosen the nut with the key, so as to free the collar. Hold the shell in the right hand and move the collar with the fore-finger and thumb of the left hand, until the arrow points to the required length of fuze; then screw up the nut with the right hand, steadying the collar at the same time with the left hand. Finally, tighten the nut with the key, or by inserting it in the socket on the axletree-box, giving the shell a slight turn towards the trail. Should the fuze be taken from the shell, the collar must be set at the "blank" before it is replaced in the box.

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* All shells before being filled should have the fuze holes and interior thoroughly examined to ascertain that they are dry and clean.

Examination of Filled Shells.

Common and Segment Shells filled with Loose Powder without Bags.

The papier-mâché wad at the bottom of the socket of the common shells will be driven into the shell by means of a piece of wood. If the powder charge is in a serviceable condition, insert a new papier-mâché wad, and re-plug 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. If the powder is so caked that it will not run out of the shell, or if any powder remains adhering to the interior of the shell, fill the shell with boiling water and allow it to stand for about five minutes, then pour out the water and fill up again with boiling water. After standing for 15 minutes more, the shell may be emptied, using the copper scraper for shells to facilitate the removal of the wetted powder. The scraper must not be applied until after 15 minutes have elapsed after the second quantity of boiling water has been poured in. When the shell is perfectly dry, refill with serviceable powder. These shells, however, will not be thus examined, unless there are evident signs of their being affected by damp.

When fixing fuzes in shells having a wad in the bottom of the socket, it is not necessary to remove the wad, as the explosion of the fuze is sufficient to force it into the shell, if using percussion fuzes.

Fixing Plugs and Fuzes and Securing Shells.

When plugs or metal fuzes are screwed into shells, they will be lubricated with Field's grease, No. 3, if for use at home stations or in British North America. Price's composite grease is to be employed at all other stations.

Distinguishing Marks on Shells.

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

Shells which have been emptied will be marked on the head with the letter E in red paint.

Charges.

(*List of Changes* § 4871.)

Full	2½lbs. R.L.G.[4]
Saluting	1lb. 8oz. Blank.

Making up Cartridges.

(*Vide Clause* 155 *Army Circulars, dated* 1*st August*, 1883.)

Care will be taken to see that the cartridges are properly dry before being filled; and the proper charge having been carefully weighed out, they will be filled as follows:—

Half the charge will be inserted into the cartridge by means of the funnel, copper, cartridge, the paper cylinder will then be placed on the powder *in the centre of the cartridge*, the flat side uppermost, and the remainder of the charge then filled in.

When filled with the proper charge, the lubricator will be placed inside with the papier-mâché disc next the powder, and the cartridge then choked tightly over the top. The line which is printed on the cartridge for the top hoop should be close under the papier-mâché disc, so as to prevent any grains of powder getting round or over the lubricator.

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.—Draw the braid through the serge until the knot of the loop comes home to the serge, 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 hoop 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.

Marking Filled Cartridges.

All cartridges when filled will have the initial or monogram of the station at which they are filled stamped on the bottom end in black printer's ink, 1 inch long. About $\frac{1}{4}$ oz. of ink will be sufficient for 100 cartridges.

The cartridges filled by the Royal Artillery will be distinguished by having no initial letter stamped on them. This order does not apply to cartridges filled by working parties of Royal Artillery for the Ordnance Store Department.

Finished Cartridges.

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

Range Table for 20-Pr. R.B.L. Gun of 16 Cwt.

Charge, 2 lb. 8 oz. R.L.G.[2] Muzzle velocity 1130 f. s.

Projectile, shot or shell.

Distance of Object.	Elevation.	Time of Flight.	Fuze Scale.	Distance of Object.	Elevation.	Time of Flight.	Fuze Scale.
yards	° ′	seconds.	tenths.	yards.	° ′	seconds.	tenths.
100	0 11	0 30	1·5	1900	5 16	6 35	34·5
200	0 25	0 60	3	2000	5 37	6 70	36·5
300	0 39	0 90	5	2100	5 58	7 10	38
400	0 53	1 25	6·5	2200	6 19	7 50	40
500	1 8	1 60	8·5	2300	6 40	7 85	
600	1 23	1 90	10	2400	7 1	8 20	
700	1 38	2 25	12	2500	7 22	8 60	
800	1 53	2 60	13·5	2600	7 43	8 95	
900	2 9	2 90	15·5	2700	8 4	9 30	
1000	2 26	3 25	17·5	2800	8 25	9 70	
1100	2 44	3 60	19	2900	8 46	10 05	
1200	3 3	3 95	21	3000	9 7	10 40	
1300	3 22	4 30	23	3100	9 28	10 80	
1400	3 41	4 65	25	3200	9 49	11 20	
1500	4 0	5 0	27	3300	10 10	11 55	
1600	4 19	5 35	28·5	3400	10 32	11 90	
1700	4 38	5 70	30·5	3500	10 54	12 35	
1800	4 57	6 0	32·5				

Drill with 20-Pr. R.B.L. on Traversing Platform.

The detachment consists of 9 Nos., and falls in two deep.

To Tell Off.

Officer.	*No. 1.*
Tell off.	

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.

Officer.	*No. 1.*
Take post under cover.	*Right turn. Double march.*

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, 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, sets the time fuze, and lays.
No. 2 attends to clamping gear, sponges (if necessary), rams home, and elevates.
No. 3 attends to clamping gear, loads and rams home.
No. 4 attends to breech-screw and tin cups, supplies rammer to 2, and traverses.
No. 5 attends to breech-screw and vent piece, traverses, makes ready, and fires.
No. 6 supplies 3 with cartridges.
No. 7 attends to fuzes, and brings up projectiles.
No. 8 attends to cartridge store, and serves out cartridges to 6.
No. 9 attends to shell store, issues shells, tubes, and fuzes.

To Prepare for Action.

Officer.	*No. 1.*
Prepare for action.	*Prepare for action. Examine gun.*

"*Prepare for action.*"
The stores are brought up as follows:—
No. 1 sights, file for vent piece, hammer and punch.
No. 2 elevating wheel, and iron-shod lever.
No. 3 iron-shod lever, and removes apron and trampeons.
No. 4 sponge rammer, and support; tin cups in pocket and extractor.
No. 5 tubes in box, lanyard, oil can and hemp.

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

No. 7, a drill shell, fuzes, fuze, and shell implements, and one set of luff tackle. He obtains the fuze boxes from 9, having ascertained from No. 1 the nature of fuzes required, satisfying himself as to the correctness of fuzes and fuze implements.

No. 8 prepares to issue cartridges.

No. 9, one set of luff tackle and a brush; prepares to issue shells, tubes and fuzes; he examines the shells carefully, cleaning them if necessary, and removing burrs; he loosens the fuze hole plugs of shells that will be first issued.

* NOTE.—The sponge and rammer heads are upon the same stave.

The stores having been brought up, or found correct, No. 1 will satisfy himself that the foresights fit properly on the gun, and the deflection leaves of the hind sights work easily, that the clip plates are secured to the carriage; he ascertains that the hydraulic buffer is filled with the proper amount of oil, that the clamping gear is in adjustment and that the racers are swept; he receives reports from the Nos. responsible of any irregularity or deficiency in connection with the different parts of the gun, carriage, platform, stores, ammunition, &c.

No. 2 sees that the elevating gear is in good working order.

The sponge is laid down to the right of the gun, and parallel to it, rammer head to the front, resting on the support provided, and in line with the breech when the gun is run up. The sponge bucket near the sponge head.

The iron shod levers are laid down, bevelled side uppermost, on either side of the platform, and parallel to it, with their points to the front.

The tin cup extractor is placed in a loop on the carriage. If the tappet ring with keep pins have been detached, 4 brings them up.

5 straps the tube box round his waist on the right side, coils up the lanyard, and places the bight of it under the tube box strap. He fills the tube box with friction tubes, which he procures from 9.

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

"*Examine gun.*"

4 and 5 place themselves alongside the platform and facing the breech, 4 opens the breech by taking the lever handle in his right hand, back up, and swinging it round a half circle towards him, from cam to cam. This will strike a blow hard enough to move the screw, which is then unscrewed two turns, and the vent piece is released; 5 lifts the vent piece out of the slot, and lays it on the platform.

At "*Clear*" from No. 1, 5 drops in the vent piece, and takes the lever handle in his left hand, back up, and turning the handle towards him, screws up the breech-screw until it is home. 4 and 5 then go under cover.

If No. 1 gives "*Sponge out,*" No. 2 provides himself with the sponge, and sponges the gun out. At "*Clear,*" 5 acts as before detailed, 2 passes the sponge over his head, as he turns left about, replaces it and goes under cover.

No. 1 then directs 5 to fire a tube.

To Load.

Officer.	*No.* 1.
Range——yards.	*Run up. Halt.*
With——load.	*With——load.*

If the gun be at the rear of the platform; at "*Run up*" 2 and 3 would attend to the clamping gear, No. 1 giving the command "*Halt*" when the gun is in its proper position for loading.

At "*Load,*" No. 1 gives No. 7 the nature of shell and fuze required, and during the loading fixes his tangent scale at the required elevation and deflection, and places himself where he can best superintend the service of the gun.

2 and 3, as soon as 5 has lifted out the vent-piece, place themselves in a position for sponging or loading about the centre of the platform, and in line with the breech, facing each other, and separating their feet about 24 inches,

3 receives a shell from 7, and introduces the shell its own length into the bore, point to the front; 2 receives the rammer from 4, and, assisted by 3, rams home the projectile, their outward hands back under, inner hands back up; 3 then turns to his right, takes the cartridge out of the case, places it in the bore and goes under cover; 2 presses the cartridge gently home, withdraws the rammer, replaces it, and goes under cover.

Should "*Sponge out*" be given, 2 receives the sponge from 4, introduces it into the bore and sponges out in two motions; he then withdraws the sponge, cleaning the chamber well, and reverses the sponge. 4 and 5 move in, 4 unscrews the breech-screw, and 5 lifts out the vent piece and places it on the platform; 4 removes the old tin cup with the extractor, and goes to the rammer, lifts it with his left hand, back under, turning to the right about as he does so, hands it to 2, and goes under cover.

As soon as the gun is loaded, 4 and 5 again move in, 4 passes a tin cap down the slot, edge to the front, and presses it into the bore. 5 drops in the vent-piece, and screws up the breech screw, as before explained, 4 (for additional security) placing both hands on the top of the lever ball, and giving two smart taps; 4 and 5 then go under cover.

No. 6 brings up a cartridge in its case, and places it on the right of 3. While the projectile is being rammed home, he uncovers the case, and as soon as 3 has withdrawn the cartridge, he removes the empty case.

7 brings up a shell, fuzed as ordered, point to his right, and hands it to 3.

8 issues a cartridge to 6.

9 issues a shell to 7.

NOTE.—At drill the cartridge of the preceding round should be forced out of the bore in ramming home the projectile. If properly rammed home, the drill shell should have been forced through the bore in the act of loading.

To Lay the Gun.

Officer.	*No. 1.*
	Elevate. Halt.
	Depress. Halt.
	Trail right. Halt.
	Trail left. Halt.

No. 2 works the elevating-wheel, 4 and 5 traverse.

4 and 5 apply the iron shod levers and traverse as directed by No. 1.

Nature of Pivot.	*Position of Nos. 4 and 5.*
Pivot "A" (under the muzzle of the gun when run up).	"*Trail right.*" 4 stands facing to the rear with the point of his lever resting on the rear racer; at "*Halt*" he scotches the rear truck his own side with the lever. 5 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. "*Trail left.*" The numbers work in the opposite directions.
Pivot "B" (under the front part of the platform.)	As with "A" 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.

Should no order to fire be given when the gun is laid, No. 1 gives the order "*Under cover.*"

To Make Ready and Fire.

At "*Ready,*" 4 and 5 withdraw their levers, and place them, bevels up, as scotches under the trucks, 2 and 4 then go under cover. 5 presses a tube into the vent, and stands ready to fire, facing the gun.

At "*Fire*" 5 draws the lanyard strongly towards his body without a jerk replaces it under his belt, and goes under cover.

In the event of a missfire, No. 5 will drop in a tube, keeping clear of the recoil, and resume the position of "*Ready.*" At practice in the event of a second tube failing, after a miss-fire, and it being necessary to take out the vent-piece, 10 minutes should be allowed to elapse before the breech screw is unscrewed, and then the vent-piece removed as quickly as possible.

To Run Back.

Officer.	*No.* 1.
	Run back.
	Halt.

"*Run back*" 2 and 3 attend to the clamping gear, 4 and 5 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. "*Halt,*" when the gun is run far enough back, 2 and 3 secure the carriage. The front blocks are unhooked by 4 and 5, who carry them to the rear, lay them down clear of the racers, and coil down the ends of the falls.

To Cease Firing and Replace Stores.

Officer.	*No.* 1.
Cease firing.	*Examine gun.*
Replace stores.	*Sponge out. Clear.*
	Depress. Halt.
	Replace stores.

At "*Cease firing,*" "*Replace stores,*" No. 1 gives "*Examine gun,*" which is carried out as before detailed. At "*Depress*" 2 lays the gun "under metal."

At "*Replace stores*" 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.

Drill with 20-Pr. R.B.L. Gun on Travelling Carriage.

The detachment consists of 9 numbers, and falls in two deep in rear of the gun, which is limbered up.

To Tell Off.

Officer.	*No.* 1.
Tell off.	

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 of the 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 front is that direction in which the gun is pointed when unlimbered, or to which, when limbered up, the horses' heads are turned.

Position of Detachment when Limbered up.

In Order of March.

No. 1 in line with the point of the near shaft, and two yards on the left of it.
Nos. 2 and 3 in line with the axletree of the gun carriage.
Nos. 4 and 5 in line with the centre of the trail.
Nos. 6 and 7 in line with the axletree of the limber.
Nos. 8 and 9 in line with the splinter bar.
The Nos. stand covering, one yard from the wheels.

In Front.

Two deep, two yards in front of the shafts, or leaders' heads.

In Rear.

Two deep, two yards in rear of the muzzle of the gun.

Right or Left.

Two deep, in line with the gun axletree, one yard to the right or left of the wheel.

Change of Position of Detachments.

To form the Order of March from Detachment Front.

Officer.	*No.* 1.
Form the order of march.	*Right turn, double march.*

"*Right turn, double march.*"—No. 1 turns with the detachment; 2 and 3 wheel to their right and open out. Each number halts when at his post; they turn to the front together, looking to No. 2, who turns about immediately he arrives at his station.

To form the Order of March from Detachment Rear, Right, or Left.

Officer.	*No.* 1.
Form the order of march.	*Left turn, double march.*

When the detachments are in rear, or on the right, they proceed direct; but when on the left they countermarch to the left. No. 1 heads the rear rank. Each number halts when at his post.

To Change from Front to Rear.

Officer.	*No.* 1.
Detachment, rear.	*Right turn, double march.* *Rear turn.* *Right turn, halt, front.*

When the detachment is clear of the gun, it turns to the rear; when in line with the position of "*Detachment, rear,*" it turns to the right; and when in rear of the muzzle, it halts and fronts.

To Change from Rear to Front.

Officer.	*No.* 1.
Detachment, front.	*Right turn, double march.* *Front turn.* *Left turn, halt, front.*

When the detachment is clear of the gun it turns to its front; when in line with the position of "*Detachment, front,*" it turns to its left, and when in front of the leading horses it halts and fronts.

To Change from Rear to Right or Left.

Officer.	*No.* 1.
Detachment, right (left).	*Right (left) turn, double march.* *Front turn, halt.*

The detachment turns to its front when one yard clear of the gun wheel, and halts when in line with the axletree.

To form Detachment Rear from the Order of March.

Officer.	*No.* 1.
Detachment, rear.	*Right about turn, double march.* *Halt, front.*

Nos. 2 and 3 close to the centre, and wheel to their left, marking time when opposite the off wheel and two yards from it; as soon as the detachment has closed up it is halted and turned to the front.

To form Detachment Front from the Order of March.

Officer.	*No.* 1.
Detachment, front.	*Double march.* *Halt, front.*

No. 1 doubles out two yards in front of the near shaft, turns to his right, and gives the order "*Double march.*" Nos. 8 and 9, followed by the other Nos., double out. As soon as 8 is clear of the shafts he inclines towards 9. When 8 and 9 arrive in line with No. 1 they wheel to their left and mark time; when the detachment is closed up, No. 1 gives "*Halt, front,*" turning himself to the front at the same time.

To change Rounds when the Gun is Limbered up.

The detachment being at the "Order of March" in changing rounds,

No. 2 becomes No. 4.
" 4 " " 6.
" 6 " " 8.
" 8 " " 1.
" 1 " " 9.
" 9 " " 7.
" 7 " " 5.
" 5 " " 3.
" 3 " " 2

To Unlimber.

Officer.	*No.* 1.
Unlimber.	*Prepare to unlimber.* *Lift.* *Limber, drive on.* *Lower.*

"*Prepare to unlimber.*" No. 1 unkeys, and with 2 and 3 stand to the trail.

If there are no horses, 9 goes to the shafts, and 8 to the splinter bar on the near side.

To Limber up.

Officer.	*No.* 1.
Limber up.	*Prepare to Limber up.* *Lift.*

The several Nos. place themselves as for unlimbering, and at "*Lift*" lift the trail, when the limber is in position for limbering up No. 1 keys up and the detachment form the order of march.

To Take Post under Cover.

Officer.	*No.* 1.
Take post under cover.	*Right turn.* *Double march.*

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).

To take Post at the Gun.

Officer.	*No.* 1
Take post at the gun.	*Right turn.* *Double march.*

Where there is no parapet, the detachment files on the gun at "*Take post at the gun*" Nos. 2 and 3 halting in line with the breech and one yard from it, 4 and 5 the centre of the trail, the whole in echelon outwards. No. 1 in rear of the gun, 8 in rear of the left limber box, 9 in rear of the right limber box, 6 and 7 on the outsides of 8 and 9.

General Duties.

No. 1 commands, sets the time fuze, directs the gun into the line of fire when running up and lays.

No. 2 runs up, sponges (if necessary), rams home, and traverses.

No. 3 runs up, loads, and rams home.

No. 4 runs up, attends to breech screw, and tin cups when used, supplies rammer to 2, and attends to elevating screw in laying.

No. 5 runs up, attends to breech screw and vent piece, makes ready, and fires.

No. 6 supplies 3 with cartridges.

No. 7 attends to fuzes and brings up projectile.

No. 8 attends to the cartridge store or limber, and serves out cartridges to 6.

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

To Prepare for Action.

Officer.	*No.* 1.
Prepare for action.	*Prepare for action.* *Examine gun.*

"*Prepare for action*"

The stores are brought up as follows :—

No. 1, handspike, sights, file for vent piece, hammer, and punch.

No. 3, elevating screw ; he also removes apron and tampeons.

No. 4, sponge, rammer, and support, tin cups in pocket, and tin cup extractor.

No. 5, tubes in box, lanyard, oil can and hemp.

No. 6, two cartridge cases, which he leaves at the cartridge store or limber, bucket, filled, and brush, two drill cartridges for drill purposes.

No. 7, a drill shell, fuzes, fuze and shell implements. He obtains the fuze boxes from 9, having ascertained from No. 1 the nature of fuzes required, satisfying himself as to the correctness of fuzes and fuze implements.

No. 8 prepares to issue cartridges.

No. 9 provides a brush for cleaning shell, prepares to issue shells, tubes, and fuzes. He examines the shells carefully, cleaning them if necessary, and removing burrs. He loosens the fuze hole plug of shells that will be first issued.

The stores having been brought up, No. 1 will satisfy himself that the foresights fit properly on the gun, that the deflection leaves of the tangent sights work easily, and that the platform is properly swept. He receives reports from the numbers responsible of any irregularity or deficiency in connection with the gun, ammunition, or stores. He ascertains that the breech fittings are properly put on and well oiled.

The sponge is laid down to the right of the gun, and parallel to it, rammer head to the front, resting on the support provided, and in line with the breech when the gun is run up. The sponge bucket is placed near the sponge head.

NOTE.—The sponge and rammer heads are upon one stave.

No. 1 ships the handspike. The tin cup extractor is placed in a loop on the carriage. If the tappet ring, with keep pins and lever, have been detached, 4 and 5 bring them up and put them on, under the superintendence of No. 1. No. 4 sees that the elevating screw is properly oiled. 5 straps the tube box round his waist on the right side, doubling the lanyard in four, and placing it under his belt. He fills the tube box with friction tubes, which he procures from No. 9.

At "*Examine gun*," 4 moves the elevating screw handle until the axis of the bore is horizontal ; he then opens the breech by taking the lever handle in his right hand, back up, and swinging it round a half circle towards him from cam to cam : this will strike a blow hard enough to move the screw, which is then unscrewed two turns and the vent-piece is released. 5 then steps in, and lifts the vent-piece out of the slot.

At "*Clear*," from No. 1, 5 drops in the vent-piece ; 5 then takes the lever handle in his left hand, back up, and turning the handle towards him, screws up the breech screw until it is home. 4 and 5 then go under cover or take post.

If No. 1 gives "*Sponge out*," No. 2 provides himself with the sponge and sponges out the gun. At "*Clear*," 4 and 5 act as before detailed, 2 passes the sponge over his head as he turns left about, replaces it, and goes under cover.

No. 1 then directs 5 to fire a tube.

To Load.

Officer.	*No.* 1.
Range——Yards. *With——Load.*	*Run up, Halt.* *With——Load.*

The gun is generally run up before loading. At "*Run up*" 2, 3, 4 and 5 man the wheels, and turning them by means of the spokes, No. 1 lifting at the handspike, guides the gun into the line of fire. As soon as the wheels nearly touch the hurter, No. 1 gives "*Halt.*" At "*Halt,*" each number returns to his place. Should it be necessary to run the gun back, No. 1 gives "*Run back*" when the same numbers move the gun.

At "*Load,*" No. 1 gives No. 7 the nature of shell and fuze required, and during the loading fixes his tangent scale at the required elevation and deflection, and places himself where he can best superintend the service of the gun.

4 and 5 step in, 4 unscrews the breech screw and 5 lifts out the vent piece and rests it on the nave of the left wheel; 4 removes the old tin cup with the extractor, and 5 cleans the vent piece, if required; 4 and 5 then go under cover.

2 and 3 then step in and place themselves in position for loading about the centre of the trail, facing each other, and separating their feet about 24 inches; 3 receives a shell from 7, and introduces the shell its own length into the bore, point to the front; 2 then receives the rammer from 4, and assisted by 3, rams home the projectile, their outward hands back under, inner hands back up; 3 then turns to his right, withdraws the cartridge from the cartridge case, places it in the bore, choke to the front, and goes under cover: 2 presses the cartridge gently home, withdraws the rammer, replaces it, and goes under cover.

Should "*Sponge out*" be given, 2 receives the sponge from 4, introduces it into the bore, and sponges out in two motions; he then withdraws the sponge, cleaning the chamber well and reverses the sponge.

No. 4 takes up the rammer with his left hand back under, turning to the right about as he does so, hands it to No. 2, and goes under cover.

As soon as the gun is loaded, 4 and 5 step in, 4 passes a tin cup down the slot, edge to the front, and presses it into the bore; 5 then drops in the vent piece, screwing up the breech screw as before detailed, 4 (for additional security) placing his hands on top of the lever handle and giving two smart taps; 4 and 5 then go under cover.

No. 6 brings up a cartridge in its case, and places it on the right of No. 3. While the projectile is being rammed home, he uncovers the case, and as soon as 3 has withdrawn the cartridge, he removes the empty case.

7 brings up a shell, fuzed as ordered, and hands it to 3.

8 issues a cartridge to 6.

9 issues a shell to 7.

NOTE.—At drill the cartridge of the preceding round should be forced out of the bore in ramming home the projectile. If properly rammed home the drill shell should have been forced through the bore in the act of loading.

To Lay the Gun.

Officer.	*No. 1.*
	Elevate. Halt.
	Depress. Halt.
	Trail right. Halt.
	Trail left. Halt.

No. 1 looks over the sights, steadying himself by leaning on the lever and works the traversing wheel.

4 works the elevating screw until "*Halt*" is given, 5 makes ready a tube.

At "*Trail right*" or "*Trail left,*" 2 standing at the point of the handspike heaves over the trail.

Should no order to fire be given when the gun is laid, No. 1 gives the order "*Under cover,*" or "*Take post.*"

To Make Ready and Fire.

Officer.	*No. 1.*
Fire——Rounds.	*No.——Ready.*
	No.——Fire.

No. 1 lowers his tangent scale except when firing at a moving object, and gives "*Ready;*" 5 presses a tube into a vent with his right thumb, step; clear of the recoil, shifts the lanyard to his right hand and extends it, keeping his hand level with the vent, facing the gun.

At "*Fire*" 5 draws the lanyard strongly towards his body without a jerk, replaces it under his belt, and goes under cover.

In the event of a missfire No. 5 will drop in a tube, keeping clear of the wheel, and resume the position of "*Ready.*" At practice, in the event of a second tube failing after a missfire, and it being necessary to take out the vent piece, ten minutes should be allowed to elapse before the breech screw is unscrewed, and then the vent piece removed as quickly as possible.

To Run Back.

Officer.	*No.* 1.
	Run back——Halt.

At "*Run back,*" which No. 1 gives (at drill) immediately after the gun has been fired, 2, 3, 4, and 5 man the wheels. No. 1 lifts at the handspike.

To Cease Firing and Replace Stores.

Officer.	*No.* 1.
Cease firing.	*Examine gun.*
Replace stores.	*Sponge out. Clear.*
	Depress. Halt.
	Replace Stores.

At "*Cease Firing. Replace stores,*" No. 1 gives "*Examine gun,*" which is carried out as before detailed. At "*Depress*" 4 lays the gun "under metal." At "*Replace stores*" the stores are replaced by the Nos. who brought them up.

N.B.—The above drill has reference to a detachment under cover, but is applicable, with trifling modifications, to the case where there is none, and the detachment takes post at the gun.

To Form Detachment Rear.

Officer.	*No.* 1.
Detachment rear.	*Outwards turn.*
	Right about turn.
	Double march.
	Halt. Front.

At "*Detachment rear*" No. 1 doubles to the left rear of the platform, faces to the left, and gives "*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 their 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 in Action.

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; and 3, 2.

INSTRUCTIONS FOR THE DISABLEMENT OR DESTRUCTION OF GUNS BY MEANS OF GUNCOTTON.

THE DESTRUCTION OF HEAVY GUNS WHEN TIME IS IMMATERIAL.

1. This duty will be performed by the Royal Artillery, the stores marked (*a*) in the following list being obtained from the Royal Engineers; and the remainder taken from the siege train equipment.

The materials required are as follows:—

(*a.*) Guncotton (1-lb. slabs), perforated, to receive a dry primer; 2 slabs for each charge, and spare slabs at the rate of 2 spare for every 5 (or less number) of guns to be destroyed.

The "guncotton wet slabs, 2 perforations," mentioned in List of Changes, § 4883, are cut in half to form these 1-lb. slabs. They are issued wet, and arrangements are made for so keeping them, but it is immaterial whether they are wet or dry when required for use.

(*a.*) Guncotton primers, dry, weighing 1 oz., 1¼ inch in diameter, coated with paraffin; 1 primer for every 2 slabs.

Bags, waterproof, to contain 2 lb. of guncotton, 1 for every 2 slabs carried.

(*a.*) Exploder, dynamo-electric, quantity.

(*a.*) Solution, india-rubber, in tin cylinder.

(*a.*) Twine, stout, 1 lb.

This is sufficient for about 20 charges.

(*a.*) Detonators, No. 13, in a cylinder containing 25 detonators, with a rectifier.

Each cylinder will suffice for 20 charges, with 5 spare detonators.

(*a.*) Wire, insulated, lengths of 40 yards each.

Five additional yards are required for each charge after the first operation, to replace the wire blown away by a discharge.

Tackle and selvagees, with rollers, skidding, handspikes, &c., for lowering the gun into a pit, or up-ending it under the branch of a tree.

The exact proportion of these cannot be given. It will depend upon the size of the guns to be destroyed, upon local circumstances, &c.

Directions for carrying out the Operations.*

Plug up, with a peg of wood, the vent of the gun to be disabled, driven well in so as to make the vent watertight.

Up-end the gun on its breech, either by digging a pit for its reception, or by other convenient means.

The officer in charge of the operations must be guided by local circumstances, but the more the gun is raised vertically on its breech the better.

* See note at end.

Clean the terminals of the insulated wire, and of the wires attached to the detonators, by scraping. The detonator is then to be connected with the insulated wires. To secure perfect electrical circuit the junctions must be insulated from each other by smearing them over with india-rubber solution, and wrapping them with tape (india-rubber or calico).

Insert the detonator, after securing it to the wires, into a dry primer, first using the rectifier to ensure the hole in the primer being of a proper size to admit the detonator, which should be set home to the head.

On no account whatever should a detonator be twisted or roughly forced into a primer.

Insert the dry primer, fitted with detonator, into the perforation in one of the 1-lb. slabs, pushing it gently in until the hole in the slab is quite filled by it.

Place the slab thus prepared, together with another slab, in a waterproof bag.

Choke the neck of the bag with twine closely round the insulated wires; plaster the inner portion of the choke round the wires with the india-rubber solution, and choke again round and above the solution, so as to make the whole as watertight as possible.

Attach to the wires a small sinker of any heavy material, so that its weight comes on them above the choke. The sinker should be small in bulk, so as to allow the charge to settle home to the bottom of the bore; and, when hanging freely from its point of support, it should be just below the bottom of the bag.

Attach to the choke a piece of stout twine long enough to reach to the bottom of the bore of the gun, and lower the charge by it carefully to the bottom of the bore, paying out the insulated wires at the same time, and taking care that no strain comes on them.

In operating upon guns of the heavier natures, it is advisable, in order to ensure their destruction, to employ two charges, to be fired simultaneously in different parts of the gun's bore. These charges should be prepared as directed and should then be firmly attached to a stick of such length that, when inserted into the gun, one of the charges shall be at the breech of the gun while the other should be just above the trunnions. One of the wires from the exploder should be attached to the detonator in the lower charge, the other wire from the exploder being attached to one of the wires of the detonator in the upper charge. The other wires of the detonators should be connected together by a piece of insulated wire. The whole of the connections must be carefully insulated.

(The sinker, which should be attached to the stick, or the lower charge, must be sufficiently heavy to prevent the charges floating).

Fill up the bore with water; connect the free ends of the insulated wires with the binding screws of the exploder, and, after seeing that all is clear, fire the charge by turning, or pressing down, sharply the handle of the exploder.

This should be done immediately after lowering the charges into the gun, so as to give the water as little time as possible to effect an entrance into the bag.

The operator should be careful to place himself and his party under cover, and the terminals of the conducting wires are not to be connected to the exploder until all present have placed themselves under cover.

In the event of a detonator failing, at once disconnect the wires from the exploder. The charge must then be taken up and re-made, with a fresh detonator. Great caution must be exercised in slowly extracting the detonator from the primer.

Cautions.

Care should be taken to see that the insulation of the wire is perfect, that the connections are clean and good, and that they are afterwards thoroughly insulated.

If any part of the wire is accidentally denuded of its insulation, prop up the adjacent insulated portion, so that the bared portion will not touch the ground. If time allows, it is better to wrap the defective place thoroughly in india-rubber tape.

Detonators by themselves must always be handled with the greatest care and freedom from rough usage, and still more so when they are fitted into guncotton. The latter by itself is harmless.

Immediately after an explosion, detach the wires from the exploder, and do not re-attach them till just before firing the next charge.

THE HASTY DISABLEMENT OF SIEGE GUNS.

The hasty disablement of siege guns will be carried out by the Royal Artillery.

Stores required.

The necessary supplies of guncotton for the disablement of siege guns will be obtained from the Royal Engineer Siege Park.

The following stores will be carried with each unit of the Siege Train :—

Boxes	guncotton, slabs*	1—½ slab	8
		8—½ slabs	1
	stores, disabling, ordnance, siege		1
	vesuvian matches		1
Cases	detonator, for 8†		2
	guncotton primers†		2
	guncotton slabs†		4
Cylinders	detonator, No. 8, for 8		2
	guncotton primer, dry, 1¼ in. × 1¼ in., for 8		2
Detonators, No. 8			16
Guncotton	dry primers, 1 perforation, 1¼ in. × 1¼ in.		16
	wet slabs, 2 perforations, 6⅛ in. × 6⅛ in. × 1⅛ in.		8‡
Pouches, match-box†			1
Rectifiers, guncotton primers			2
Twine, choking, 3-thread		pieces	1

Instructions for carrying out the Operations.§

In the case of guns of 64-pr. and larger calibres two slabs must be employed.

Insert a detonator into a dry primer.

On no account should a detonator be twisted or roughly forced into a primer.

Insert the dry primer fitted with detonator into the perforation in one of the slabs, pushing it gently in until the hole in the slab is quite filled by it.

Tie a piece of twine round the detonator, pass the ends round the slab, and then tie them together; the object being to prevent the primer slipping out of the slab.

Place the slabs lengthways on the chase, their long sides touching, about a foot from the muzzle. Tie them on tightly with twine, to prevent them slipping from wind or other disturbing cause.

The exact position must depend on the form of the gun. The great thing is to have as much of the surface of the cotton *in actual contact* with the gun as possible. Hence the slabs should not ride on an astragal or moulding, but should always be placed on a plain part of the chase.

Observe the direction of the wind, and arrange the slab containing the detonator so that the tail of the safety fuze is away from the slab and to leeward of it. This is to lessen the chance of a spark igniting the guncotton before the detonator is fired, in which case, in all probability no effect whatever would be produced on the gun.

---

* Copper, tinned. † Leather.

‡ In half slabs, 1 perforation in each. § See note at end.

If projectiles belonging to the gun are available, and time allows, it is advisable to ram one up the bore; so that when the gun is dented by the explosion it may be imprisoned there and prevent the gun from being used even to fire a bag of bullets.

Tear or cut the little calico cap off the end of the safety fuze and ignite the fuze by the vesuvian matches provided, or other convenient means. An ordinary flame does not readily ignite it. The fuze ignites most easily when cut obliquely with a sharp knife.

Retire under cover, and await the explosion. The length of safety fuze will burn about 45 seconds.

Should circumstances permit, the effect of the detonation will be increased by placing a filled sandbag or a sod of turf on the guncotton, when lashed in position on the chase. Great care should be taken in this operation not to strike or bend the detonator.

It is also advisable, after the explosion, to try if the gun is so dented as to prevent loading. If the dent is not sufficient, the operation should be repeated putting the fresh slabs in the same place as the first.

Caution.

Never roughly bend or kink the safety fuze. If it has apparently gone out without firing the detonator, allow at least half an hour to elapse before meddling with it, if time will admit, but if not, the greatest care must be taken in touching it, to avoid accident by a "hang fire."

NOTE.—The above instructions have been prepared with special reference to the disablement or destruction of muzzle-loading guns. Breech-loading guns can generally be temporarily disabled by the removal or destruction of portions of the breech apparatus. In destroying such guns, or rendering them permanently disabled, Officers will, while being guided generally by these instructions, use their discretion as to the application of the charges in such positions as may appear most suitable, according to the particular construction of the gun to be operated upon.

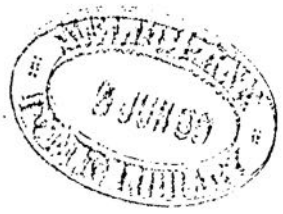

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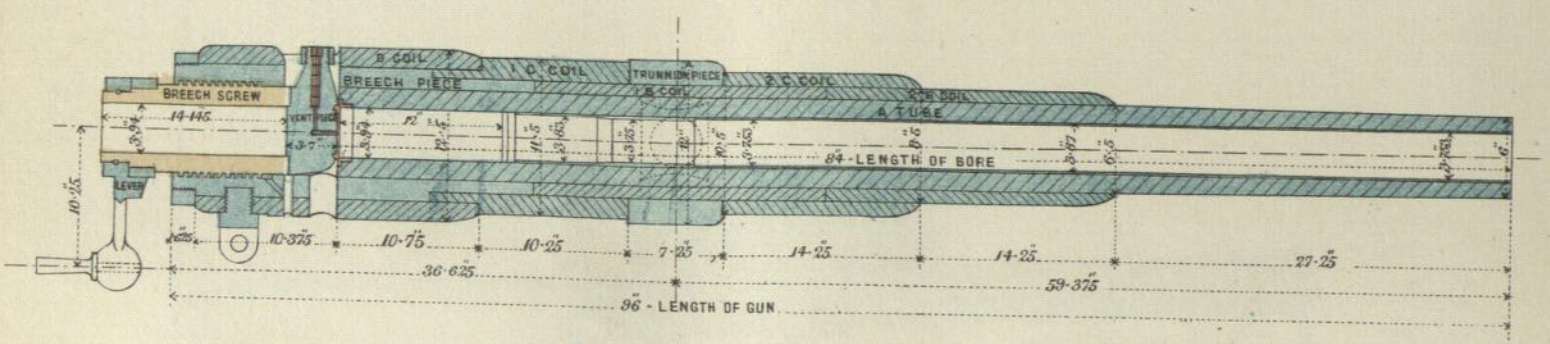
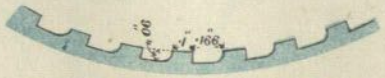
Plate 1.

ORDNANCE R. B. L. 20 PR. 16 CWT.

SCALE $\frac{1}{14}$





SECTION OF RIFLING.
FULL SIZE.

DANGERFIELD LITH. 22 BEDFORD ST. COVENT GARDEN

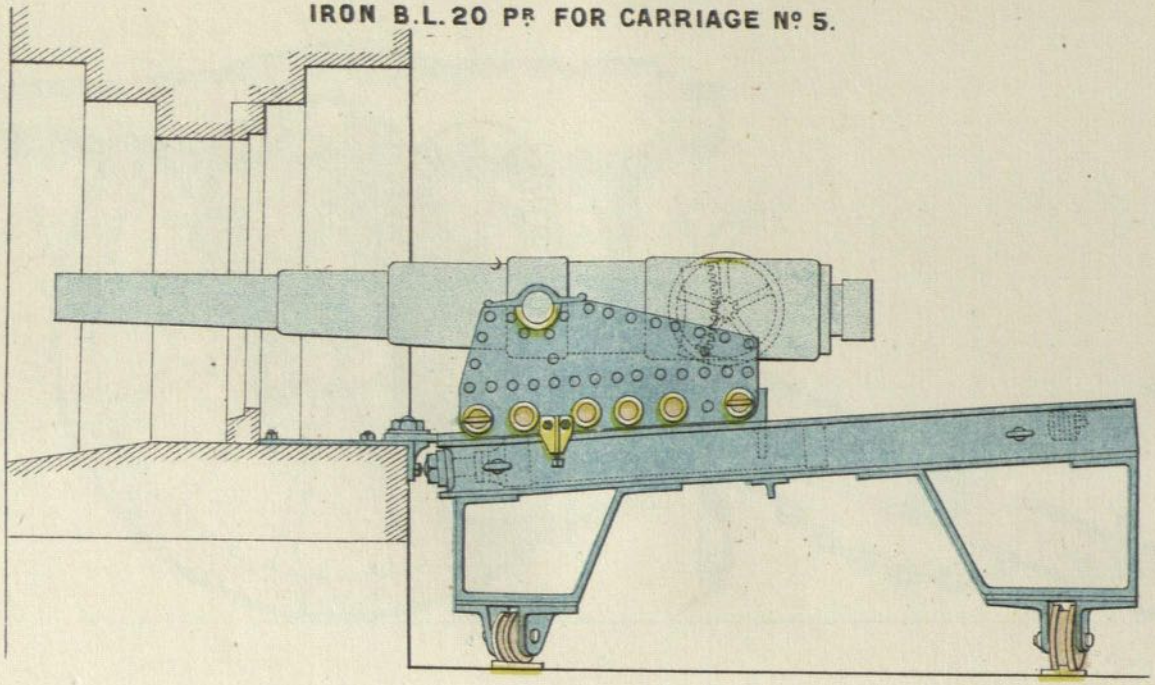
Plate II.

CARRIAGE. GARRISON. SLIDING. MEDIUM. Nº 5.

IRON B.L. 20 PR FOR PLATFORM Nº 5.

PLATFORM TRAVERSING MEDIUM Nº 5.

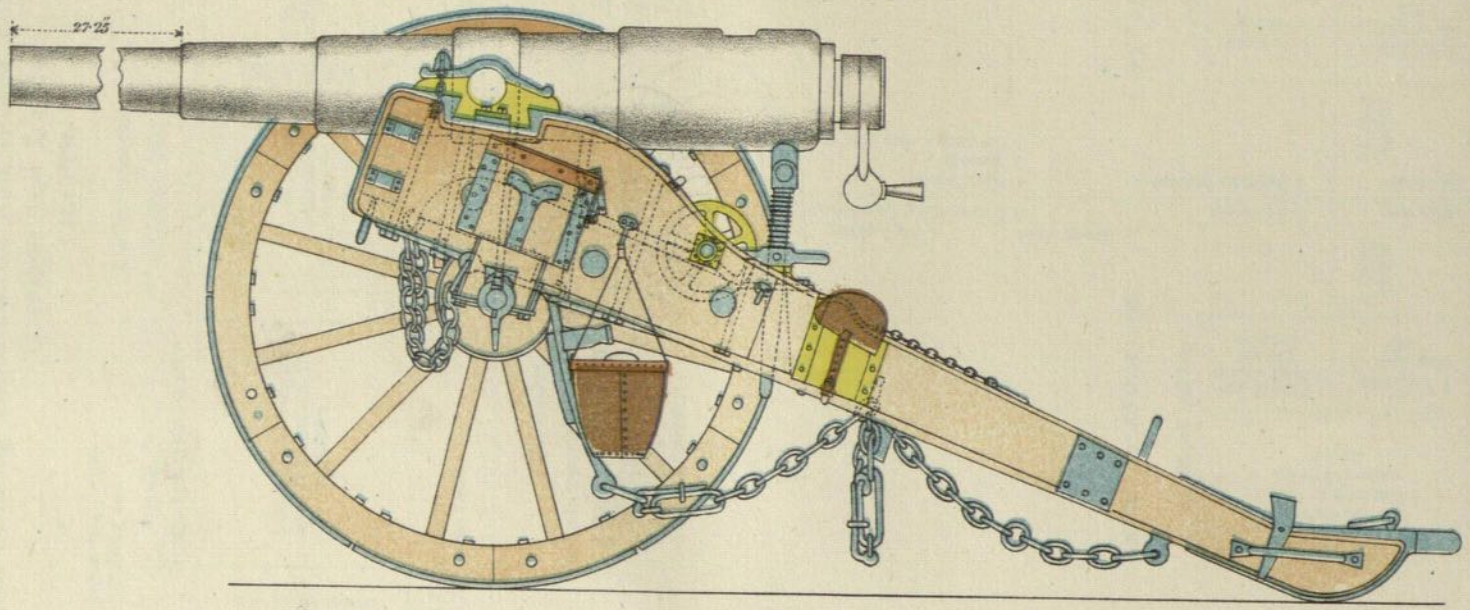
IRON B.L. 20 PR FOR CARRIAGE Nº 5.



DANGERFIELD LITH. 23 ...

CARRIAGE. FIELD. R.B.L. 20 PR.

WOOD WITHOUT LIMBER.

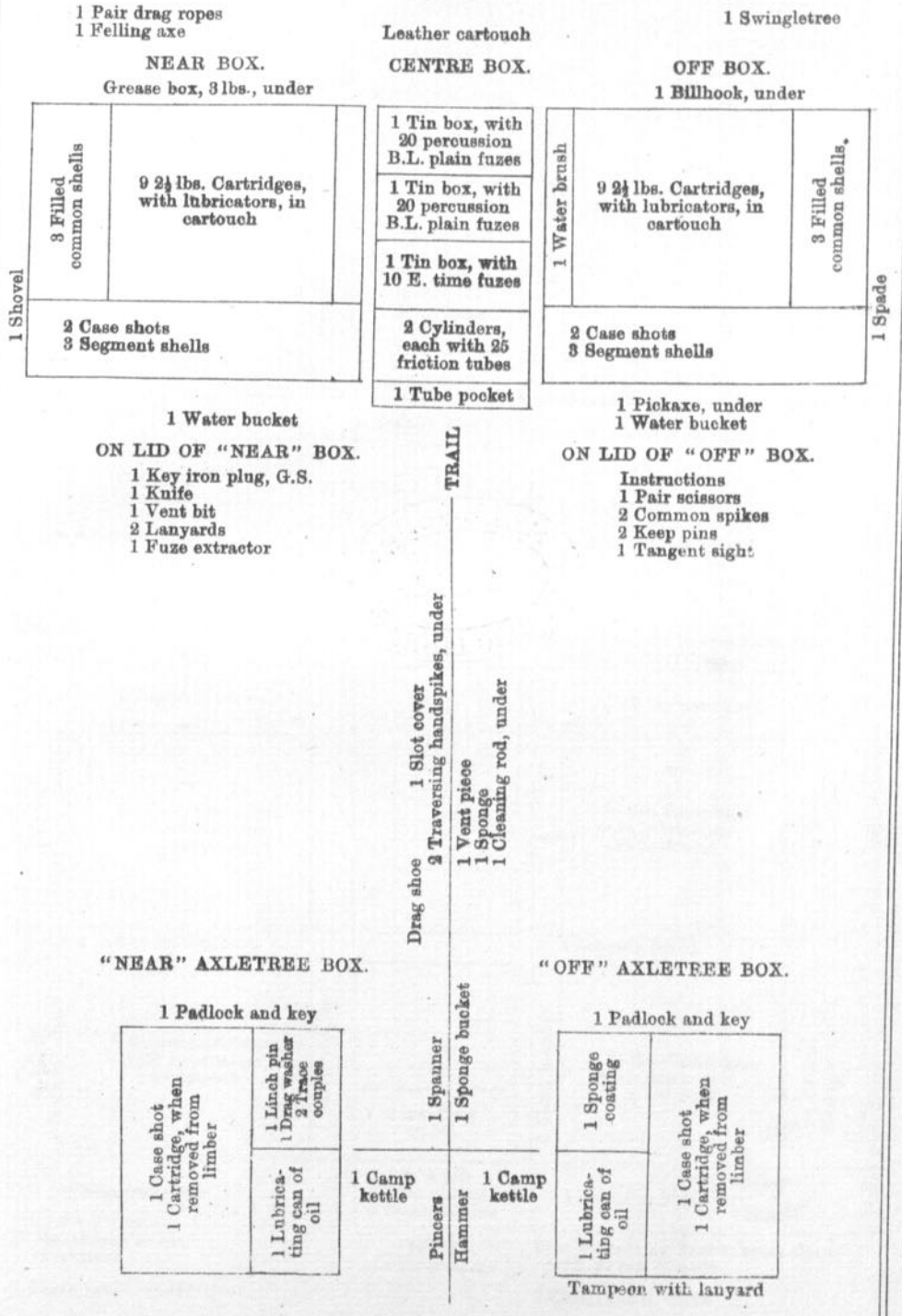


DANGERFIELD. LITH. 22. BEDFORD ST COVENT GARDEN 5.86.11922.

20 Pr. R.B.L. (16 cwt.)

Mode of Packing Ammunition and Stores belonging to the Gun, Carriage and Limber.

LIMBER.

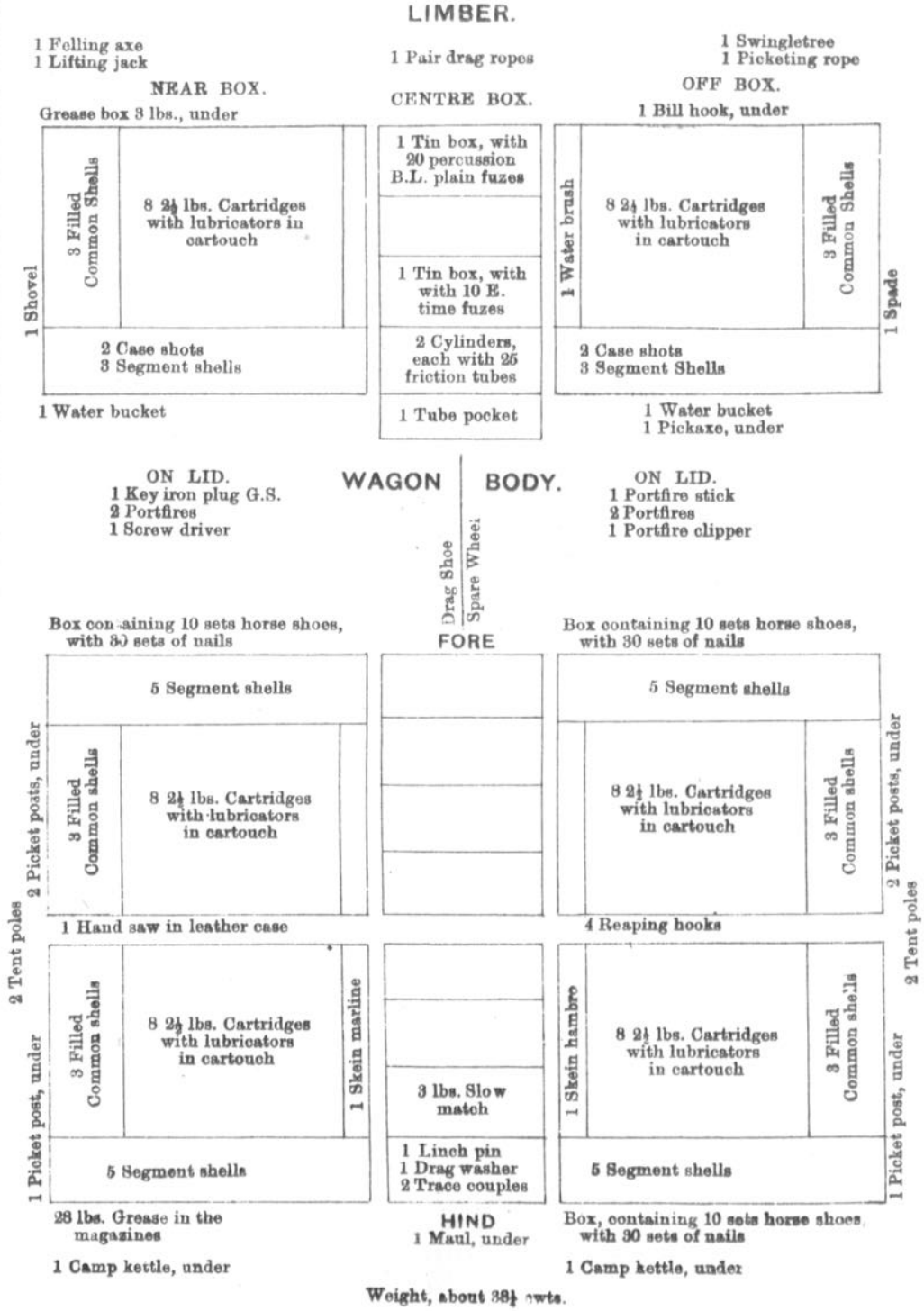


Weight, packed, about 48½ cwt.

DANGERFIELD, LITH. 22, BEDFORD ST. COVENT GARDEN 5.86.11922

20 Pr. R.B.L. (16 cwt.)

Mode of Packing Ammunition and Stores belonging to the Ammunition Wagon and Limber.



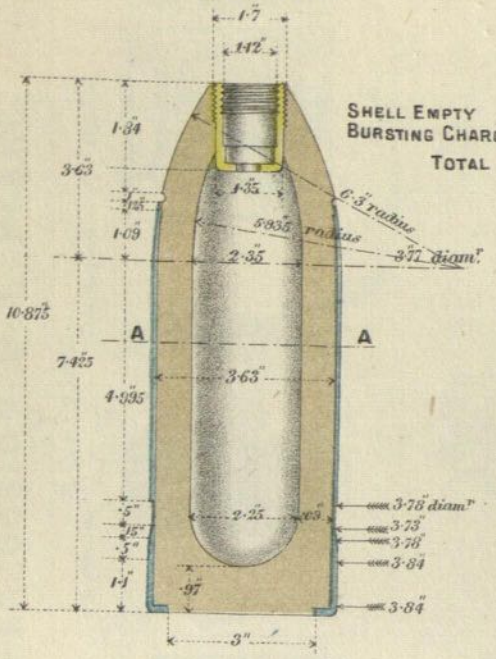
Weight, about 38¼ cwts.

DANGERFIELD, LITH. 22, BEDFORD ST. COVENT GARDEN 5.86.11922

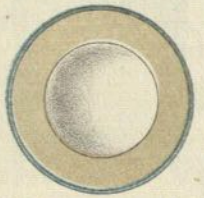
Plate VI

PROJECTILES R.B.L. 20 PR.

COMMON II.

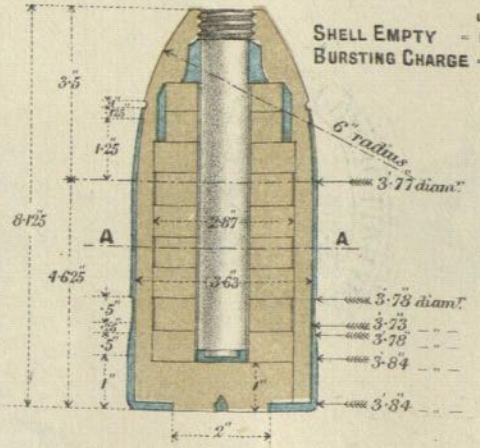


	LB.	OZ.
SHELL EMPTY	= 20.	8
BURSTING CHARGE	= 1.	2
TOTAL	21.	10

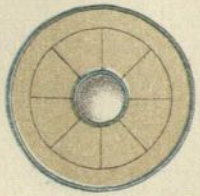


SECTION AT A.A.

SEGMENT II.

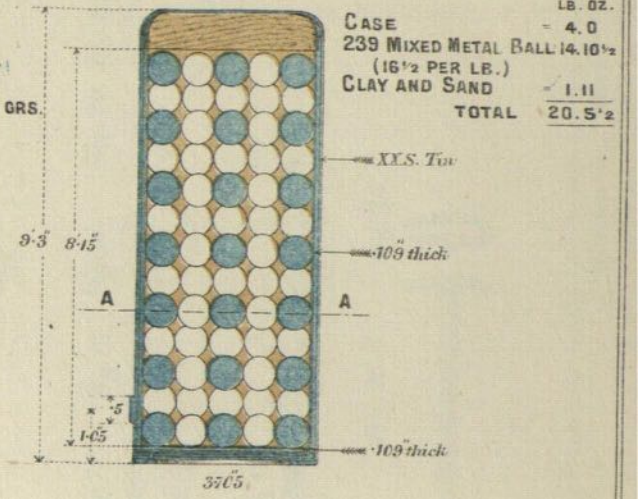


	LB.	OZ.
SHELL EMPTY	= 19.	10
BURSTING CHARGE	= 700 GRS.	

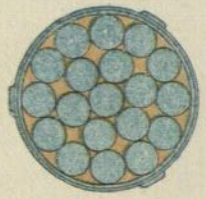


SECTION AT A.A.

CASE III.



	LB.	OZ.
CASE	= 4.	0
239 MIXED METAL BALL (16½ PER LB.)	14.	10½
CLAY AND SAND	= 1.	11
TOTAL	20.	5½



SECTION AT A.A.

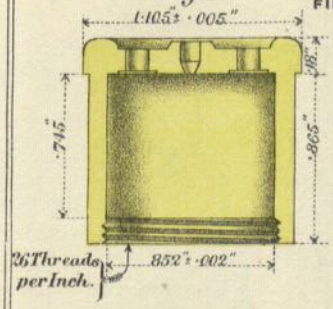
DANGERFIELD, LITH. 22, BEDFORD ST COVENT GARDEN 5.86.11922

FUZE PERCUSSION. B. L. PLAIN.

IV.

§ 2292 & 2620

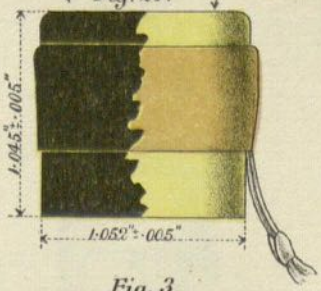
Fig. 1.



FINISHED

Fig. 27.

UNPAINTED



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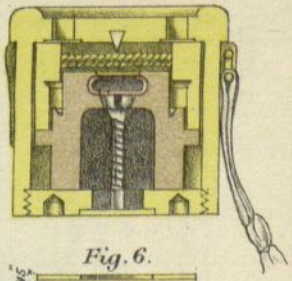
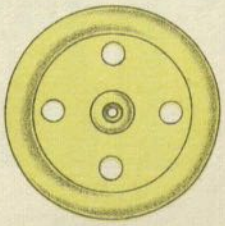


Fig. 6.

Fig. 2.



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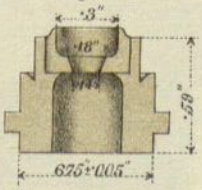

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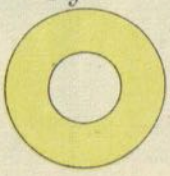

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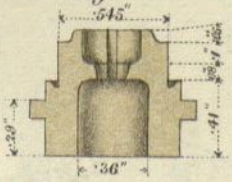

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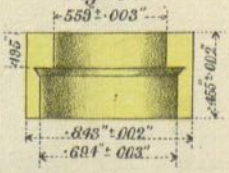

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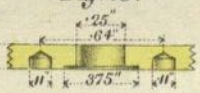

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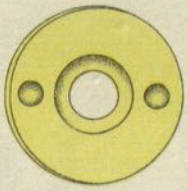

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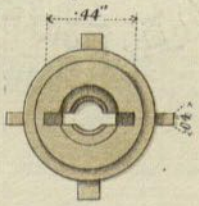

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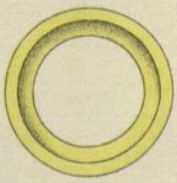


Fig. 12.

Fig. 14.

Fig. 16.

Fig. 18.

Fig. 20.

Fig. 22.

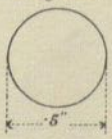


Fig. 23.

Fig. 13.

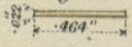


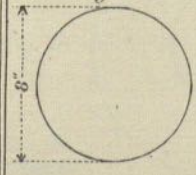
Fig. 15.

Fig. 17.

Fig. 19.

Fig. 21.

Fig. 24.



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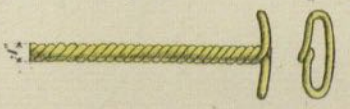


Fig. 26.

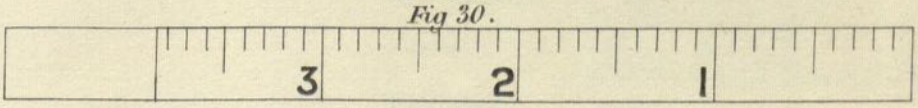
Copper
Gun metal
Lead
Brown paper

FUZE TIME METAL ARMSTRONG E

CAP III.

§ 1790

Fig 30.



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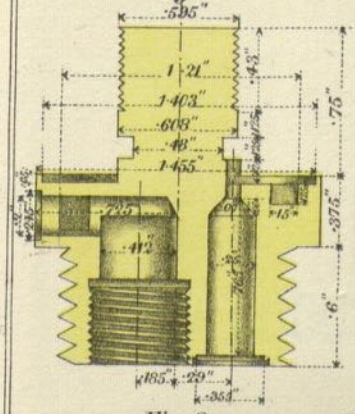

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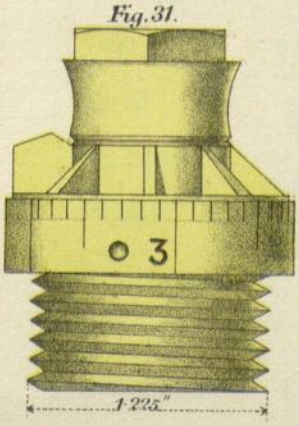

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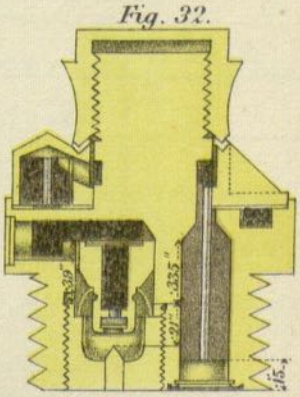

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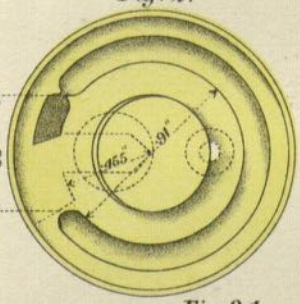


Fig. 9.

Fig. 10.

Fig. 3.

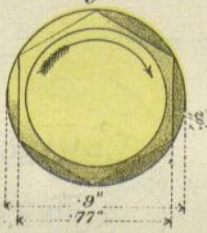


Fig. 11.

Fig. 12.

Fig. 14.

Fig. 5.

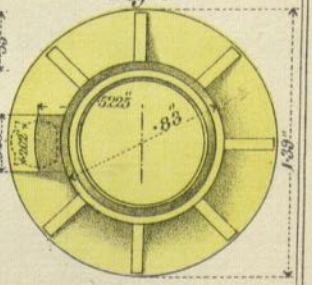
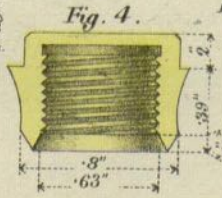


Fig. 13.

Fig. 15.

Fig. 4.



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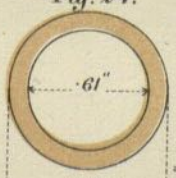

Fig. 7.

Fig. 6.

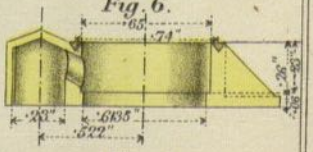

Fig. 16.

Fig. 18.

Fig. 20.

Fig. 8.

Fig. 25.

Fig. 22.

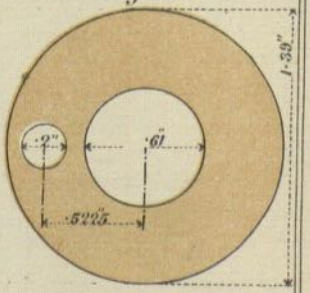

Fig 17.

Fig. 19.

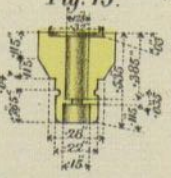

Fig. 21.

Fig. 26.

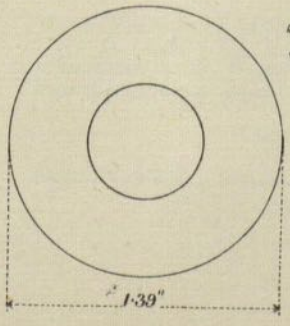

Fig. 27.

Fig. 28

Fig. 29.

Fig. 23.