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HANDBOOK

1460

FOR

9-PR. R.M.L. GUNS OF 6-CWT. & 8-CWT.

(LAND SERVICE).

1889.

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PLATES.

MEMO.

This handbook is correct up to November, 1889. Any alterations which may be suggested should be forwarded to Assistant to D. of A., Woolwich.

9-pr. Rifled Muzzle-loading Guns of 6-cwt. & 8-cwt.

DESCRIPTION.

GUN.

(Plates I and II.)

		6-cwt. Gun.	8-cwt. Gun.
Material,	exterior	Wrought iron	Wrought iron.
	tube	Steel	Steel.
Length,	nominal	71 inches	68·5 inches.
	total	74·5 inches	72 inches.
Weight, nominal		6 cwt.	8 cwt.
Preponderance		10 lb.	7 lb.
Bore,	calibre	3 inches	3 inches.
	length	66 inches	63·5 inches.
	capacity of unrifled portion of bore	24·86 cubic inches	24·86 cubic inches.
Rifling,	system	Woolwich	Woolwich.
	twist	Uniform, 1 in 30 cals.	Uniform, 1 in 30 cals.
	length	62·3 inches	59·8 inches.
	grooves — No.	3	3.
	grooves — depth	0·11 inch	0·1 inch.
	grooves — width	0·8 inch	0·8 inch.
Vent, hardened copper		0·6 inch from end of bore.	0·6 inch from end of bore.

SIGHTS.

The guns are sighted centrally, and provided with the following *sights*:—

6-cwt. Gun:—Two tangent scales, graduated in degrees, yards, and lengths of fuze; one reading from 0° to 5°, the other from 0° to 12°.

8-cwt. Gun:—Two tangent scales, graduated in degrees, yards, and lengths of fuze, one reading from 0° to 6° and the other to 12°.

The tangent scale is set at an angle of 1° 30′ to correct drift. It has a gun-metal sliding leaf, graduated to 30 minutes for deflection, in order to allow for wind or other irregularity.

1 foresight. A small hog-backed sight screwed into a recess in the dispart patch.

A clinometer is supplied for elevation above 12°.

CARRIAGE AND LIMBER, MARK I.

The carriage is formed of two bracket sides, connected by transoms, bolts, and a trail plate; an axletree bed with axletree and field wheels.

Each bracket side is constructed of plate iron, rivetted to the outer side of an angle iron frame.

The trail plate is of the same form as in the wood field gun carriages; its eye is steeled to prevent wear.

The axletree bed is of wrought iron, constituting with the axle a beam of box girder section. It is connected to the brackets by stays.

The wheels are of the 2nd class, with metal nave.

The elevating screw is of the Whitworth pattern, and is worked by a handwheel on the right.

The axletree boxes are fitted with guard-irons and sliding foot rests, in order that they may serve as seats. Each carries two rounds of case shot, or two shells and small stores. A leather guard is fitted to the lid of the near box to protect the gunners' overalls from contact with the sponge head.

The limber is formed on the same plan as the wood limber, but has the futchells and splinter bar of iron.

To support the ammunition boxes, four knees of T-iron are secured to the back of the bed.

The limber hook is steeled to prevent wear, and has a steel key.

The axletree is the "light field" axle (2nd class), and the wheels are the same as those for the gun carriage.

The shafts are "near" and "off," the latter known as the "Brandling" pattern, and the limber is fitted for single, double, treble, and bullock draught.

The limber boxes are "near," "off," and "centre;" the "near" and "off," carry each 18 projectiles in trays, and as many cartridges in a canvas cartouche.

Four extra projectiles can be carried under the trays, and as many more cartridges in the cartouche when necessary. In this case, however, the cylinder for bits and hookborer will have to be removed from the lids of the off limber boxes, and carried where convenient.

CARRIAGE AND LIMBER, MARK II.

(*Plates III and IV.*)

The carriage differs from Mark I carriage, in having the plate of each bracket placed on the inner instead of the outer side of the frame; and in the trail piece, which lies between the brackets instead of overlapping them.

The wheels and elevating screw are the same as in Mark I carriage; the axletree boxes are similar, but not interchangeable with those of Mark I.

The limber differs from Mark I in having an iron (box girder) axletree bed instead of wood, and in the form of the limber hook, which is made to stand out from the bed, and so obviates the necessity of a block between them.

The wheels and boxes are the same as in Mark I limber.

		Mark I.	Mark II.
Height, centre of gun		3′ 6″	3′ 6½″
Length of carriage, with wheels		10′ 3″	10′ 4″
Length of carriage, without wheels		9′ 0″	8′ 10½″
Length of axletree		6′ 4¼″	6′ 4¼″
Length of carriage & limber, without gun		21′ 0½″	21′ 3½″
Length of carriage & limber, with gun		22′ 4½″	22′ 6″
Minimum space through which carriage can turn		32′ 3″	32′ 0″
Angle of trail		22°	23°
Elevation, maximum, with screw		21½°	22°
Elevation, maximum, without screw		24°	22°
Depression, maximum		4°	6½°
Wheels, track		5′ 2″	5′ 2″
Wheels, diameter		5′ 0″	5′ 0″
Weight of carriage, empty, with wheels, drag shoe, and elevating screw	cwts. qrs. lb.	12 3 8	11 3 8
Weight of limber, empty, with boxes, shafts, and wheels		11 1 19	11 1 10
Weight of wheels		4 2 0	4 2 0
Weight of elevating screw		0 0 11	0 0 11

AMMUNITION WAGON, MARK I.

The frame of the wagon consists of a perch of girder iron, with steeled eye, and two sides of angle iron, connected together by iron plates, over which the boards are secured, namely, two footboards and three platform. The axletree, which is the "light field" axle, is secured in a bed of wood bolted beneath the perch and sides.

The wheels of the wagon are the same as for the gun carriage.

The wagon is fitted with a sabieu block, with arm, for carrying a spare wheel, and has also fittings for carrying a drag shoe and stores.

The ammunition boxes (four) stand between the platform boards, secured by nib irons and straps; two are the same as the "near" gun limber box, and two the same as the "off," except lib fittings. Beneath the wagon are two under boxes.

The wagon limber is identical with the gun limber.

AMMUNITION WAGON, MARK II.

(Plate V.)

This wagon differs from Mark I in having an iron axletree bed, similar to that of the gun carriage, instead of a wooden one; in the perch being formed of channel iron in two parts, with strengthening plates, instead of solid girder iron, and in the block for the spare wheel being of iron instead of wood. The perch resembles the trail of gun carriage in its general form, and is rivetted to the axletree bed. The wheels, ammunition boxes, &c., are the same as in Mark I wagon.

The wagon limber is identical with the gun limber.

	Mark I.	Mark II.
Length of wagon and limber ...	20′ 5½″	20′ 7½″
Minimum space through which wagon can turn	29′ 8½″	29′ 6″
	cwts. qrs. lb.	cwts. qrs. lb.
Weight of wagon and limber, empty...	25 3 13	25 0 22

PROJECTILES.

(Plate VI.)

			Weight. lb.	oz.
Shells,	Common... Mark V.	empty	8	9½
		filled with 7·5 oz. bursting charge ...	9	1
	*Shrapnel Mark VIII.	filled with 63 mixed metal bullets, 28 at 18 per lb., and 35 at 34 per lb., and 12 drams bursting charge	9	12
Shot,	†Case, Mark IV., filled with 110 mixed metal bullets, at 16½ per lb., clay and sand		9	10¼

INSTRUCTIONS FOR THE PREPARATION OF SHELLS AND THE EXAMINATION OF FILLED SHELLS.

(See Regulations for Magazines, &c., 1887.)

Filling and Securing Shells.

Shells, R.M.L., Common.

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, insert the wad, fuze-hole, G.S., with the side on which the shalloon is cemented downwards, *i.e.*, next the powder; drive it in with the "Drift, G.S.," as far as the shoulder on the drift will allow, and then screw in the fuze or plug as may be required.

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* Shrapnel shell can be utilised as case shot, for distances up to 100 yards, by loading the reverse way, and firing them without fuze or plug.

† The shot, when placed in axletree boxes, should be packed with oakum to prevent their being damaged in travelling.

Shells, R.M.L., Shrapnel.

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 "Primer Shrapnel shell," and, by means of the driver screw Shrapnel large III, screw it tightly into the tube, and then screw in the fuze or plug as may be required.

Fixing Plugs and Fuzes.

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

Distinguishing Marks.

All shrapnel shell will be painted with a red tip 1 inch deep.

All filled shell will have a red band, $\frac{1}{2}$ inch wide, painted around the head, $1\frac{1}{2}$ inches from the top. In the case of shrapnel, this band will be $\frac{1}{2}$ inch below the red tip. They will also be marked with the date of filling, and except (when filled by Royal Artillery), the monogram of station. The colour of the paint will be red on a black ground, or black on a red ground.

Projectiles which are to be used for practice only will be marked with a yellow band round the head.

Examination of Filled Shells.

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

Shells, Common, filled with Loose Powder.

Remove the fuze-hole plug, pass the "hook G.S. 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. 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 scrapper 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.

Remove the fuze-hole plug, unscrew the primer with the "driver screw Shrapnel large Mark III," and lift out the primer with the "pincers Shrapnel 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.

FUZES.

(Plates VII and VIII.)

Percussion R.L. No. 7. (Marks II, II* and III.)
Time, Wood M.L., 15-secs., No. 41. (Mark II.)

Description of Fuzes.

Percussion R.L. No. 7. (Marks II, II and III.)*

The body is of gun-metal; both body and top are cast in one piece, and the bottom is screwed in. A square hole in the head fits the key by which it is screwed into the shell. This fuze fits G.S. gauge.

The safety-pin (of double twisted wire) passes through the head of the fuze, and is kept in its place by the two ends being opened out slightly, so as to bind themselves in a conical cup, as shown in the Plate. A thin disc of brass is then fitted over the ends, and soldered to keep the fuze water-tight. The head of the safety-pin is fitted with a loop of string, by which it is withdrawn. The pin is not to be withdrawn until the shell is placed in the gun.

When the safety-pin is withdrawn, the hole through which it passed, if left open, would probably admit of the passage of the flash from the discharge of the gun into the interior of the fuze, and so a premature burst would take place. To guard against this, a small lead pellet slides freely in a recess cut in the head and closed by a thin brass disc soldered on flush with the top of the fuze. When the shell is rammed home, the pellet sets back, and so closes the safety-pin hole.

The percussion arrangement consists of a steel needle, fixed point down in the centre of the top on the inside, and a lead pellet containing in its head a cap of detonating composition. The pellet is kept in position by a gun-metal guard, which rests on two feathers on the outside of the pellet. On the shock of discharge, the guard sets back, shearing off the feathers, and on graze or impact, the guard and pellet fly forward together, bringing the cap in contact with the needle, and thereby firing the fuze.

Mark III fuze, which will supersede Mark II, has a shield of copper placed over the top of the lead pellet to prevent the brass safety-pin from indenting the soft metal of the pellet, and thereby allowing the detonator to approach too close to the needle.

Mark II* are Mark II fuzes altered to Mark III pattern.

Fuse, Time, Wood, 15 secs., M.L. No. 41. (Mark II.)

Is made of beech wood, with a composition channel bored almost the whole length of the centre of the fuze. This channel is lined with paper, and driven with 2 inches of slow-burning composition. Above this is an 0·6-inch pellet of mealed powder, having a hole bored down its centre to a depth of 0·4 inch. There are six powder channels bored parallel to the composition channel, connected at the bottom by a quick-match placed in an annular groove and pressed into the bottom of each channel. The last hole is bored through and threaded with quick-match. The numbers on the paper scale are reversed, so that they read correctly when the fuze is being bored. Each side hole is marked on the index paper with a dot of yellow paint. The head of the fuze is closed by a gun-metal plug, round the pin of which quick-match is looped and led through two fire-holes to a groove. This groove is covered by a copper and tape band which must be removed before firing.

Preparing Fuzes.

Fuzes, Time, Wood, 15 secs., M.L.

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.

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, plug, G.S.," or "Key fuze universal."

The safety-pin must not be removed until the shell is placed in the muzzle of the gun.

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* The hook is conical to fit the fuze.

Fixing Fuzes.

Fuzes, Time, Wood, M.L.

The fuzes are fixed in the fuze-hole by screwing the fuze round by hand until it is held firmly in the fuze-hole; the fuze must not be uncapped until the shell is placed in the muzzle of the gun. The 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.

Wad, fuze-hole, G.S.

When fixing fuzes in shells having a wad in the fuze-hole, 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; and if using wood time fuzes, the wad is driven into the shell in the operation of fixing the fuze.

Extracting Wood Fuzes.

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

CHARGES.

Service, silk cloth or serge	... ...	1¾ lb. R.L.G.* powder.
Exercise, silk cloth	... ...	1 lb. Blank R.L.G. or L.G. powder.

DIRECTIONS FOR MAKING UP CARTRIDGES.*

(See Regulations for Magazines, &c., 1887.)

Filling.

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

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* Cartridges are supplied filled for field guns (*vide* Equipment Regulations, 1881, § 249).

Hooping.

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

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 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.

After choking and hooping the ends of the choke are cut off to a convenient length (not to exceed half the diameter of the cartridge).

Finished Cartridges.

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

Tube.

Tube friction copper short.
Tube friction copper solid drawn.
The present store of the former pattern will be first used up.

Range Table.

M.V., 1330 f.s. Jump, 9′.
Charge, 1¾ lb. R.L.G.[2] Projectile, Common Shell.
Based on practice of 5.7.88 and 6.2.89.

Remaining velocity.	Time of flight.	Angle of descent.	Elevation.	Range.	Fuze scale.	5 minutes' elevation alters point of impact.		50 per cent. of rounds should fall within.		
						In Range.	Vertically.	Length.	Height.	Breadth.
f.s.	secs.	° ′	° ′	yds.		yds.	yds.	yds.	yds.	yds.
1275	0·27	0 11	0 1	100	—	45	—	7	0·1	0·6
1224	0·54	0 23	0 12	200	—	44	0·29	9	0·1	1·2
1177	0·81	0 35	0 23	300	0·5	43	0·43	10	0·1	1·8
1133	1·09	0 49	0 34	400	1·0	42	0·58	12	0·1	2·4
1093	1·36	1 1	0 46	500	1·5	41	0·72	13	0·2	3·0
1056	1·64	1 15	0 58	600	2·0	40	0·87	15	0·2	3·7
1031	1·92	1 30	1 10	700	2·5	39	1·01	16	0·2	4·3
1007	2·20	1 45	1 23	800	3·5	38	1·16	18	0·3	5·0
985	2·49	2 1	1 36	900	4·0	38	1·31	19	0·3	5·7
964	2·78	2 18	1 50	1000	4·5	37	1·45	21	0·4	6·5
944	3·08	2 35	2 4	1100	5·0	36	1·60	23	0·5	7.3
924	3·38	2 53	2 18	1200	6·0	35	1·74	25	0·7	8·2
905	3·69	3 12	2 32	1300	6·5	34	1·89	26	0·8	9·1
887	4·01	3 32	2 47	1400	7·0	33	2·03	28	1·1	10·0
870	4·34	3 53	3 2	1500	8·0	33	2·18	30	1·4	11·0
853	4·67	4 14	3 18	1600	9·0	32	2·32	32	1·7	12·2
837	5·00	4 37	3 34	1700	9·5	31	2·47	34	2·0	13·5
821	5·34	5 0	3 50	1800	10·0	30	2·61	36	2·4	14·8
806	5·68	5 24	4 7	1900	11·0	30	2·76	37	2·8	16·1
792	6·03	5 49	4 24	2000	12·0	29	2·91	39	3·4	17·5
778	6·39	6 16	4 42	2100	12·5	28	3·05	41	4·1	19·1
764	6·75	6 45	5 0	2200	13·5	27	3·21	43	4·8	20·8
750	7·13	7 15	5 19	2300	14·5	27	3·34	45	5·6	22·6
737	7·51	7 48	5 38	2400	15·5	26	3·49	47	6·6	24·6
724	7·90	8 22	5 58	2500	16·0	25	3·63	49	7·7	26·7
711	8·30	8 59	6 18	2600	17·0	24	3·78	52	8·9	28·9
698	8·71	9 39	6 39	2700	18·0	23	3·92	54	10·2	31·2
686	9·12	10 21	7 1	2800	19·0	22	4·07	56	11·7	33·7
674	9·54	11 6	7 24	2900	20·0	22	4·21	58	13·3	36·3
662	9·98	11 54	7 47	3000	21·0	21	4·36	61	15·0	39·0
650	10·43	12 46	8 12	3100	22·0	20	4·51	63	16·9	41·8
639	10·89	13 42	8 37	3200	23·0	19	4·65	65	18·9	44·8
627	11·36	14 42	9 3	3300	24·0	18	4·80	67	21·0	47·9
616	11·85	15 48	9 31	3400	25·0	17	4·94	70	23·2	51·0
605	12·35	17 0	10 0	3500	26·0	17	5·09	72	25·6	54·3
594	12·85	18 19	10 31	3600	27·0	16	5·23	75	28·1	57·8
583	13·36	19 44	11 3	3700	28·0	15	5·38	78	30·8	61·4
573	13·89	21 18	11 35	3800	29·0	14	5·52	81	33·6	65·1
562	14·43	22 56	12 9	3900	30·0	14	5·67	83	36·5	68·9
552	14·98	24 40	12 44	4000	—	13	5·81	86	39·7	72·2

DRILL.

The detachment consists of nine numbers, and falls in two deep (one pace between ranks), 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 right of the detachment takes a pace to his front, turns to his left, 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 right of the front rank.

No. 5 then straps on the fuze and tube pocket.

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.

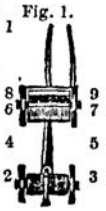
Nos. 4 and 5 in line with the centre of the trail.

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. (Fig. 1.)

Fig. 1.



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.

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* Should the detachments be marched to their guns unlimbered in the barrack square, they will be halted in line facing the front, and to the left rear of the trail, and told off. On the command from the officer, "Take post at the gun," No. 1 will order "Right turn, double march," and the men will file to their places in action.

Mounted.

(*Battery of Field Artillery.*)

No. 1 on his horse; 2 and 3 on the gun limber; 4 and 5 on the axletree seats*; 8 and 9 on the wagon limber; 6 and 7 in front of the wagon body; 2, 4, 6, 8, on the near; 3, 5, 7, 9, on the off side.

When going into action, No, 6 will ride between 2 and 3 on the gun limber.

(*Battery of Horse Artillery.*)

Nos. 2 and 3, on the gun limber; 8 and 9 on the wagon limber; 2 and 8 on near, 3 and 9 on off boxes.

With detachments of 8 Nos.	front rank	5	4	12†	1
	rear rank	11†	6	13†	7
With detachments of 7 Nos.	front rank	5	4	12†	1
	rear rank	11†	13†	6	
With detachments of 6 Nos.	front rank		4	12†	1
	rear rank		11†	6	5

To Mount.

(*Battery of Field Artillery.*)

Officer.	*No. 1.*
Prepare to Mount.	*Prepare to Mount.*
Mount.	*Mount.*

"*Prepare to mount.*"—No. 1 runs to his horse, the other Nos. double to their places, at the carriages. 2 and 8 lay hold of the guard-iron with the left, 3 and 9 with the right hand, placing the inner foot on the trail or perch handle. 4 and 6 lay hold of the guard-iron with the right hand placing the right foot on the foot rest or spoke; 5 and 7 lay hold of the guard iron with the left hand, placing the left foot on foot rest or spoke. When 6 has to mount on the gun limber, he lays hold of the left guard-iron with his right hand and places his right foot on the spoke of the wheel in front.

"*Mount.*"—The whole spring into their places (the Nos. on the gun and wagon limbers facing to the rear, but turning round to the front, lifting their feet close together, and throwing them over the guard-irons, the Nos. on the axletree seats turning outwards), and when seated lay hold of the hand straps with both hands, and sit upright.

At the word "*March*" the gunners seated on the ammunition-boxes and axletree seats, are to lay hold of the guard-irons with their outward hands, and when going over rough ground they should slightly raise themselves, so as to avoid being jolted.

"*Sit at ease.*"—Drop the hand-straps, and sit well back, both hands remaining between the thighs.

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* In R.M.L. batteries when wagons are present 4 and 5 may ride (when ordered) on the rear of the wagon body. When only 3 wagons are present, 7, 8, and 9, of the right sub-division on the right side of the section wagon and those of the left sub-division on the left side.

† This mark denotes horseholders.

To Mount.

(Battery of Horse Artillery.)

Officer.	*No. 1.*
Prepare to mount.	*Prepare to mount.*
Mount.	*Mount.*

At "*Prepare to mount,*" Nos. 1, 4, 5, 6, and 7 run to their horses' heads by the front; 2 and 3 to the gun limber; 8 and 9 to the wagon limber; 2 and 8 lay hold of the guard-irons with their left hands; 3 and 9 with their right, placing the inner foot on the trail or perch handle.

"*Mount.*"—The whole spring into their places; the numbers on the limbers facing to the rear, but immediately afterwards turning round to the front, by lifting their feet close together, and throwing them over the guard-irons.

To Dismount.

(Battery of Field Artillery.)

Officer.	*No. 1.*
Prepare to dismount.	*Prepare to dismount.*
Dismount.	*Dismount.*

"*Prepare to dismount.*"—Nos. 2, 3, 8 and 9, throwing their legs over the guard-irons, turn to the rear; Nos. 4 and 5 place their inward hands on the gun and their feet in front of the foot rests; the other Nos. stand up, keeping their outward hands on the guard-irons.

"*Dismount.*"—The whole jump off and form the order of march, but if for action they go to their posts at the gun.

When 6 has to dismount from the gun limber he jumps off on the near side.

To Dismount.

(Battery of Horse Artillery.)

Officer.	*No. 1.*
Prepare to dismount.	*Prepare to dismount.*
Dismount.	*Dismount.*

"*Prepare to dismount.*"—The Nos. 2, 3, 8 and 9 throwing their legs over the guard-irons turn to the rear.

"*Dismount.*"—The whole dismount and stand at attention.

If for "*Action,*" the horseholders do not dismount, the other numbers take their posts at the gun, the dismounted numbers leaving their horses by the rear; when the detachment is in rear of the gun they leave their horses by the front.

Exercise with Drag Rope.

When drag ropes are used Nos. 2 and 3 hook them to the drag washers on their own side, all available numbers man them on their own side. The highest No. in the shafts.

To Advance without Drag Ropes.

Nos. 2 and 3, between muzzle and wheel, push at the axletree seats 4 and 5 man the gun wheels, highest No. in the shafts, remaining Nos. assist.

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, takes a side pace to his left, allows the detachment to pass him, then doubles to his post; 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 changing his flank by the front. Each number halts when at his post.

To Change from Front to Rear.

Officer.	*No.* 1.
Detachment rear.	*Left about wheel, double march.* *Forward.* *Left about wheel, halt.*

When the detachment is two yards in rear of the muzzle it halts.

To Change from Rear to Front.

Officer.	*No.* 1.
Detachment front.	*Right incline, double march.* *Forward.* *Left incline, forward, halt.*

When the detachment is clear of the gun it inclines to its left; when in line with the position of Detachment front "Forward," "Halt," is given.

To Change from Rear to Right or Left.

Officer.	*No.* 1.
Detachment right (left).	*Right (or left) incline.* *Double march.* *Forward, halt.*

The detachment inclines 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 off shaft, turns to his left, and gives the order "*Double march.*" Nos. 8 and 9, followed by the other Nos., double out. 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.*
Action, front.	*Action, front.*
„ (*right*).	„ (*right*).
„ (*left*).	„ (*left*).
„ (*rear*).	„ (*rear*).

"*Action, front.*"—No. 3 unkeys, and with No. 2 lifts the trail; when the trail is clear of the hook, No. 3 gives "*Limber, drive on.*" The trail is carried round a half circle to the left by Nos. 2 and 3, No. 2 shifting round the trail eye to avoid walking backwards; the wheels are manned by Nos. 4 and 5, the trail is lowered to the ground and the Nos. take post as detailed.

The limber moves forward one yard and reverses to the right when sufficiently to the rear it reverses to the right again, and halts ten yards in rear of the trail-eye, covering the gun. The wagon reverses to the right and when sufficiently to the rear, reverses to the right again and halts four yards in rear of and covering the limber.

"*Action, right,*" is the same as "*Action, front*" but the trail is carried round a quarter of a circle only; the limber drives on one yard, then takes ground to the left and reverses to the left. The wagon the same as the limber.

"*Action, left.*"—The trail is taken to the right; No. 3 in this case shifting round the trail-eye. The limber moves forward one yard, then takes ground to the right and reverses to the right.

"*Action, rear.*"—The gun is unlimbered in the same manner, but the trail is not thrown round; the limber moves forward one yard, inclines to the left, and then reverses to the right, and halts ten yards from the trail-eye covering the gun. The wagon inclines to the left, moves to the rear, and forms up four yards in rear of the limber.

In all unlimbering except for "*Action, left*" and "*Action, rear,*" No. 2 will shift round the trail, as soon as it is unhooked, to avoid walking backwards.

When there are no horses, 6, 7, 8, and 9 attend to the limber, No. 9 is between the shafts, 8 at the point of the near shaft, 7 at the point of the off shaft, and 6 in rear of the limber.

No. 1 is responsible for the correct dressing of his gun when it comes into action.

Position and General Duties.

No. 1 stands on the right of the trail-eye, ships and unships the handspike, commands, sees that the time fuze has been bored correctly by 5, lays and lifts at the handspike in running up and back.

No. 2 stands facing the gun, outside and in line with the front of the right wheel. sponges, rams home, and mans the right wheel.

No. 3 stands five yards in rear of the left wheel, obtains ammunition, hands time shell to No. 5. places cartridge, percussion shell or case in the bore, removes safety-pin, and mans the left wheel if necessary.

Nos. 4 and 5 stand in line with and facing the breech outside the wheels.

No. 4 supplies 2 with sponge, replaces it on the trail, attends to vent, traverses at the end of the handspike, and mans the right wheel.

No. 5 bores time fuze, shows it to No. 1, fixes it, loads time shell, uncaps and removes safety-pin when in the bore, makes ready, fires, and mans the left wheel.

No. 6 stands in rear of the limber, fixes percussion fuzes, loosens plugs of time shell, and supplies 3 with ammunition.

Nos. 7, 8 and 9 constitute the reserve, stand (or lie down) 5 yards in rear of the limber (or any adjacent cover).

They replace casualties at the gun take the place of men who are fatigued; and replenish the limber with ammunition from the wagon when required. Should the distance or nature of the ground between gun and limber render No. 3's duties very arduous, one of the reserve numbers should, if present, assist in supplying ammunition.

During the cessation of fire the gun detachments should, whenever considered advisable, be ordered to "*lie down.*" When required to resume their places the word "*rise*" should be given.

General Duties with Reduced Nos.

3 *Nos.*

No. 1 commands, attends to vent, lays, makes ready and fires; 2 sponges, rams home and traverses; 3 bores and fixes fuses, loads and supplies himself with ammunition.

4 *Nos.*

No. 1 commands, attends to vent, lays, makes ready and fires; 2 sponges, rams home, and traverses; 3 bores and fires fuses, loads and supplies himself with ammunition from 4; 4 stands in rear of the limber and supplies ammunition.

5 *Nos.*

No. 1 commands and lays; 2 sponges and rams home; 3 bores and fixes fuzes, loads and supplies himself with ammunition from 5; 4 attends to vent traverses, makes ready and fires; 5 stands in rear of the limber and supplies ammunition.

Action.

Officer.	*No.* 1.
Action.	*Action.*

The gun being unlimbered and horizontal, tampeon removed, fuze and tube pockets filled and buckled on, sights fixed, and several points to lay on selected, at the word

"*Action.*"—No. 1 ships the handspike, sees that the gun and its fittings are in good working order, and that the bore and vent are clear.

No. 2 receives the sponge from 4, and remains facing the gun with the sponge stave in his right hand, sloping at 45°, rammer head on the ground to the rear.

No. 3 remains steady.

No. 4 steps in, unbuckles the sponge, and throws it over to 2, steps out again, and remains facing the gun.

No. 5 takes the lanyard out of his tube pocket, which is on his right side, and puts it under his belt.

No. 6 prepares to issue ammunition.

The instructor can at any time ascertain that each No. is at his post by proving. This he does by calling out No. 1 "*Prove*," No. 2 "*Prove*," &c. The man called upon raises his right arm and extends it smartly to the front, hand open, thumb upwards, as high as the shoulder. When the next number is called he drops his hand. The last No. lowers his hand at the word "*Down*."

On all occasions before giving a word of command, No. 1 should repeat the number of his gun.

Loading should be performed as rapidly as is consistent with the proper performance of all the duties, avoiding confusion.

The cartridge should be kept covered until the sponge is out of the bore.

Load.

	Officer.		*No.* 1.
No. 1 gun.	Shell.* Shrapnel.† Fuse.‡ Case. Blank cartridge. Load.	Front§ — yds. deflection.‖ Right§ — yds. „ Left§ — yds. „	Shell.* Shrapnel.† Fuze.‡ Case. Blank cartridge. Load.

* Common shell and percussion fuze always understood unless otherwise ordered.
† Time fuze always understood unless otherwise ordered.
‡ Here say number of graduations required.
§ Here indicate target.
‖ Here order No. of minutes deflection necessary.
If the elevation is to be given by the clinometer, or with Scott's sight the command is "*degrees*" instead of "*yards*."

"*Load.*"—No. 1 communicates to 6 the directions which he receives as to projectile, fuze, &c., and when time fuzes are used he sees that they have been bored correctly by 5. He adjusts the scale of elevation and deflection.

No. 2 takes an oblique pace to the right with the right foot, then an oblique pace to the left with his left, then a side pace of 30 inches to his right, at the same time bringing the sponge stave horizontal, sponge head towards the gun; he then enters the sponge head into the bore, shifts his left hand, back under, to the right, straightens right knee, forces the sponge up the bore until his hands meet the face of the piece, shifts his hands to the rammer head, and forces the sponge hard home, bending over the left knee. He then gives the sponge two half turns by first lowering his wrist and then raising it, at the same time pressing the sponge against the bottom of the bore. He next draws the sponge out about half its length, at the same time straightening the left knee and bending over on his right; then again bending over the left knee, and shifting his hands to the centre of the stave, he bends

outwards, withdrawing the sponge, and, with the left hand close to the head, turns the sponge, keeping the right hand fast, but turning the wrist, and throwing the sponge head upwards with the left hand, with which he seizes the stave at the rammer head. When No. 3 or No. 5 has put in the charge, uncapped the fuze, or removed the safety-pin, 2 introduces the rammer head, brings his hands to the sponge head, and forces the charge home in one motion, throwing in the weight of his body, both arms extended as far as possible so as to keep his body clear of the muzzle.* The charge is pressed home with one motion with as much force as possible. Directly the charge is home he springs the rammer by jerking it out with his right hand, and allowing the stave to slide through his hand; he then grasps it firmly in the middle with the right hand, and at the rammer head with the left, both knees straight, steps back outside the wheel, first with his right foot, then with his left, and brings the right heel to the left; he brings the sponge stave to the slope, and the left hand to the side in the first motion of stepping back, and remains facing the gun. These movements should be frequently practised until the greatest precision and smartness are attained.

No. 3 doubles to the limber, receives the ammunition from 6, the cartridge in his right hand covered by the left arm, the projectile in his left hand, backs of both hands down. He hands time shell to No. 5, and as soon as the sponge is withdrawn he places cartridge, percussion shell or case in the bore, removes safety-pin, taking care that the choked end of the cartridge is next the projectile, and that the seam does not come under the vent; he then returns to 6 for another round and halts at his own station.

No. 4 steps in, places his left thumb on the vent, keeping his elbow raised and his fingers on the left side of the gun, when 2 has sprung the rammer, 4 places himself at once at the end of the handspike, and stands ready to traverse.

No. 5 receives time shell from 3, bores the fuze, shows it to No. 1, fixes it, loads time shell, uncaps or removes safety-pin when in the bore. He then prepares a tube.

No. 6 attends at the limber and issues ammunition. He fixes percussion fuses and loosens plugs of time shell. He should take care that the limber box is open as short a time as possible.

To Lay the Gun.

Officer.	*No.* 1.
	Trail, right.
	„ (*left*).
	Halt.

No. 1, looks over the sights, gives the necessary elevation with the elevating screw, and "*Trail right*, or *left*" as required, then lowers the tangent scale.

No. 4 traverses with the handspike as directed, taking care to

* N.B.—The mark on the rammer flush with the muzzle denotes when the charge is home.

move the gun little or much as indicated by No. 1's right hand as in silent drill. No. 4 should frequently be exercised in traversing.

If no order to fire should be given, No. 1 gives "*Take post*," when the Nos. take post as detailed for "*Action*."

To Make Ready and Fire.

Officer.	*No.* 1.
Fire No. — gun.	*No.—Ready.* *No.—Fire.* *Run up.* *Halt.*

No gun is ever to be fired without the order of the No. 1.

At "*Fire No.—gun*" No. 1 gives the number of his gun and "*Ready*" and steps clear of the wheel; 5 steps in and presses the tube into the vent with his right thumb; steps outside the wheel and stands facing the front, holding the lanyard taut with his left hand, the left elbow being bent so that the hand is level with the vent, the forearm across the body.

No. 2 steps to his left in line with the axle.

No. 4 steps smartly outside the wheel.

No.—"*Fire.*" No. 5 slews his body smartly to the left, and thus fires the gun, he replaces the lanyard under his belt.

In the event of a miss-fire, No. 5 will go round to the front of the axletree on his own side, and from there put in another tube, keeping clear of the muzzle, resuming the position of "*Ready.*" No. 4 after the gun has been fired steps in and clears the vent.

As soon as the gun is fired No. 1 if necessary gives the order "*Run up,*" Nos. 2, 4 and 5 man the wheels, No. 1 lifting at the handspike. At "*Halt*" each number returns to his place.

To Unload.

Officer.	*No.* 1.
	Unload.

At drill as soon as the gun is fired No. 1 gives "*Unload.*"

Nos. 2 and 5 man the wheels.

Nos. 1 and 4, raise the trail until the drill ammunition falls out.

No. 3 takes back the ammunition to the limber.

With service ammunition if it is required to remove a case shot or cartridge from the bore it is done as above.

Common and Shrapnel are as a rule not unloaded but should be fired off.*

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* When this is impracticable, shell may be unloaded by upending the trail, but this should not be done when it can be avoided, and then very carefully, and under the Commanding Officer's order.

If a shell jams in the bore and cannot be rammed home or got out by lowering the muzzle, the cartridge must be drowned, and the shell blown out by means of a small quantity of powder poured into the vent.

To Cease Firing.

Officer.	*No. 1.*
Cease firing.	*Cease firing.*

"*Cease firing.*"—At this command all guns fully loaded with shell are to be fired when the Commanding Officer orders.* Case shot or blank cartridge is to be unloaded as described in last paragraph. No. 1 unships the handspike and buckles it on the trail, setting the scales at zero.

No. 2 throws the sponge over to 4.

No. 3 gives the ammunition to 6 and falls into his place.

No. 4 receives the sponge from 2, putting the rammer head through the iron loop, buckles the stave on the trail, and resumes his position outside the wheel.

No. 5 replaces the lanyard in the tube pocket.

No. 6 replaces ammunition; if shells have been prepared, he re-inserts the safety-pin, removes the fuzes, screws in plugs, and replaces shells, &c., in the boxes.

If any time fuzes have been bored, they should be destroyed, as should any percussion fuzes the safety-pins of which cannot be replaced.

"*Stand fast.*"—If the firing is only to be stopped for a time "*Stand fast*" should be given, on which each number stands fast (but should the tube be in the vent it is to be removed). On the word "*Go on,*" the service of the gun is continued, or on "*Cease firing*" the detachment proceeds as above.

To Change Rounds in Action.

Officer.	*No. 1.*
Change rounds.	*Change rounds.*

In changing rounds—

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

To Limber Up.

Officer.	*No. 1.*
Front, limber up.	*Front, limber up.*
(*Right*) ,,	(*Right*) ,,
(*Left*) ,,	(*Left*) ,,
(*Rear*) ,,	(*Rear*) ,,
	Halt, limber up.

* When this is impracticable, shell may be unloaded by upending the trail, but this should not be done when it can be avoided, and then very carefully, and under the Commanding Officer's order.

If a shell jams in the bore and cannot be rammed home or got out by lowering the muzzle, the cartridge must be drowned, and the shell blown out by means of a small quantity of powder poured into the vent.

Limbering up may be done to the front, rear, right, or left.

"*Front, limber up.*"—The trail is lifted by 2 and 3 and carried round a half circle to the right, and lowered gently to the ground. Nos. 4 and 5 man the wheels. As soon as the trail is round, Nos. 2 and 3 get under cover between breech and wheels; No. 1 in front of No. 2, 4 and 5 between the muzzle and wheels; 6 and 7 if present in front of 4 and 5; the whole with their backs to the axletree. The limber comes up on the right of the gun, and when it is square, No. 1 gives "*Halt, limber up,*" 2 and 3 lift the trail and place it on the hook; 4, and 5 man the wheels. No. 3 keys up and the whole forms the order of march.

"*Rear, limber up.*"—The numbers get under cover as before, but the limber reverses to the left as soon as it arrives at the trail, which is not thrown round. "*Right, limber up,*" is the same as "*Front, limber up,*" except that the trail is only carried round a quarter of a circle.

"*Left, limber up.*"—The trail is carried round a quarter circle to the left, and the numbers get under cover as before.

Method of Drilling Recruits.

Gun in Action.

Load.

Commence—

"No. 1 on the command, "*Load,*" and give detail of first para. of "*Load,*" p. 20. Then say, "*No. 1 only, Load.*"

Next—

"No. 4 on the command, "*Load,*" steps in, places his left thumb on the vent, keeping his elbow raised and his fingers on the left side of the gun," after which, say "*4 Load.*"

Next—

"No. 2 takes an oblique pace to the right with his right foot,* then an oblique pace to the left with his left,* then a side pace of 30 inches to his right, at the same time bringing the sponge stave horizontal, sponge head towards the gun*; he then enters the sponge head into the bore,* shifts his left hand back under to the right, straightens right knee,* forces the sponge up the bore until his hand meet the face of the piece,* shifts his hands to the rammer head,* and forces the sponge hard home, bending over the left knee.* He then gives the sponge two half turns by first lowering his wrist and then raising it, at the same time pressing the sponge against the bottom of the bore.* He next draws the sponge out about half its length, at the same time straightening the left knee, and bending over on his right,* then again bending over the left knee, and shifting his hands to the centre of the stave, he bends outwards, withdrawing the sponge,* and with the left hand close to the head, turns the sponge, keeping the right hand fast, but turning the wrist, and throwing the sponge head upwards with the left hand, with which he seizes the stave at the rammer head."* Here say, "*Stand fast, 2.*"

*Note.—This detail should be given with a distinct pause at each point marked by an asterisk, so as to admit of the recruit carrying out in successive motions the detail given; thus simplifying a lengthy detail.

Next—

"6 on the command, "*Load,*" and give 6's deta for loading, then, "6, *load.*"

Next, No. 3; and give—

"3 on the command, "*Load*" doubles to the limber," &c.; and complete No. 3's detail; then give "3, *Load.*"

Here take up No. 5's detail, and give "5, *Load.*" Now go back to No. 2, starting with:—When No. 3 or No. 5 has put in the charge, uncapped the fuze, or removed the safety-pin, 2 introduces the rammer head, brings his hands to the sponge head, and forces the charge home in one motion, throwing in the weight of his body, both arms extended as far as possible, so as to keep his body clear of the muzzle"—here give "*Go on,* 2." Then continne No. 2's duties thus:—"The charge is pressed home with one motion with as much force as possible. Directly the charge is home he springs the rammer by jerking it out with his right hand, and allowing the stave to slide through his hand,* he then grasps it firmly in the middle with the right hand, and at the rammer head with the left, both knees straight, steps back outside the wheel, first with his right foot,* then with his left, and brings the right heel to the left*; he brings the sponge stave to the slope and the left hand to the side, in the first motion of stepping back, and remains facing the gun," and give "*Go on, No.* 2."

Vide above note.

Finish up by giving remainder of No. 4's detail:—"When 2 has sprung the rammer, 4 places himself at once at the end of the handspike, and stands ready to traverse," "*Go on,* 4," and so on.

Drill by Signals.

Well drilled detachments can be exercised with advantage by means of a signal from the No. 1, thus enforcing silence, and compelling the Nos. to fix their attention on their own No. 1. The only commands necessary from the No. 1, are that of "— (*shell*)," "*Load,*" and "*No. — Fire.*"

To Load.

No. 1.

"— " "*Load.*"—No. 1 gives the order and all Nos. proceed as with ordinary drill.

To Lay the Gun.

"*Trail right,*" or "*left.*"—No. 1 motions with the right hand in the required direction, the arm well back.

"*Halt.*"—No. 1 drops the arm.

To Make Ready and Fire.

"*Ready.*"—No. 1 holds the left hand out in line with the shoulder.

"*Fire.*"—No. 1 gives the order.

"*Run up.*"—No. 1 runs to the trail.

"*Halt.*"—No. 1 holds up the left hand.

To Unload.

No. 1 holds up the right hand.

To Cease Firing.

No. 1 unships the handspike.

Instructions for the Hasty Disablement of Field Guns.

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

Stores Required.

The following stores will be carried by each battery of Royal Horse Artillery:—

Boxes ..	guncotton slabs, 1—½ slab*	12
	stores, disabling ordnance, R.H.A.	1
	vesuvian matches	1
Cases ..	detonator for 4†	3
	guncotton slabs†	6
Cylinders	detonator, No. 8, for 4	3
	guncotton, primer, dry, 1¼ in. × 1¼ in., for 4	3
Detonators, No. 8		12
Guncotton	dry, primers, 1 perforation, 1¼ in. × 1¼ in.	12
	wet, slabs, 2 perforations, 6¼ in. × 6¼ in. × 1¼ in.‡	6
Pouches, match-box†		3
Rectifiers, guncotton primers		3
Twine, choking, 3-thread	pieces	3

* Copper tinned. † Leather. ‡ In half slabs, 1 perforation in each.

These stores will only be issued in time of war. The guncotton and detonators will be carried by the Ammunition Reserve Column till active operations are impending: and, when required in the field, the supply of guncotton (both slabs and primers) will be replenished from the Royal Engineer Field Park.

The stores will be carried by horse-holders of Nos. 1, 3, and 5 subdivisions, one set in each subdivision, as follows:—

The cases for guncotton slabs—one in front of each wallet, fastened by a strap going round the wallets, passing through the staple, and then through two loops attached to the ends of the guncotton cases.

(The slabs can be withdrawn without removing the sheepskin).

The case, leather, containing the detonators and primers—under the picket peg in rear of the valise, the top opening on the near side, the sheepskin covering the whole.

The pouch, leather, for vesuvian matches, and twist of twine—on the waist-belt.

Instructions for carrying out the Operations.*

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 the slab, 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 slab lengthways on the chase, about a foot from the muzzle. Tie it on tightly with twine to prevent it 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 slab 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 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 cotton before the detonator is fired, in which case, in all probability, no effect whatever would be produced on the gun.

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 apparatus 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 to a safe distance (say 50 yards) 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 sand-bag 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."

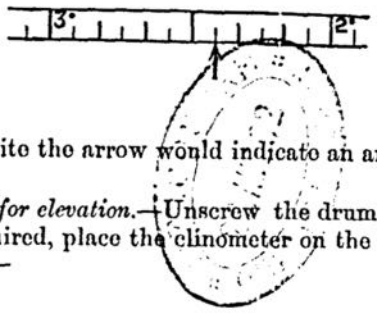
---

* 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.

Instructions for Using Watkin's Clinometer.

To read the angle marked on the drum.—The brass drum is marked in degrees, commencing at 0° on the top to 45° at the bottom. Each degree is sub-divided into 12 parts, each small division, therefore, represents angles of 5 minutes.

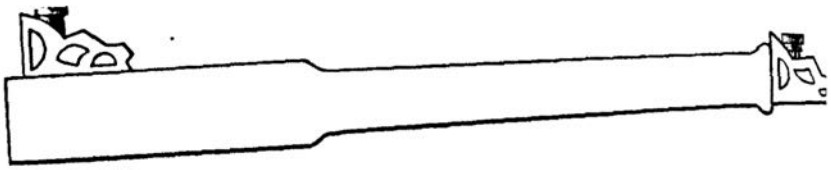
The scale is read from right to left, thus—



the reading opposite the arrow would indicate an angle of 2° 25′.

To lay a gun for elevation.—Unscrew the drum until ∀ points to the elevation required, place the clinometer on the breech, or against the muzzle, thus—

Fig. I.



and elevate the piece until the bubble of the spirit-level is in the centre of the tube.

For angles of depression.—Proceed as above, but reverse the direction of the instrument, thus—

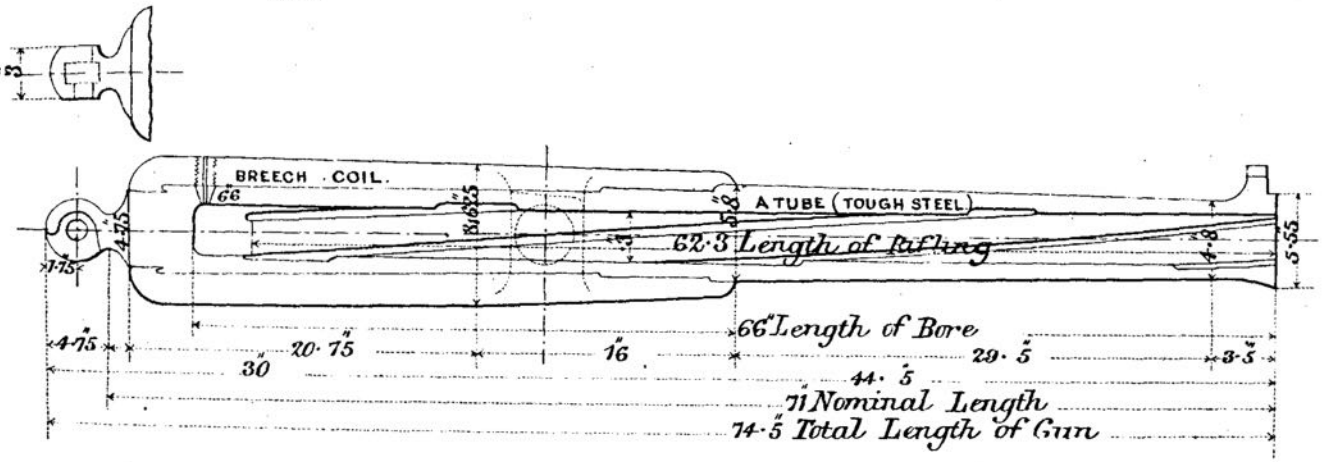
Fig. II.

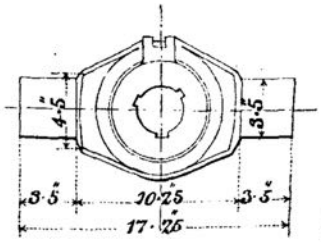
(Wt. 15411 1250 12 | 89—H & S 3673)

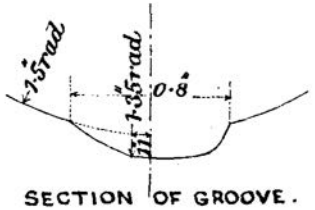
ORDNANCE R.M.L. 9 PR 6 CWT. MARK II.

17.9.74 80 / GEN: No 2262

WEIGHT ..... 6 CWT. 0 QR. 0 LB.
PREPONDERANCE ..... 10 "







SECTION OF GROOVE.
Full Size.

Number of Grooves ..... 3.
Rifling an uniform twist of 1 turn in 30 Calibres.

Plate I.

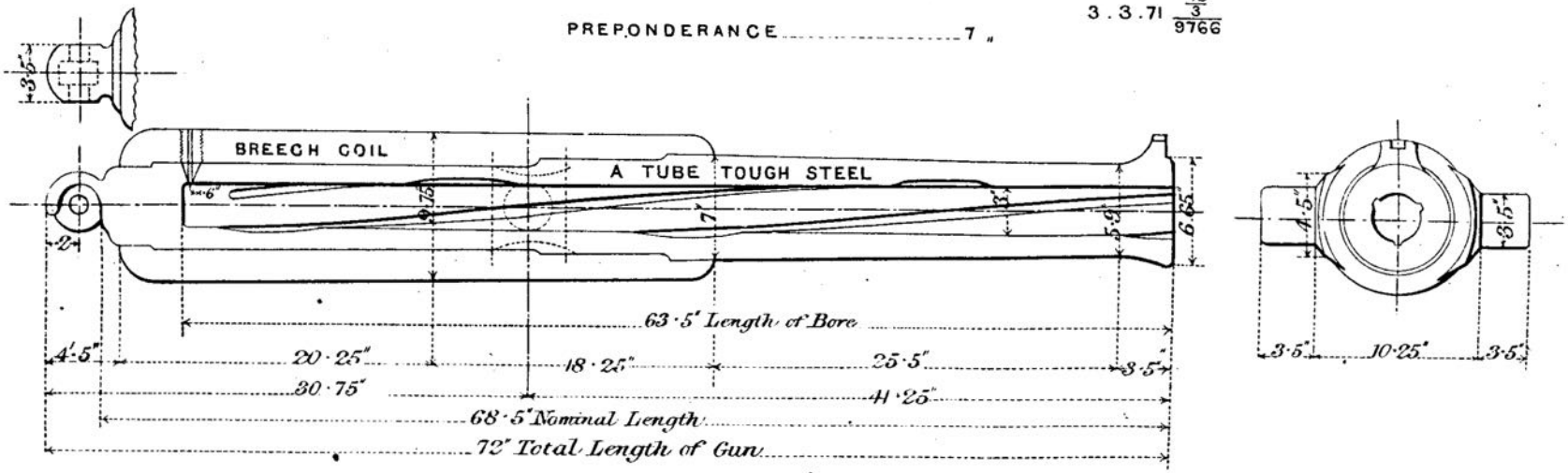
DANGERFIELD LITH. 22, BEDFORD ST COVENT GARDEN. 5291.

ORDNANCE R.M.L. 9 PR 8 CWT. MARK I.

WEIGHT ..... CWT. 1 QR. 4 LB.

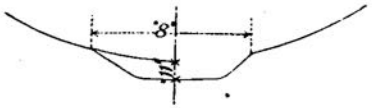
PREPONDERANCE ..... 7 "

3.3.71 $\frac{73}{3}$ / 9766



Number of Grooves ... 3.

Rifling an uniform twist of 1 turn in 30 calibres



SECTION OF GROOVE.

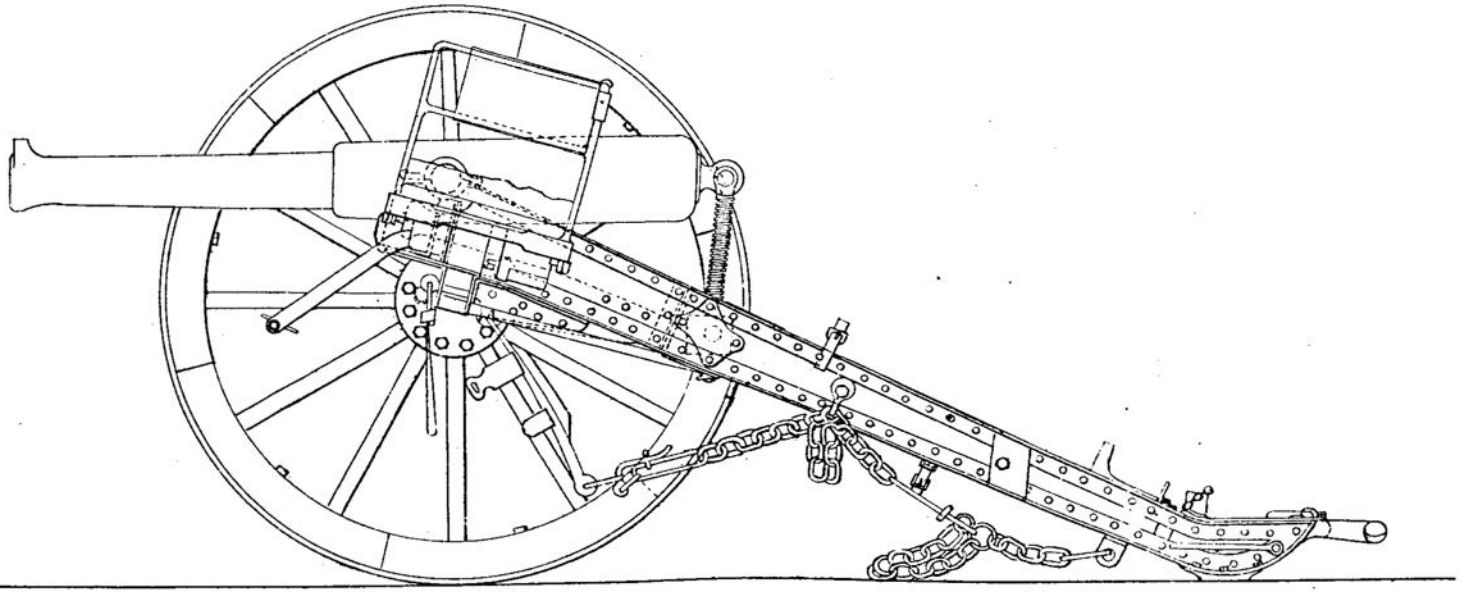
Full size

Plate II.

DALGETY FIELD LITH. 22, BEDFORD ST. COVENT GARDEN. 1900 (3.89)

GARRIAGE, TRAVELLING, COMPLETE, WROUGHT IRON, FIELD, (WITHOUT LIMBER.) R.M.L. GUN 9 Pr MARK II.

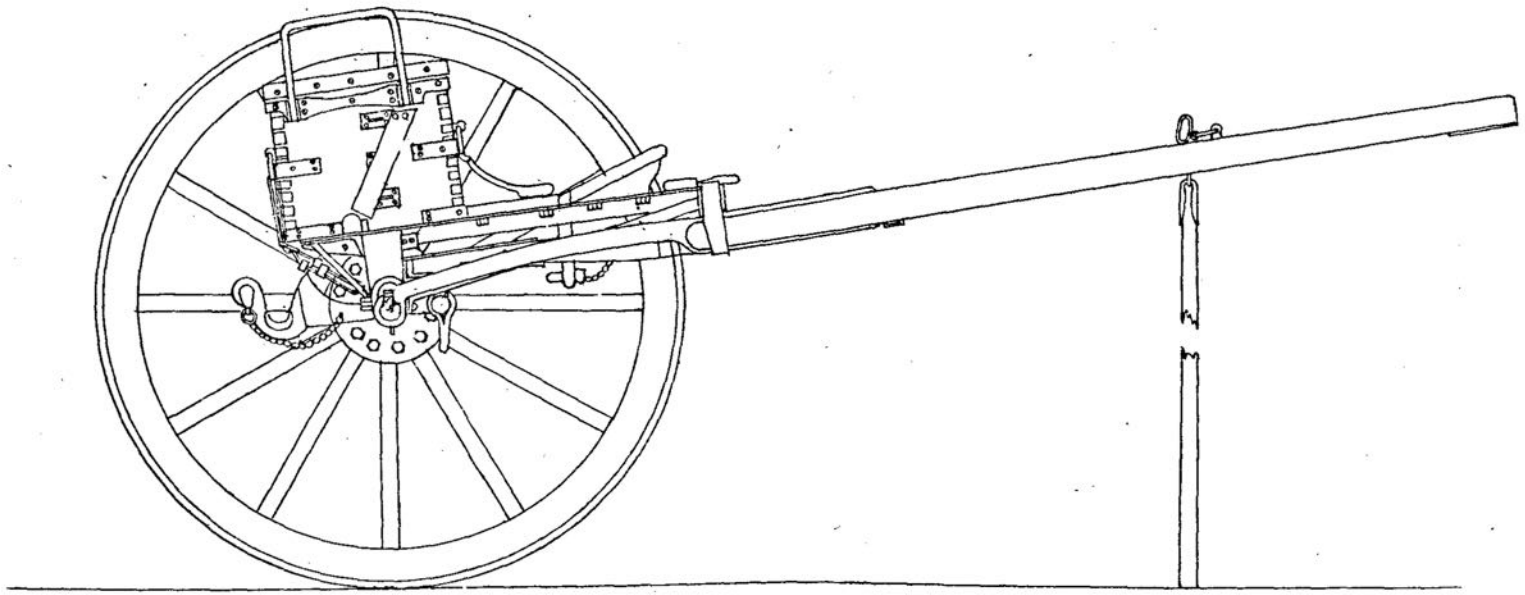
NOTE; SUITABLE FOR 8 OR 6 CWT GUN.



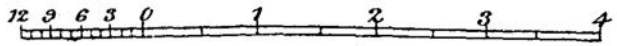
SCALE.

Dangerfield Lith 22 Bedford St Covent Garden 5292

LIMBER, WROUGHT IRON, COMPLETE, FIELD, R.M.L. { 16 Pr MARK II. / 9 Pr MARK II.



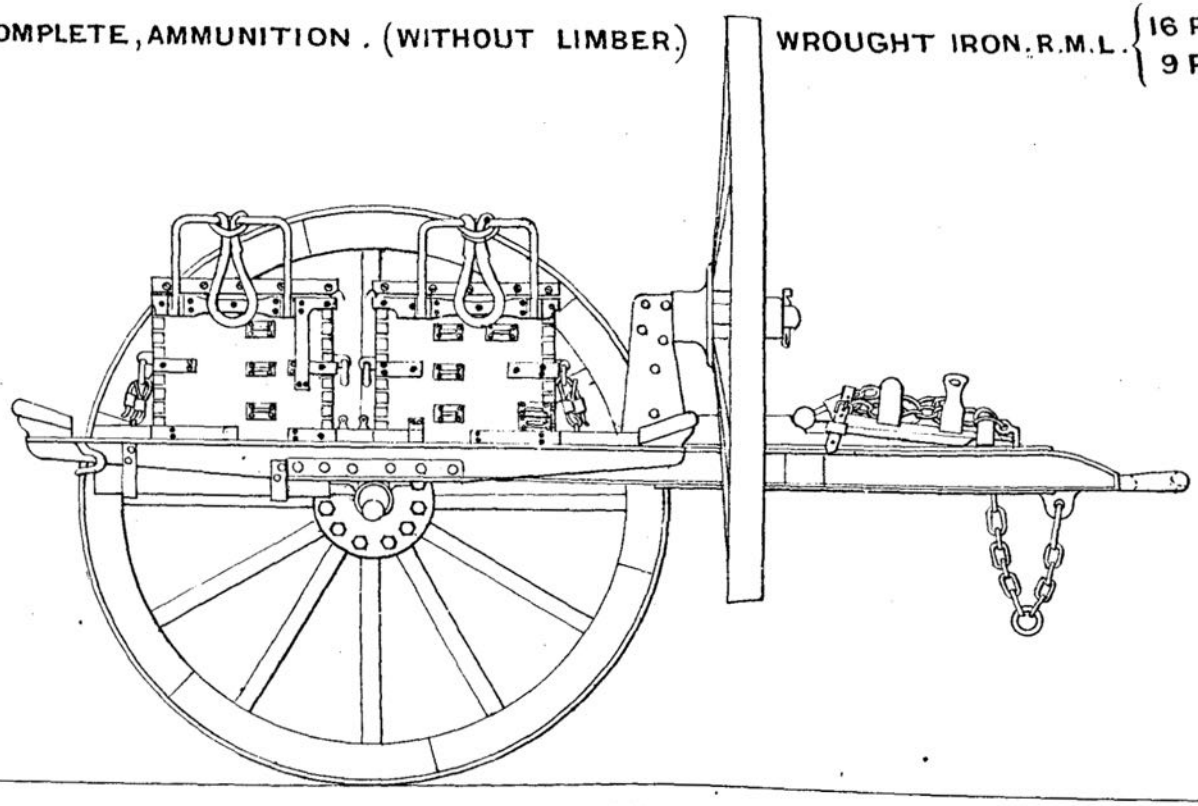
SCALE.



DANGERFIELD LITH 22 BEDFORD ST COVENT GARDEN 5292.

WAGON, COMPLETE, AMMUNITION. (WITHOUT LIMBER.)

WROUGHT IRON. R.M.L. { 16 Pr MARK II. / 9 Pr MARK II.



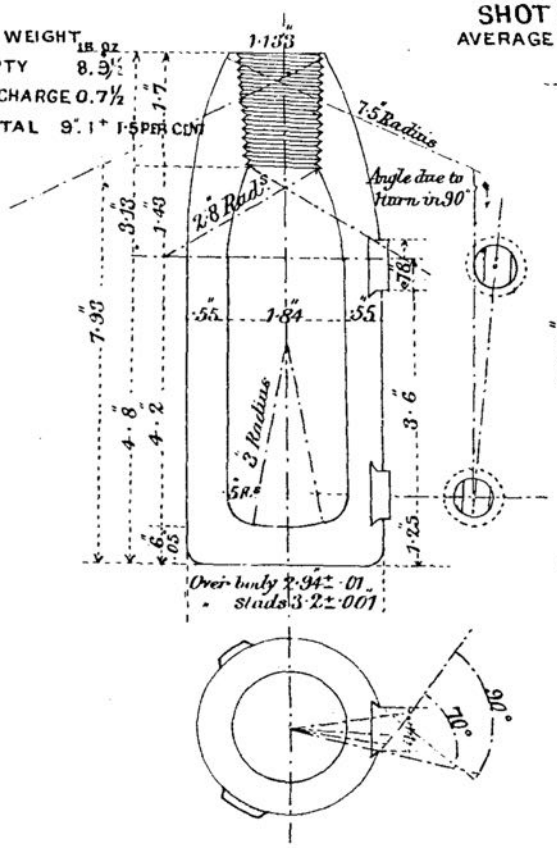
SCALE.

12 9 6 3 0 1 2 3 4

Dangerfield Lith 22. Bedford St Covent Garden 5292.

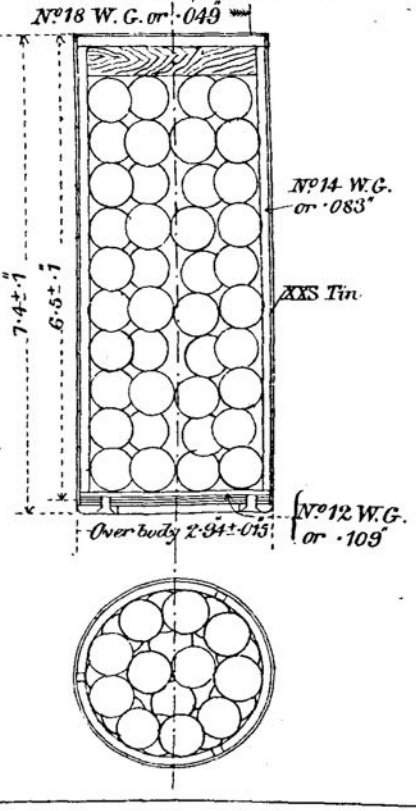
SHELL R.M.L. COMMON 9 Pr V.

MEAN WEIGHT LB. OZ.
SHELL EMPTY 8. 9½
BURSTING CHARGE 0.7½
TOTAL 9. 1 ± 1·5 PER CENT



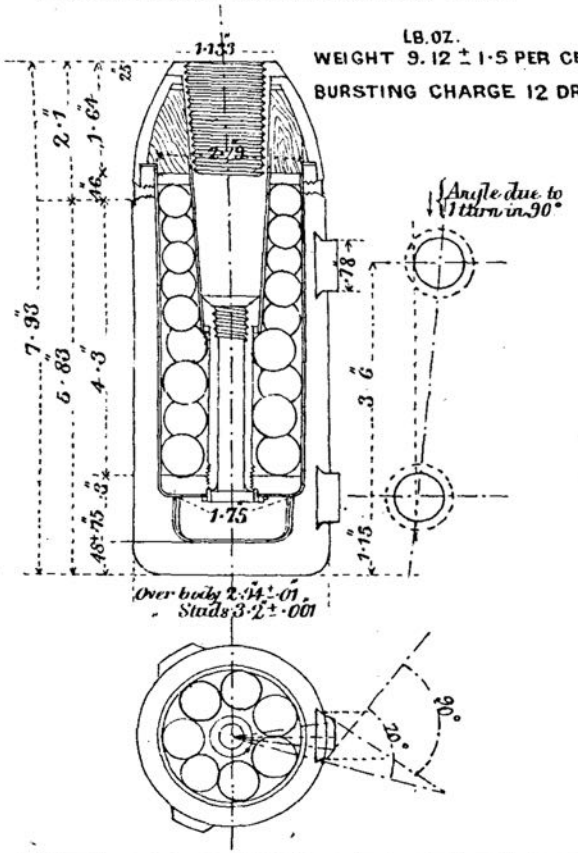
SHOT R.M.L. CASE. 9 Pr IV.

AVERAGE WEIGHT 9 LBS. 10¼ OZS ± 6 OZS.



SHELL. R.M.L. SHRAPNEL 9 Pr VIII.

LB. OZ.
WEIGHT 9. 12 ± 1·5 PER CENT
BURSTING CHARGE 12 DRS.

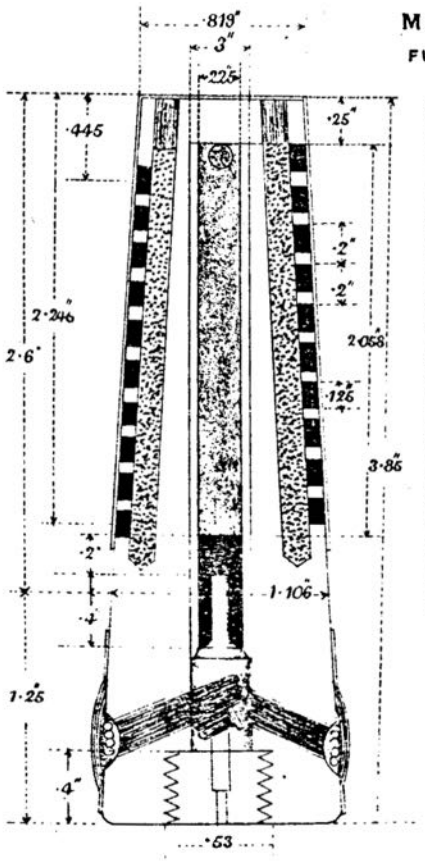


DANGERFIELD LITH 22, BEDFORD ST COVENT GARDEN. 5292.

FUZE, TIME. WOOD, M.L. 15 SECONDS.

MARK II.

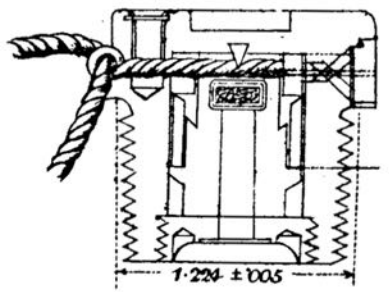
FULL SIZE.



	30	29·5	29	28·5	28
27·5	27	26·5	26	25·5	25
24·5	24	23·5	23	22·5	22
21·5	21	20·5	20	19·5	19
18·5	18	17·5	17	16·5	16
15·5	15	14·5	14	13·5	13
12·5	12	11·5	11	10·5	10
9·5	9	8·5	8	7·5	7
6·5	6	5·5	5	4·5	4
3·5	3	2·5	2	1·5	1

FUZE, PERCUSSION, R.L. II.

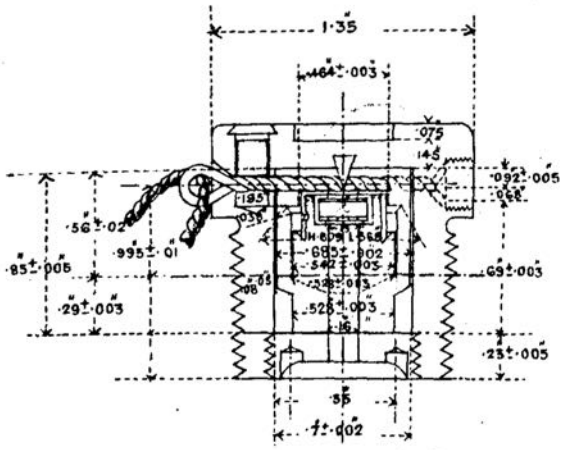
MARK II.



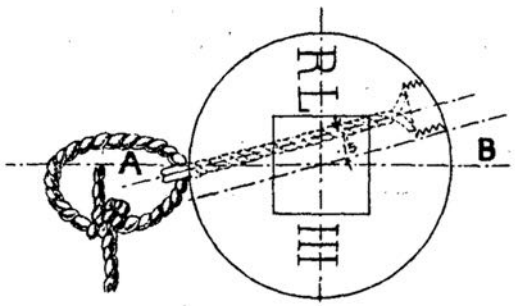
DAUGHTREY LITH 22 BEDFORD ST COVENT GARDEN 5669.

FUZE PERCUSSION R.L. Nº 7 MARK III.

FULL SIZE.



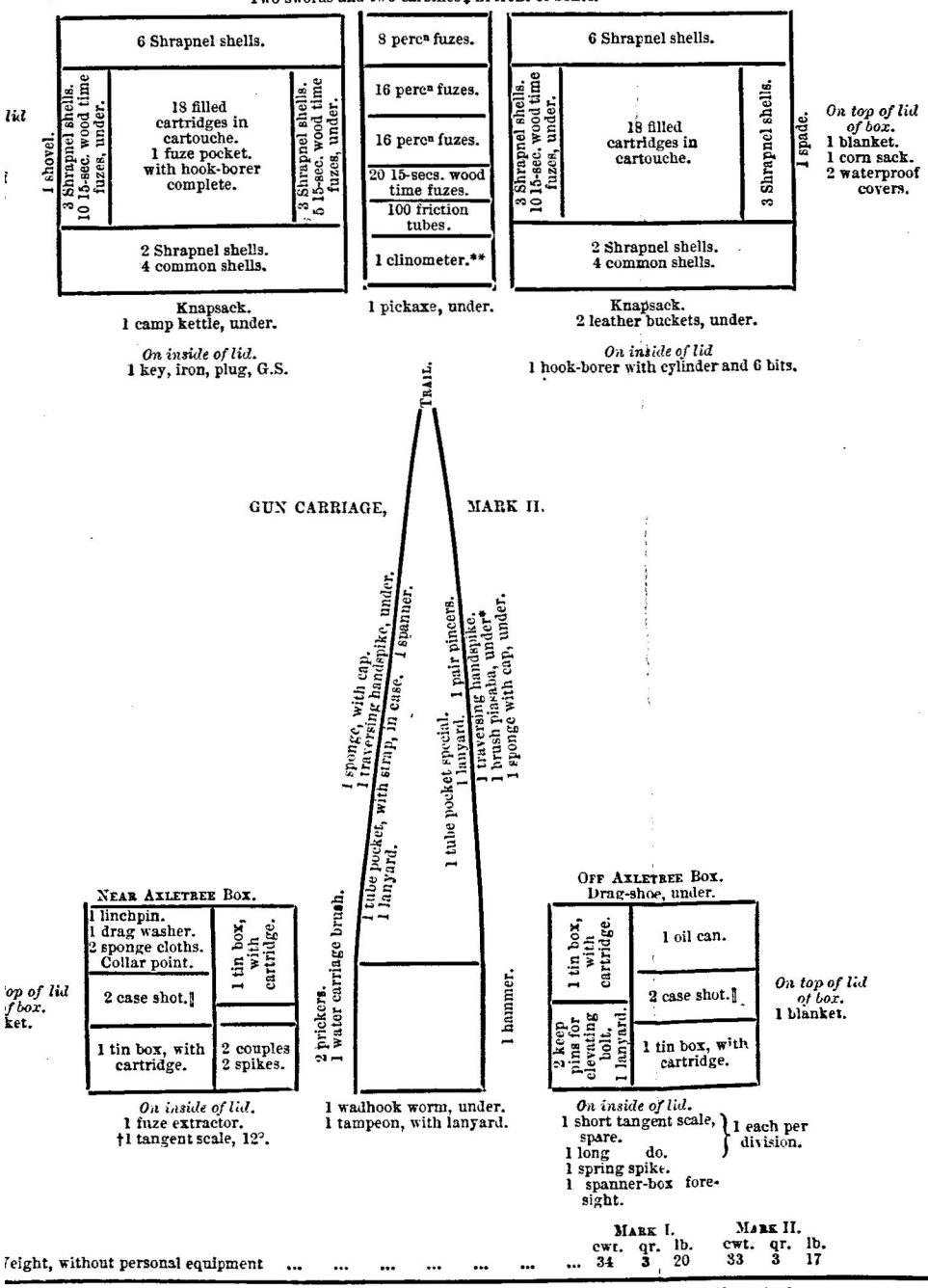
SECTION AT A.B.



PLAN.

DANGERFIELD LITH. 22, BEDFORD ST COVENT GARDEN. 15262. 11/87.

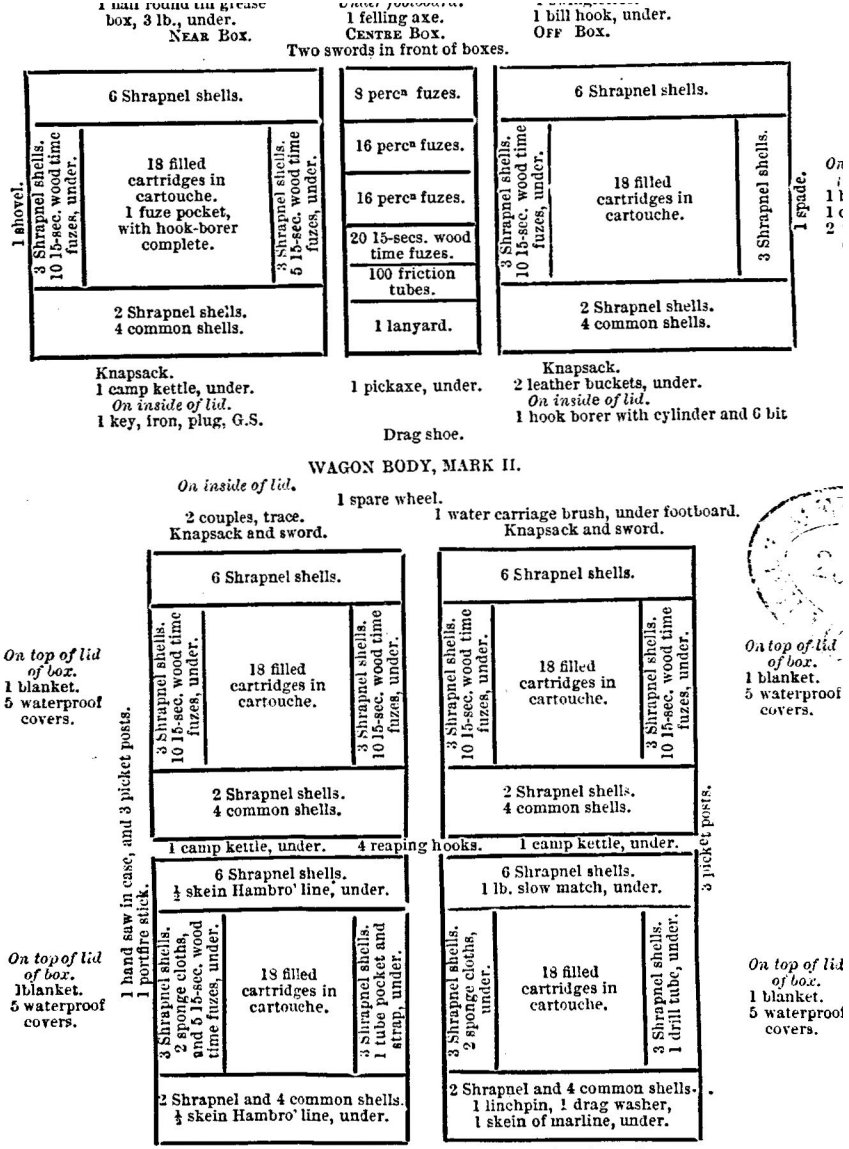
GUN CARRIAGE, MARK II.



Weight, without personal equipment	Mark I. cwt.	qr.	lb.	Mark II. cwt.	qr.	lb.
	34	3	20	33	3	17

* With No. 1 gun. † When not in use in gun. ‖ This box is fitted to carry 2 shells if required.
§ One pair on Nos. 1, 3, and 5 gun limbers.
‡ M.H. carbines are carried in leather cases attached to the boxes.
** 1 per division with Nos. 1, 3, and 5 limbers.

WAGON BODY, MARK II.



Weight, without personal equipment, about 40 cwt. 0 qrs. 2 lb.

† Batteries of R. H. A. having only 2 wagons will carry three drill cartridges in this box, and 1 dummy friction tu side tray of the off fore ammunition box. When in constant use for drill purposes the dummy friction tubes may be car with the cartridges.

Note.—A little oakum may be used with advantage to prevent the movement of time fuze cylinders in ammunition and centre boxes, and case shot in axletree boxes.
An empty common shell, for drill purposes, should be carried in each gun limber. The powder from the shell to be wetted and destroyed.
The packing of the gun and wagon limbers is made nearly identical, to facilitate the supply of ammunition in action by replacing one by the other.
Valises are carried on top of the ammunition boxes attached to the guard-irons of horse and field batteries; in the latter none are carried on the boxes of the limber.
Waterproof covers are issued additional for camp equipment and for batteries on a war establishment.

...ORE WAGON AND LIMBER R.A. MARK I.†

PACKED FOR 9 PR R.A.

WAR ESTABLISHMENT.

LIMBER.

1 Felling axe. under. Swingletree.

1 Bill hook. under.

...rease tin. 3 lbs. under. 1 pair drag ropes.

A. C.

B. D.

1 Spade.

...nkets. } 1 Pickaxe under.
...n sack. } on top of box.
...ter proof covers }

2 Water backets, under.

1 Drag shoe.

WAGON BODY.

...under. 2 Picket posts under. Box under.

2 Chests of collarmakers tools. (on top.)

E.

2 Platform boards. }
Sack of coal. } on top.
Camp stool. }

F.

2 Picketing ropes. on top.

G.

2 Lanterns with bottle of oil in box } on top.

2 Picket posts, under.
2 Picket posts, under.
Crowbar, under.
1 Picket post, under.

...under. 4 Picket posts. under. Box under.
...l. under. 1 Camp Kettle. under. 1 Camp Kettle. under.

Compartment A. Bottom of Limber Box.

Cantles, saddle		1.	Linen, old	lbs.	2½.	Wax, bees	o.
Case, cloak		1	Oil, linseed	pts.	½	,, black	lbs.
Cord, whip	lbs.	1½	Straps, web nosebag		1	Web, diaper	,,
Chapes, nosebag		5	Thread, collar	oz.	12	,, straining	,,
Flour	lbs.	¾	Trough, luggage		1	Web, blue worsted.	yd.
Ink, marking	pts.	½	Twine, quilting	lbs.	1		

Compartment B. Bottom of Limber Box.

Bars, saddle drivers		2.	Straps, 1" wide	x 36"	2.	Straps, 1" wide	x 10"
,, ,, luggage		2	,, ,,	x 30"	4	,, ¾ ,,	x 28"
Leathers, hand		4	,, ,,	x 28"	6	,, ½ ,,	x 9"
Straps, 2" wide	x 42"	2	,, ,,	x 26"	6	,, ,,	x 7"
,, 1½ ,,	x 14	2	,, ,,	x 22"	6	Ties, linch pin	
,, ½ ,,	x 30	1	,, ,,	x 18"	7		
,, 1 ,,	x 44	15	,, ,,	x 13"	4		

Compartment C. Bottom of Limber Box.

Bosses, brass, bit		3.	Buckles, for numnah	3/4"	2.	Screws, brass, fine	½"
,, ,, crupper.		1	Burrs, brass		1	,, ,,	strong⅝
,, ,, head collar		1	Chains, trace		2	,, iron	¾
Buckles, brass, single	1in	1	Couples,		2	Staples, saddlery	
,, ,, roller	1¼	1	Dees, iron, saddlery		1	,, harness	
,, ,, ,,	1"	1	,, ,, harness		6	,, crupper	
,, ,, ,,	⅞	1	Key, spring lock and pocket		1	,, front	
,, ,, ,,	¾	1	Nails, brass		1	,, valise and wallet	
,, ,, ,,	⅝	1	Pins, cantle, brass		1	Washers	
,, iron, barred	1¼	3	Plates, crupper		1	Wick, cotton	yds.
,, ,, ,,	1	3	,, front, with rings		1	Wire, copper, 17 WG	soft.
,, ,, ,,	⅞	7	,, top		1	,, ,, 1 ,,	
,, ,, single	2¼	2	,, with dees, drivers		3	,, ,, 7 ,,	hard
,, ,, ,,	2	2	,, ,, luggage		3	,, iron 7 ,,	soft
,, ,, ,,	1½	6	,, for dees		6	,, ,, 5 ,,	
,, ,, ,,	1¼	4	,, ,, universal		1	,, ,, 7 ,,	hard
,, ,, ,,	⅝	3	Rivets, iron		4	,, ,, 4 ,,	
,, ,, stirrup	1½	2	,, copper, long		1	,, ,, 1 ,,	
,, ,, nosebag	1⅛	3	,, short		1	Rings, brass	1½
,, ,, ,,	1¼	3	Squares, head collar		4	,, ,,	1¼

Compartment D. Bottom of Limber Box.

Borax	oz.	1.	Rings, iron		4.	Thread, fine	lbs.
Burrs, copper		2	Rivets, copper, long		10	,, coarse	,,
,, iron		11	,, ,, short		17	,, black	,,
Eyelets, brass		5	Spelter, brass,	lbs.	1½	,, whited, brown	
Nails, iron tack	lbs.	1	Studs		7		
Paper, glass, sheets		¼	Thongs, lacing		1		

On Top of Cover Board of Limber Box.

Bars, saddle, universal		2.	Hair, horse	lbs.	7.	Pin, linch	
Cordage, white, fathoms		4	Linen, old cleaning	lbs.	15	Seats, saddle	
Covers, canvas		8	Lock, pad with key		1	Serge, 40in.	yds.
Flaps, saddle,	pairs	3	Numnah cuttings	lbs.	5	Washer, drag	

Compartment E. Wagon Body.

Basils, brown strained		½.	Hides, collar		1.	Shoes, horse, in 2	
,, unstrained		12	,, heavy		½	,, boxes, pairs	
Felloes, wheel			,, bag or cloak		¾	Soap, hard	lbs.
5ft, 2nd class		6	,, bellies of		1½	Spokes, wheel	
,, 3ft 1in, 2nd ,,		2	,, light		1	,, 5ft 2nd class	
Hides, white horse		¾	,, shoulders of		½	,, 3ft 4in ,,	
,, bridle		⅞				Timber for boxes, pieces	
						Tools, farriers in bag	

Compartment F. Wagon Body.

Arches, saddle, front		3.	Iron Wrought Bars.	round 16	x 1" diam	1.	Rings, handspike
,, ,, hind		3		,, 16	x ⅝	1	Screws, limber hook
Cordage, tarred	¾ fath's	56		,, 16	x ¾	1	Shoe, drag
Hasps, iron, turnbuckle		4		,, 16	x ⅝	1	,, handspike
Hides, collar, back		¾		,, 16	x ⅞	1	Soles, steel, drag shoe
Hoops, coppr 1¼" 18WG	ft	30		,, 19	x ½	2	Spindle, elevating screw
Hooks, drag shoe		6		,, 32	x ⅜	1	Staples, shaft, off
Iron, Wrought. hoop 1½ 14 WG	lbs.	1½		,, 32	x ¾	2	Steel, atlas 16 x 1½ sq. piec
angle 32 x 2 x 2	pieces	1	tire	12	x ⅝	2	,, cast, oval 16 x ⅝ x ¾
flat 32 x 2½ x ¾	,,	1	Keys, limber hook			2	Steels, moveable, eye
32 x 2 x ¾	,,	1	Loops, draught			2	,, ,, hook
plate 14 x 3½ x ⅜	,,	2	,, sponge			1	Tackle, luff set
,, 12 x 6 x ⅜	,,	2	Plates, camp kettle			2	Iron bolt ⅝ lbs. 2½ flat lbs.

Compartment G. Wagon Body.

Stationery in Box.

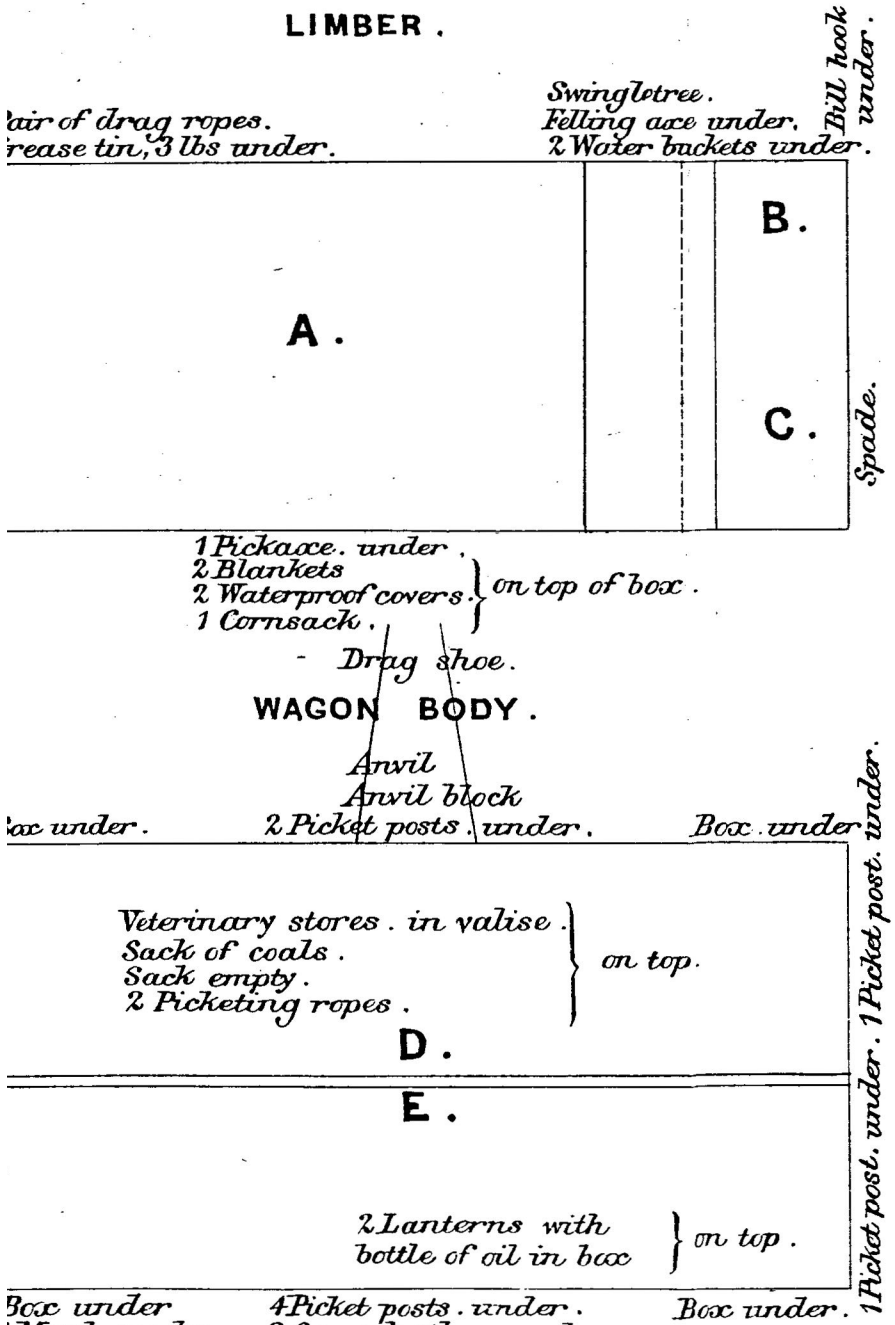
† Mark I.

ORGE WAGON AND LIMBER. R.A. MARK II.

PACKED FOR 9 PR AND 16 PR

WAR ESTABLISHMENT.

LIMBER.



Compartment A. Bottom of Limber Box.

*Dubbing: lbs. 11.** lb
Oil. sweet or rape, pts. 40. Paint preprd. lamp black
,, colza ,, 12. Soap, soft lbs.
,, rangoon ,, 12. Turpentine pts.

Compartment B. Bottom of Limber Box.

Bolt, shaft, near, with key and chain
Caps, bearing, elevating screw
Chain, iron, 14 lbs. per yard yds.
Collars, with keys for forge
Glue lbs.
Keys, capsquare, with chains
,, flat, with chains, axletree box
,, pinion, for blower set of
,, iron, spring lock
,, steel, pinion, for blower set of
Locks, ammn. box, with keys, plates and rivets
Lugs, capsquare, hook
,, ,, eye
Pins, lock, with cord
,, connecting rod, with collar and key
,, with chain, handspike
,, linch, 2nd class
,, with chains, platform board
Plates, staple, single
,, ,, treble
Staples, iron, lashing, riveting
,, ,, round crowned, large
,, ,, ,, small
,, ,, platform board
Turnbuckles, axletree box
,, under wagon, and A and S wagon
,, for steps
Washer, drag, 2nd class
Wire, copper, 15 W.G. feet

Compartment C. Small Tray.

Couples, trace 2. *Lock, pad, with key*
Key, lock with pocket 1. *Wick, cotton ⅝ yds.*

Compartment D. Wagon Body.

Chest of smiths tools, and part set Tinmans
,, Wheeler fitters tools
Aprons, leather 5‡ *Sponge cloths*
Hand books, Artificers 2. *Vice portable*
Handle, hammer, sledge 1. *Wedges, iron*
Bolts Borax—Irons branding—Nails—Rivets
Resin—Sal-ammoniac—Solder—Stone rub—
Stamps—Screws, and Spelter.

Compartment E. Wagon Body.

Bag, Farriers, empty
Forge, field, with poker and slice
Grindstone in frame
Hammer sledge, 10 lbs.

* 12 lbs. for 16 pr. 15 lbs. for R.H.A. † ½ lb for R.H.A.
‡ 6 for R.H.A.