

1591 HANDBOOK

FOR

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

(MOVABLE ARMAMENT

1898.



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MEMO.

This handbook has been corrected up to August, 1898. Any alterations which may be suggested should be forwarded to Chief Inspector, Woolwich Arsenal.

C.H.A.

9-pr. R.M.L. Guns of 6 cwt., Mark II, and 8 cwt., Mark I.

(MOVABLE ARMAMENT.)

DESCRIPTION.

GUN.

(*Plates I and II.*)

			6-cwt. Gun.		8-cwt. Gun.	
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	.. ..	French, modified	.. ..	French, modified.	
	{ twist	.. ..	uniform, 1 in 30 cal.	.. ..	uniform, 1 in 30 cal.	
	{ length	.. ..	62.3 inches	.. ..	59.8 inches.	
	{ grooves { number..	.. ..	3	.. ..	3	
		{ depth ..	0.11 inch	.. ..	0.11 inch.	
		{ width ..	0.8 inch	.. ..	0.8 inch.	
Vent, hardened copper	.. ..	.. ..	.. ..	.. ..	0.6 in. from end of bore.	

The two natures of this gun differ from one another chiefly in weight and dimensions; they both fit the same carriage, are vented alike, have the same rifling, and take the same ammunition.

As regards their construction they each consist of an "A" tube of steel, over which is shrunk a wrought-iron jacket.

The cascable is in one piece with the "A" tube in the 8-cwt. gun, and was originally so in the case of the 6-cwt. gun also, but in the latter was too weak to stand the jar of the elevating gear on firing, and so has been removed, a cascable of wrought iron, of strengthened pattern, being screwed in to replace it.

SIGHTS.

Both guns are centre-sighted, and each is provided with 2 tangent sights of different lengths, only the shorter of which can be carried in the gun. The longer one is only for use when firing at higher angles of elevation than those given on the short sight.

In each gun the tangent sight is set at an angle of $1^{\circ} 30'$ to correct for drift.

(1765).

A 2

The sights are graduated in degrees, yards, and length of fuze, and are each provided with a deflection leaf, capable of giving 30 minutes right or left.

The graduations are:—

			degrees.	yards.
6-cwt. gun	{ short sight	..	0 to 5 ..	2,100
	{ long	..	0 to 12..	2,500
8-cwt. gun	{ short	..	0 to 6 ..	2,400
	{ long	..	0 to 12..	3,500

The tangent sights are not interchangeable between the two guns, as they are graduated to a different radius.

The fore-sight is a small hog-backed sight, screwed into a recess in the dispart patch at the muzzle. A wrench is provided for removing the sight when necessary.

A clinometer is supplied for use when firing at elevations above 12°, a plane being cut for it on the gun immediately in front of the vent.

CARE AND PRESERVATION OF GUN AND FITTINGS, BASED ON INSTRUCTIONS CONTAINED IN "REGULATIONS FOR MAGAZINES AND THE PRESERVATION OF ARTILLERY MATÉRIEL."

A "Memorandum of Examination" is issued with each gun. It contains a drawing showing the principal dimensions, with a short description of the construction and rifling, as well as the particulars of any slight original defects or tool marks which may have existed at the date of issue. In it are recorded in detail the number of rounds fired, and the date and result of any examination.

This memorandum will remain in charge of the officer who has possession of the ordnance, and a certificate to the effect that it is in possession and complete up to date will be included in the Annual Return of Rifled Ordnance, Army Form G 872.

At the conclusion of each day's firing an entry will be made in the memorandum by the officer in charge, giving a detail of the rounds fired, so that an accurate record of the firing may always be kept up.

A statement of the results of the examination will be added to the memorandum by the inspecting officer or other examiner who performs the duty, and when the gun is returned into, or issued from, store, the memorandum will accompany the vouchers.

If at any time the memorandum be lost or damaged, a duplicate can be obtained from the Chief Inspector, Woolwich, by whom also inside sheets for continuation of the record of the number of rounds fired will be supplied on demand.

The gun will, as far as possible, be examined after firing 150 rounds, and practice from such ordnance should cease until such examination has been carried out. In cases, however, where such examination would happen within a series of rounds allowed for practice, and thus cause inconvenience, the gun will be examined before practice commences, irrespective of the number being completed.

In computing the number of rounds for examination purposes, four rounds of blank charges may be regarded as equal to one round with projectile, but in recording the number on the memorandum of examination, "blank rounds" should be shown as such. Ordnance used for saluting purposes or for time-guns should, however, be examined at least once a year, or oftener if necessary.

The exterior of the gun will be painted biennially, and the bore will be lacquered at the conclusion of each year's practice, when, in addition, the vent will be plugged, and all fittings liable to damage by exposure will be removed.

During practice the bore will be kept slightly oiled to prevent rusting; at the close of each day's practice the gun will accordingly be washed out and placed under metal, and as soon as dry, the bore will be oiled with a greasy sponge and the muzzle closed with a tampeon.

The clinometer plane is not to be painted, and it is on no account to be cleaned by filing, or by the use of brick dust. It must be cleaned by a soft rag, and afterwards slightly oiled.

The sights must be kept clean, free from grit, and oiled, and the sliding leaves of the tangent sights must have free play; on no account are the sights to be burnished or cleaned in such a manner as to remove the bronzing or blueing.

Preserving and fixing screws should be occasionally removed and slightly oiled, to prevent them from setting fast.

RIFLES, AIMING, M.-H. CHAMBER, EWART.

This apparatus is for use with the gun in imparting instruction in laying, and consists of the following parts:—

Rifles, aiming, M.-H. chamber,

Ewart—

Bands	..	..	..	Bronze.
Front	..	..	..	With securing bolt, nut, and washer.
Rear	..	..	..	With securing bolt, nut, and washer, buffer, and key.
Barrel, rifle	..	..	..	M.-H. rifle barrel, with breech action and metal boss.
Cord, firing	..	..	..	White line, tarred, 2 yards long (with two hooks).
Lever, vent	..	..	..	Steel.
Link, trigger	..	..	..	Bronze, with fixing screw.
Tube, 0.23-inch "J"	..	..	..	Including breech-piece, bushes (movable and fixed), set nut, and leather washer.
Lanyard, friction tube, siege,				With toggle, 5 feet 5 inches.
No. 1				
Tube, friction, drill	..	..	..	Dummy, iron, with spring clip.
Tube, 0.23-inch—				
Brush, cleaning.				
Key, M.-H.				
Rod, cleaning.				

Method of Fitting, Adjusting, and Using the Apparatus.

The aiming rifle is fitted to the left side of the gun in the following manner:—

The two bands are placed over the chase of the gun, the distance between the inner faces of the bands being 27 inches.

The bands are secured round the gun by fixing bolts. The muzzle of the rifle is passed through the hole in the arm projecting from the front band, and the breech is placed in the socket on the rear band and fastened with a key. A buffer spring, to lessen the strain on

recoil, fits into the socket in rear of the rifle. A hole is made at the rear end of the socket to facilitate the extraction of the buffer spring.

To adjust the rifle on the gun, the latter is laid horizontally; the 0.23-inch tube "J" is then inserted in the bore of the rifle, sufficient length being allowed to project from the bore to admit of the application of a spirit level to the 0.23-inch tube, by which means the rifle is levelled, so that the axis of rifle and gun are in parallel horizontal planes. The bands are then firmly screwed up, care being taken to see that they do not shift during the operation, in the event of which they must be slackened and re-adjusted.

Elevation is obtained by means of the gun sights, and any error in line is corrected by use of the deflection scale.

The rifle is fired by means of the firing cord. One end is hooked to the loop of the "Link, trigger," and the other end to an arm of the "Lever, vent," the service "Lanyard, friction tube, siege, No. 1" is then hooked to the other arm of the "Lever, vent," the latter being kept in position by the service dummy tube.

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 two 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, which is connected to the brackets by stays. A deflector, which is fitted with a pendulum to indicate on a degree scale the differences in the height of the wheels, is suspended by loops from the axletree bed.

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

The elevating screw is attached to the cascade by a bolt, and worked by a metal nut, bevel wheel, spindle, and 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 No. 1 "near" and Nos. 3 and 19 "off," the latter known as the "Brandling" pattern; they are fitted for farmers' draught, 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 hookhorer 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 the 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 the Mark I carriage; the axletree boxes are similar, but not interchangeable with those of Mark I.

The limbers differ 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' 6½"	3' 6½"	
Length of	{	carriage	..	{ with wheels	10' 3"	10' 4"	
			..	{ without wheels	9' 0"	8' 10½"	
	{	axletree	..	..	6' 4½"	6' 4½"	
		carriage and limber	{ without gun	..	21' 0½"	21' 3½"	
		{ with gun	..	22' 4½"	22' 6"		
Minimum space through which carriage can turn				..	32' 3"	32' 0"	
Angle of trail	..	..	..	..	22°	23°	
Angle of lock	..	..	..	..	52°	56½°	
Elevation, maximum	{	with screw	..	..	21°	22°	
		without screw	..	..	24°	22°	
Depression, maximum	..	..	..	..	4°	6°	
Wheels	{	track	..	..	5' 2"	5' 2"	
		diameter	..	..	..	5' 0"	5' 0"
Weight of	{ carriage, empty, with wheels, drag				..	..	
	{ shoe, and elevating screw				..	..	
	{ limber, empty, with boxes, shafts, and				..	..	
	{	wheels	..	..	..	11 1 19	11 1 10
		wheels	..	..	..	4 2 0	4 2 0
		elevating screw	..	..	..	0 0 11	0 0 11
	{ carriage and limber, packed				..	..	
					tons.	tons.	
Tonnage of carriage and limber	..	..	..	..	4.079	3.818	

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 platforms. 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 lid 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'	5 $\frac{1}{2}$ "		20'	7 $\frac{1}{2}$ "	
Minimum space through which wagon can turn	29'	8 $\frac{1}{2}$ "		29'	6"	
	cwt. qrs. lbs.			cwt. qrs. lbs.		
Weight of wagon and limber, empty.. ..	25	3	13	25	0	22
" " " packed	41	1	25	40	0	2
Tonnage of	tons.			tons.		
	4.493			4.373		

INSTRUCTIONS FOR CARE AND PRESERVATION.

All bearings should be kept clean and slightly oiled, and all nuts tightly screwed up. Linch pins, washers, the end of the wheel iron of the off shaft, and axletree arms should be kept perfectly clean, care being taken in cleaning them not to rub them away too much, and so reduce them in size; they can be kept slightly oiled, but if so the old oil must be frequently rubbed off and fresh put on. Carriages kept in store should have the bright parts of the ironwork coated with grease. Water should not be allowed to lodge in any of their recesses.

Defects or damages should be made good without delay, and if the paint becomes rubbed off at any part, it should be patched over as soon as possible. Opportunity should be taken of the annual painting to give the carriages a thorough overhauling and repair.

Elevating Screws.

Elevating screws should be kept clean and oiled; if they do not run up and down freely, they should be removed and examined; if the threads are indented on the edges, they must be neatly filed down. If the bevel pinions in the box have become indented or choked up with clotted oil and dirt, the box should be opened, the necessary adjustments made, and the inside of the box painted with red lead.

Cap-squares.

The inside of the cap-squares and the trunnion bearings must be kept clean and oiled.

The lugs and the crown of the cap-square are liable to be "drawn," giving too much play to the trunnions of the gun. The cap-square should be repaired as soon as possible, as the deformation otherwise will rapidly increase in firing, and the lugs will be broken.

Bolts.

All bolts should be kept tightly nutted up. Sometimes a particular nut will work loose continually; in such cases, after tightening it up, cut the thread of the bolt across close up to the nut, and caulk it under a little.

Care must be taken in painting that no working parts are painted, and intelligence must be exercised in keeping the working surfaces free from paint. Such parts must, on the other hand, *on no account be polished*, but kept clean by greasing or oiling. If they are not in constant action, a coating of oil will preserve them from rust and not collect dust.

AMMUNITION.

CHARGES.

Service, $1\frac{3}{4}$ lbs. R.L.G⁴., silk cloth.
Saluting, 1 lb. blank, L.G. „

These are of No. 1 class silk cloth, hooped with silk braid, and choked with silk twist.

For filling and examining cartridges, see "Magazine Regulations" and "Regulations for Army Ordnance Services."

Drill Cartridge.

A dummy cartridge of raw hide is issued for drill.

PROJECTILES.

(Plate VI.)

Nature.	Mark.	Bursting charge.		Weight.
		Weight.	Powder.	
Shell { common ..	V	8 $\frac{3}{4}$ oz.	P and F.G.	9 lbs. 2 $\frac{1}{4}$ oz.
Shrapnel ..	VIII	12 drms.	F.G.	9 „ 12 „
Shot, case.. ..	IV and V	..	..	9 „ 10 $\frac{1}{4}$ „

Projectiles will be painted black, except the studs and distinguishing marks.

Common Shell.

The common shell is of iron, cast to finished dimensions, and furnished with two rings of studs. The head is struck with a radius of $1\frac{1}{2}$ cals. The interior of the shell is lacquered, and the fuze-hole is tapped to G.S. gauge.

The bursting charge is in the proportion of 6 oz. of P and $2\frac{3}{4}$ oz. of F.G.

*Shrapnel Shell.**

The body of the shell is cast to finished dimensions, and has two rings of copper studs. The walls of the shell are thickened near the base so as to form a shoulder, on which rests a wrought-iron diaphragm, a lining of brown paper, and mixed metal bullets, 28 at 18 per lb. and 35 at 34 per lb., run in with melted resin. The head is of Bessemer metal lined with wood, and contains a composite fuze socket of tin and gun-metal, screwed to G.S. gauge. The bursting charge is contained in a tin cup in the base of the shell, connected with the fuze socket by a gun-metal tube screwed into the diaphragm.

Case Shot.†

The body of Mark IV is of tin, in three parts, soldered together longitudinally. The base is strengthened by having a disc of sheet iron laid loose in the interior, and a ring of the same rivetted to the tin case outside. The sides are lined with three longitudinal segments of sheet iron laid in loose. The top consists of a disc of sheet iron secured to the case by turning over and soldering the ends of the latter. It is filled with 108 mixed metal balls at $16\frac{1}{2}$ per lb. packed in clay and sand.

Mark V differs from Mark IV in being fitted with a wrought-iron handle on the top to facilitate the removal of the shot from the limber boxes. Earlier patterns are not issued.

DISTINGUISHING MARKS.

Shrapnell shell will be painted with a red tip, 1 inch deep. All filled shell will be marked in red as follows:—

- (a) A band $\frac{1}{2}$ inch wide round the head, $1\frac{1}{2}$ inches from the top; this will be $\frac{1}{2}$ inch below the red tip of Shrapnel shell.
- (b) The monogram of the station.
- (c) The date of filling.
- (d) The letter "P," 1 inch long, if filled with P. and F.G.
- (e) The word "fuzed" if the shell is fuzed.

Projectiles which are to be used for practice only will be marked with a yellow band, $\frac{1}{2}$ inch wide, round the body.

Shells which have been emptied will be marked on the head with the letter "E," in red paint, and also the monogram of the station.

MAKING UP CARTRIDGES, &c.

FILLING SHELLS, &c.

See "Magazine Regulations" and "Regulations for Army Ordnance Services."

* Shrapnel shell can be utilized 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.

FUZES.

Percussion, { R.L., No. 7. Marks II*, III*, IV.
 { small, No. 8. Mark IV.
 Time, 15-secs., M.L., No. 41. Mark II.
 Time and percussion, No. 56. Mark IV.
 Primer, fuze, percussion, R.L., No. 7.

DESCRIPTION OF FUZES.

Percussion, R.L., No. 7.

(Plate VII.)

The body is of gun-metal, screwed to fit the G.S. gauge, and with a square hole in the head to fit the key by which the fuze is screwed into the shell.

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, in the conical cup, as shown in Plate VII. A thin disc of brass is then fitted over the ends, and soldered to keep the fuze watertight. The head of the safety-pin is fitted with a loop of tarred twine, 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 cause a premature burst. To guard against this, a small lead pellet slides freely in a recess cut in the head above the safety-pin hole. When the shell is rammed home, the pellet sets back, and so closes the safety-pin hole.

The percussion arrangement of Mark IV fuze consists of a steel needle, fixed in the centre of the top on the inside, and a lead pellet containing a detonator covered by a brass disc 0.005 inch thick, and having a tinfoil disc under it to prevent the detonating composition working through the fire holes in its head. The pellet is kept in position by a gun metal guard, which rests on two feathers on the outside of the pellet. The guard is furnished with a feather on the outside which fits a groove in the body of the fuze, so that body and guard must rotate together. On the shock of discharge, the guard sets back on the pellet, shearing off the feathers, and on graze or impact, the guard and pellet fly forward together, bringing the detonator in contact with the needle, and thereby firing the fuze.

A shield of copper is placed over the top of the lead pellet to prevent the brass safety-pin from indenting it, and thereby allowing the detonator to approach too close to the needle. Mark III has the brass disc over the detonator only 0.001 inch thick, and the guard has no feather. This pattern when converted to Mark IV pattern is called Mark III*. Mark II had not the copper shield.

Percussion, Small, No. 8.

(Plate VIII.)

The fuze (Mark IV) consists of the following parts:—

Body, detonator pellet, with two retaining bolts, spiral spring, safety-pin, closing pellet, needle plug, and magazine.

The body is of gun-metal, screwed on the outside to the G.S. gauge. It is bored out from the top to receive the detonator pellet, and is closed by means of the needle plug. Two holes, closed on the outside by brass discs, are bored in the body to receive the retaining bolts of the pellet. Two fire-holes are bored in the bottom to communicate the flash from the pellet to the magazine, which consists of a pierced pellet of pressed powder, secured in the lower end of the fuze by a brass disc spun in.

A detonator, covered by a brass washer, 0·03 inch thick, and having a tinfoil disc under it to prevent the detonating composition working through the fire-holes, is secured in a recess in the top of the gun-metal pellet, and two fire-holes filled with F.G. powder, lead from it to the bottom, where they are closed with paper discs. The top of the pellet is reduced to fit inside a spiral spring, which prevents the pellet rebounding or working forward during flight.

The two retaining bolts, with brass spiral springs, pass transversely through the pellet (as shown in the drawing), the springs keeping them locked in the holes in the body until spun out by the rotation of the shell. A screw in the body projects into a groove down the side of the pellet, and prevents it from turning.

The needle plug has a steel needle fixed in the centre, and screws into the top of the body. A hole through the side of the fuze into the needle plug contains a brass pellet, with spiral spring behind it, for closing the safety pin-hole.

The safety-pin, of twisted copper wire, passes through the needle plug, down the body, behind the head of one of the retaining bolts, and is bent over at the top into a groove in the needle plug.

Mark III differed from the above in having the detonator pellet held in position by a small screw plug, and in having no protecting washer over the detonator. In Mark II the spiral spring in front of the detonator pellet was found stronger, and was replaced by the same spring as in Mark III, the fuze being then Mark II*, which was identical with Mark III. Marks II* and III will be exchanged for Mark III* or IV.

Mark III fuzes are converted to practically the same as Mark IV, and are then Mark III*.

Action of the Fuze.—The safety-pin being withdrawn at the moment of loading, the hole is closed by the closing pellet. On discharge the centrifugal motion of the shell causes the retaining bolts to fly outwards, leaving the detonator pellet free to move forward. On impact, the pellet compresses the spring in front of it, and moves forward on to the needle, which ignites the detonator, and so fires the fuze.

Fuze, Time and Percussion, No. 56.

(Plate IX.)

The fuze consists of the following parts, made of gun-metal, except when otherwise stated, viz.:—Body, detonator plug with detonator, percussion pellet, brass spiral spring, base plug, brass safety pellet, brass ball, composition ring, cap, brass washer, dome, and two safety-pins, and two leather washers.

The *body* is screwed at the lower end to G.S. fuze-hole gauge, and is bored from the bottom to receive a percussion pellet and base plug. Two holes are bored beyond the recess for percussion pellet, one for the detonator plug, the other for the safety pellet.

The *detonator plug* is screwed on the outside and fitted with a detonator.

The hole bored for the detonator plug is continued above it to form a small magazine filled with F.G. powder. In the top of the body is bored a recess to contain a perforated pellet of pressed pistol powder, which communicates with the magazine by a hole bored at right angles to the axis of the fuze. The stem on the body is screwed on top to take the cap, two grooves being cut in the top end of stem to receive the feathers on the brass washer. A groove is cut in the top face of body, close to the stem, and half way round it, and a gas escape hole bored obliquely through the body into the groove. A small tablet of fine white paper is secured with shellac to the body of the fuze over the perforated powder pellet, and over it, two washers of fine white paper and calf-skin are secured with shellac, a hole being cut through the washers and tablet immediately over the powder pellet.

The *percussion pellet* has a cut in the side for the safety pellet and ball to fall into when set in action. A hole is made transversely through the pellet and fitted with a brass retaining bolt, held in position by a brass spiral spring. The pellet contains a powder charge of F.G. powder. A small set screw, in the wall of the body, fits into a slot in the percussion pellet to prevent it from turning in flight.

The *base plug* has a conical hole bored in it, and closed at the bottom by a shalloon disc and brass washer spun in; it contains a perforated pellet of pressed powder, secured by a brass washer spun over on top.

The *safety pellet* has a slot cut in the side to clear the brass ball, and is suspended in the body by a thin copper wire passing through it. A hole is also bored in the upper part of the pellet and body of fuze for the safety pin to pass through.

The *composition ring* has a chamber on one side, and three projections on the inside to keep it concentric with the stem of the body. The chamber has a hammer with a steel needle suspended in it by a copper wire over a patch of detonating composition. A safety pin also passes through the hammer and chamber. The ring has a groove on the underside filled with composition, and connected with the chamber by a lighting hole. The outside of the ring is graduated from 0 to 18, each division being subdivided into halves and quarters, with a broad arrow at the point, where the groove is interrupted by a bridge soldered in.

The *dome* is made of sheet brass.

The *washer* is made of sheet brass, with two feathers, which fit into featherways cut in the top of the stem. When screwing up the cap the washer remains stationary, thus preventing the dome from turning and altering the setting of the fuze.

The *cap* is hexagonal in form, and screws on the stem of the body.

The fuze is stamped **T** on the composition ring close to the time safety pin, and **P** on the body close to the percussion pin.

The fuze should be set *before* the safety-pins are withdrawn.

To set the time arrangement, the cap is loosened with the "key, fuze, universal," and the ring moved round until the graduation ordered is exactly in line with the arrow on the body; the fuze is then clamped by screwing down the cap as tightly as possible, care being taken that the ring and dome have even bearings.

If the fuze is required to act as a percussion fuze only, the **P** pin should be withdrawn and the **T** pin left in position; otherwise both

pins should be withdrawn, but this should not be done till the moment of loading.

Action.—On discharge, if the time safety-pin has been withdrawn, the hammer sets back, shearing the suspending wire, and igniting the detonator and the time ring, which burns until it comes over the pellet, and so flashes down through the radial magazine, detonator pellet, and base plug, and into the shell.

If the percussion pin has been withdrawn, the safety pellet sets back, shearing the suspending wire, and the brass ball falls down into the space over the safety pellet. The centrifugal bolt, owing to the rotation of the shell, is withdrawn, the percussion pellet is free to move forward on impact and ignite the detonator, which flashes through the percussion pellet and base plug into the shell.

At rest it burns about 13 seconds.

Time, 15 seconds, M.L., No. 41.

(Plate X.)

Is 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 a 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 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 round the head. This groove is covered by a copper and tape band, which must be removed before firing.

The fuze is prepared for any desired time of flight by boring through the "side-hole" corresponding to the required time into the composition.

The fuze is fixed in the fuze-hole by screwing it round by hand until it is held firmly in the fuze-hole; it must not be fixed by tapping with a mallet or striking the fuze, previously inserted loosely in the shell, against any hard object. Such action would tend to crack the fuze and cause a premature explosion.

The fuze must not be uncapped until the shell is placed in the muzzle of the gun. This is done by taking hold of the exposed end of the copper band, and unwinding from *right to left* smartly, so as to thoroughly detach the band from the head of the fuze, and to leave the priming fully exposed.

Time of burning at rest, 14·6 to 16·5 seconds.

Primer, Fuze, Percussion, R.L., No. 7.

(Plate XI.)

The primer is for use with the "Fuze, percussion, R.L., No. 7." It resembles the G.S. plug without loop, but is smaller so as to fit the bottom of the G.S. fuze-hole. It has four fire-holes on top, one at each corner of keyhole recess.

FIXING PLUGS, FUZES, AND SECURING SHELLS.

When plugs or metal fuzes are screwed into shells, they will, unless required for immediate use, be lubricated with a mixture composed of whiting, mineral jelly, and castor oil. It is issued, ready mixed, in tin cylinders.

The mixture is to be applied to the threads of the fuze or plug with a brush, in sufficient quantity to cover them, care being taken that it does not extend over the bottom. A coat of paint of the same colour as the tip of the shell will be applied over the junction of the G.S. fuze-hole, plug, and shell when the latter is filled.

The "turnscrew" on the limber is to be used for starting fuze-hole plugs that may have become jammed or set fast.

TUBES, FRICTION, COPPER, SOLID DRAWN, WITH BALL, MARK II.

(Plate XI.)

The tube is made of solid drawn copper, and has a solid head: it is filled with pistol powder, and the bottom is closed by a brass ball, over which is a cork plug, secured by shellac. The length is 2.1 inches. The nib-piece is solid drawn, and projects right through the tube, and has a small hole bored in it to allow the flash from the friction composition to reach the powder in the tube.

The nib-piece contains a copper friction bar roughened on both sides; the roughened portion of the bar has a detonating composition, composed of chlorate of potash, sulphur, and sulphide of antimony, smeared on both sides of it. The composition is damped with shellac varnish while it is being smeared on. The nib-piece is pinched down so as to press on the sides of the friction bar, the projecting part of which has a vertical eye, into which the hook of the lanyard fits. The exterior of the tube is varnished black, after the tube has been thoroughly dried.

On pulling the lanyard the friction bar is drawn out, igniting the composition and firing the tube. The gas from the exploded cartridge drives the tube out of the vent.

RANGE TABLE.

Charge, { weight, 1 $\frac{1}{2}$ lb.
nature, R.L.G.².
Projectile, Common shell.

Muzzle velocity, 1330 f.s.

Remain- ing velocity.	5' elevation or deflection alters point of impact.		Slope of descent.	ELEVATION.	RANGE.	FUZE scale for time and percussion fuze, Mark IV.	50 per cent. of rounds should fall in			Time of flight.
	Range.	Laterally or vertically.					Length.	Breadth.	Height.	
f.s.	yards.	yards.	1 in	° ' "	yards.		yards.	yards.	yards.	secs.
1275	45	0.14	312	0 1	100	$\frac{3}{2}$	7	0.1	0.1	0.27
1224	44	0.29	149	0 12	200	$\frac{2}{2}$	9	0.1	0.1	0.54
1177	43	0.43	98	0 23	300	$1\frac{1}{2}$	10	0.1	0.1	0.81
1133	42	0.58	72	0 34	400	$1\frac{1}{2}$	12	0.1	0.2	1.09
1093	41	0.72	56	0 46	500	2	13	0.1	0.2	1.36
1058	40	0.87	46	0 58	600	$2\frac{1}{2}$	15	0.1	0.4	1.64
1031	39	1.01	38	1 10	700	3	16	0.2	0.6	1.92
1007	38	1.16	33	1 23	800	$3\frac{1}{2}$	18	0.2	0.7	2.20
985	38	1.31	28	1 36	900	$3\frac{1}{2}$	19	0.2	0.9	2.49
964	37	1.45	25	1 50	1000	$4\frac{1}{2}$	21	0.3	1.1	2.78
944	36	1.60	22	2 4	1100	$4\frac{1}{2}$	23	0.4	1.3	3.08
924	35	1.74	20	2 18	1200	$5\frac{1}{2}$	25	0.5	1.5	3.38
905	34	1.89	18	2 32	1300	$5\frac{1}{2}$	26	0.7	1.8	3.69
887	33	2.03	16	2 47	1400	6	28	0.9	2.0	4.01
870	33	2.18	15	3 2	1500	$6\frac{1}{2}$	30	1.1	2.3	4.34
853	32	2.32	14	3 18	1600	7	32	1.4	2.6	4.67
837	31	2.47	12	3 34	1700	$7\frac{1}{2}$	34	1.8	2.9	5.00
821	30	2.61	11	3 50	1800	8	36	2.2	3.2	5.34
806	30	2.76	10	4 7	1900	$8\frac{1}{2}$	37	2.5	3.6	5.68
792	29	2.91	9.8	4 24	2000	9	39	2.9	4.1	6.03
778	28	3.05	9.1	4 42	2100	$9\frac{1}{2}$	41	3.3	4.6	6.39
764	27	3.20	8.4	5 0	2200	10	43	3.6	5.1	6.75
750	27	3.34	7.8	5 19	2300	$10\frac{1}{2}$	45	3.9	5.7	7.13
737	26	3.49	7.3	5 38	2400	$11\frac{1}{2}$	47	4.1	6.4	7.51
724	25	3.63	6.8	5 58	2500	$11\frac{1}{2}$	49	4.3	7.2	7.90
711	24	3.78	6.3	6 18	2600	$12\frac{1}{2}$	52	4.4	8.1	8.30
698	23	3.92	5.9	6 39	2700	13	54	4.5	9.1	8.71
686	22	4.07	5.5	7 1	2800	$13\frac{1}{2}$	56	4.6	10.2	9.12
674	22	4.21	5.1	7 24	2900	$14\frac{1}{2}$	58	4.6	11.5	9.54
662	21	4.36	4.7	7 47	3000	15	61	4.7	13.0	9.98
650	20	4.51	4.4	8 12	3100	$15\frac{1}{2}$	63	4.7	14.5	10.43
638	19	4.65	4.1	8 37	3200	$16\frac{1}{2}$	65	4.8	16.1	10.89
627	18	4.80	3.8	9 3	3300	17	67	4.8	17.8	11.36
616	17	4.94	3.5	9 31	3400	$17\frac{1}{2}$	70	4.8	19.7	11.85
605	17	5.09	3.3	10 0	3500		72	4.9	21.8	12.35
594	16	5.23	3.0	10 31	3600		75	5.2	23.9	12.85
583	15	5.38	2.8	11 3	3700		78	5.5	26.5	13.36
572	14	5.52	2.6	11 25	3800		81	6.2	29.8	13.89
562	14	5.67	2.4	12 9	3900		83	7.3	33.9	14.43
552	13	5.81	2.2	12 44	4000		86	8.6	39.1	14.98

Forms G. 849—2.

SPECIMEN FORM

Description	{	Depression Range-finder.	Mark.
		Field	"
		" Mekometer	"
		" Telemeter	"

Inspection before Acceptance. Date

Issues and Exchanges.					
Date.	From	To	For	Date.	Occasion.
5.1.87	P.O.O.	C.R.A., Western Districts	Service	...	...
0. 87	C.R.A., Western District	P.O.O.	Inspection	4.12.87	Annual
10.12.87	P.O.O.	C.R.A., Western District ...	Service	...	...
8.6.88	C.R.A., Western District.	P.O.O.	Repair of cross wires	20.6.88	After repairs...
&c.	&c.	&c.	&c.	&c.	&c.
10.1.90	C.R.A., Western District	P.O.O.	Repair, blown down, placed too near gun	30.1.90	Inspection ...

* First line of heading will be filled in by P.O.O.
Second line by Inspecting Officer.

OF HISTORY SHEET.

Army Form G. 920.

Number

Manufacturer.

"

"

"

"

"

"

Signature of Inspecting Officer

Inspections.				Repairs.		Signature of Officer who makes the entry.*	
Remarks of Inspecting Officer.				Recommendation.	Date.		By
***				***	***	***	H. W.
Good order				Service	***	***	
***				***	***	***	
Good order				Service	12.6	Smith	
&c.				&c,	***	***	84 W
Damaged beyond repair				Struck off charge	Authority.		

Remaining entries will be made as follows:—

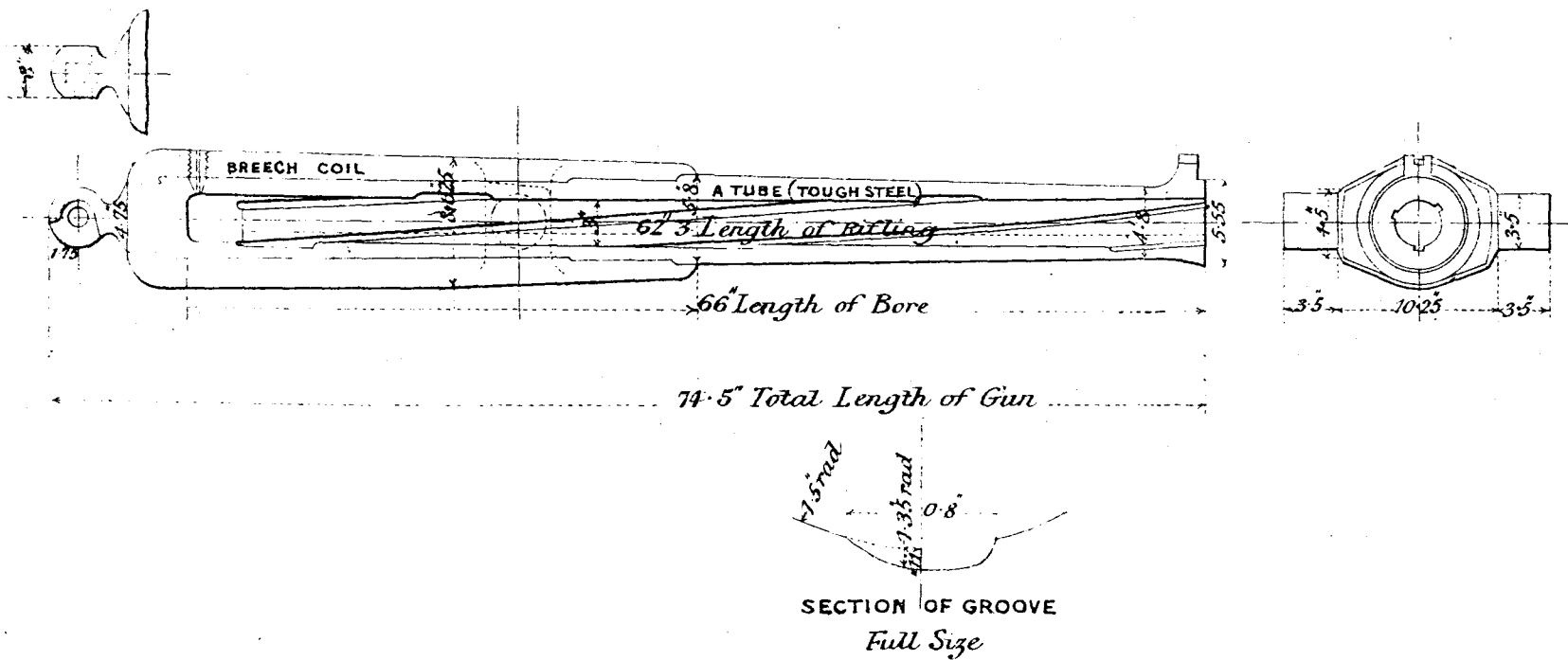
Issue to batteries, or to C.O., abroad by P.O.O., also name of instrument
maker who executes repairs.

Returns to Store, by Officer returning the instrument.

Inspections, by Inspecting Officer.

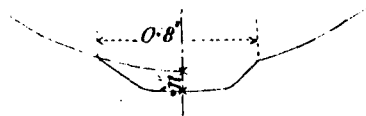
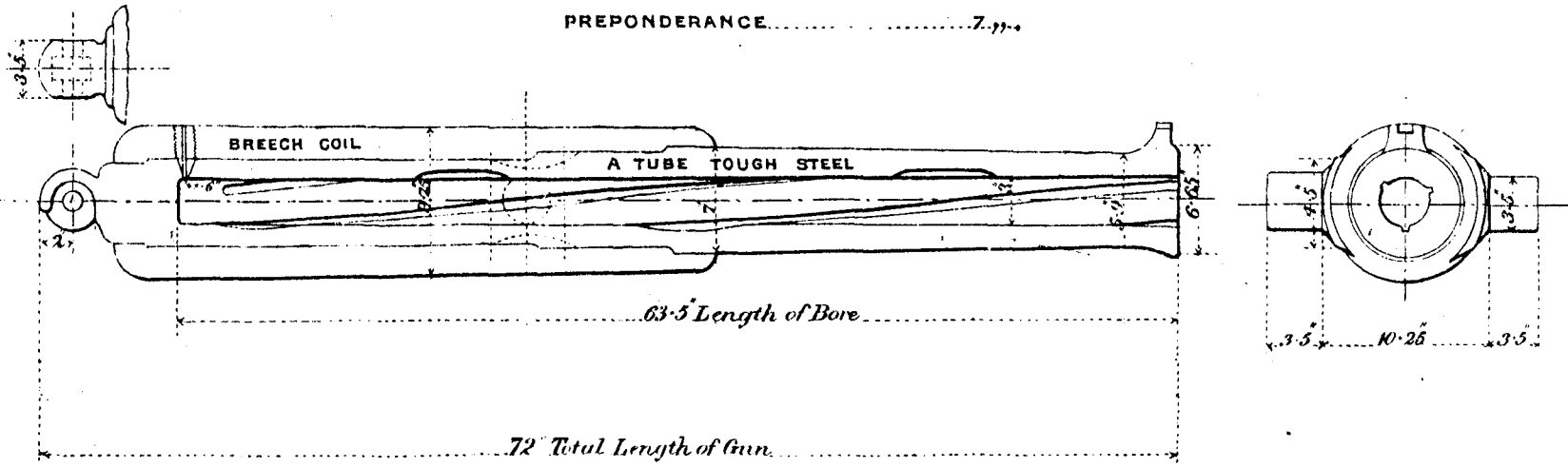
36

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



ORDNANCE, R. M. L., 9-PB, 8-CWT., MARK I.

PREPONDERANCE.....7.99.

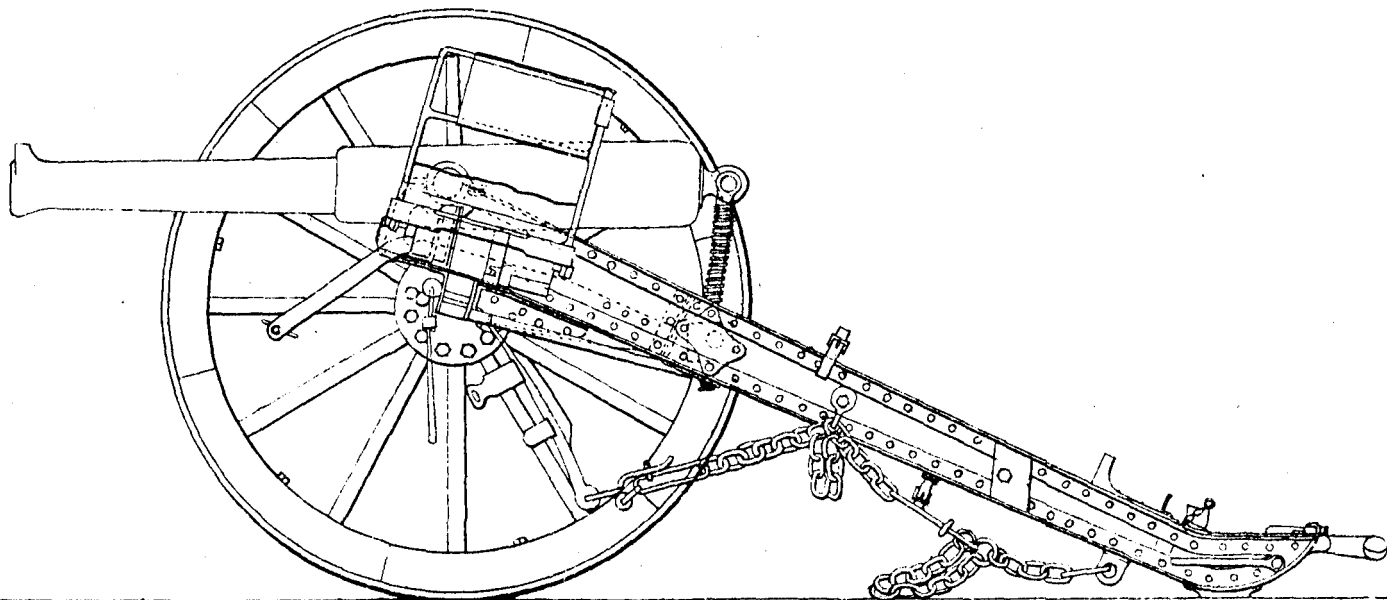


SECTION OF GROOVE.

Full size.

CARRIAGE, FIELD, R. M. L., 9-P^R, MARK II.

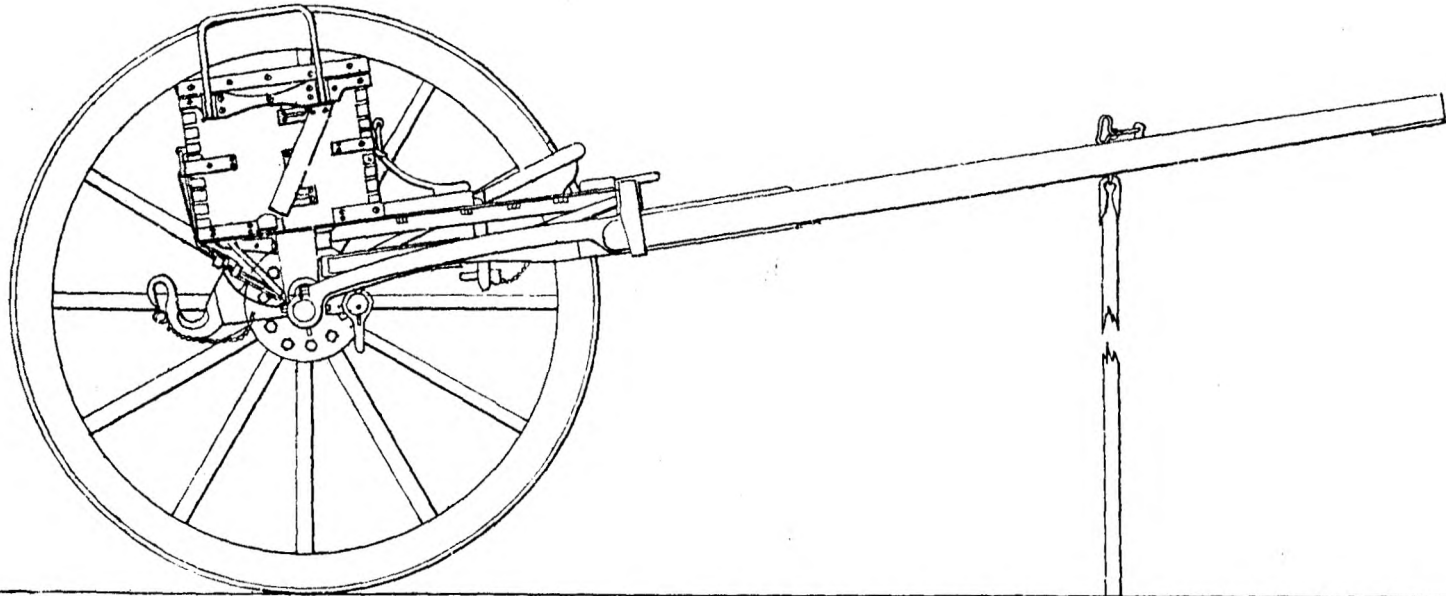
NOTE; SUITABLE FOR 8 OR 6 CWT GUN.



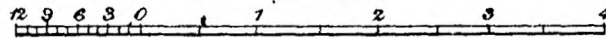
SCALE.



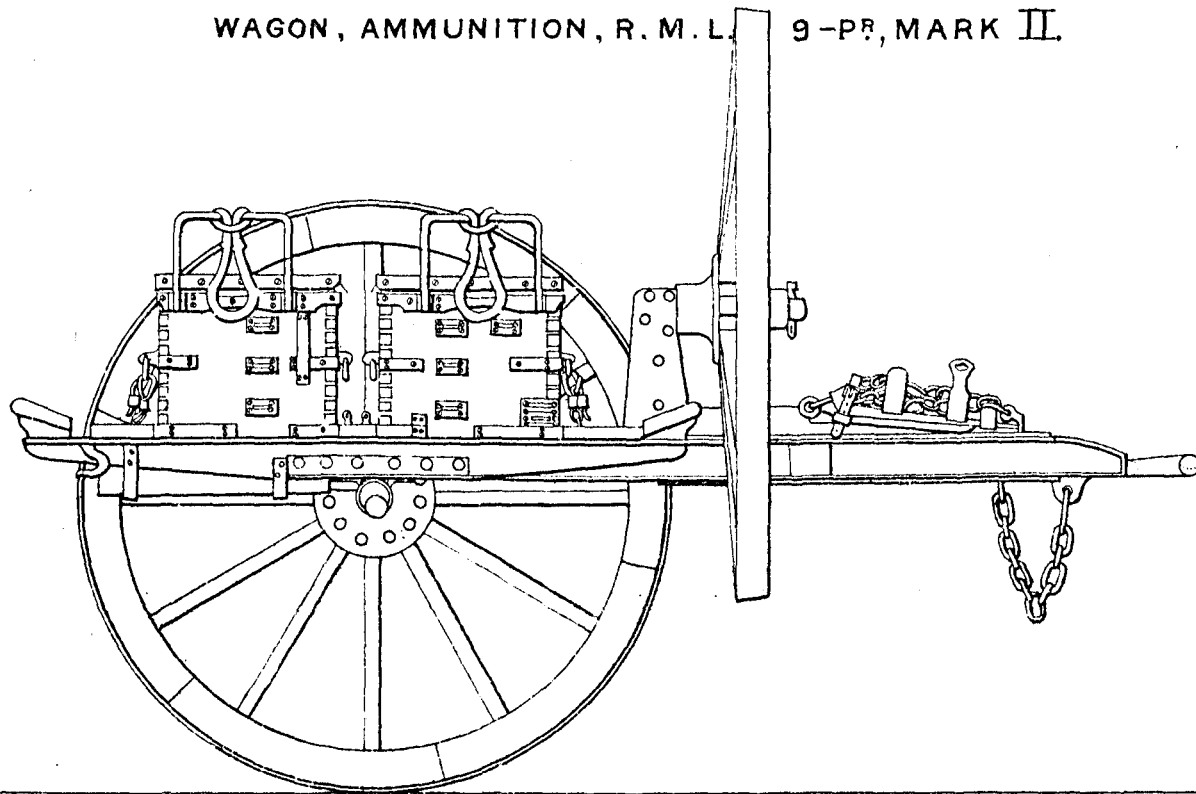
LIMBER, FIELD, R. M. L., 9-P^R, MARK II.



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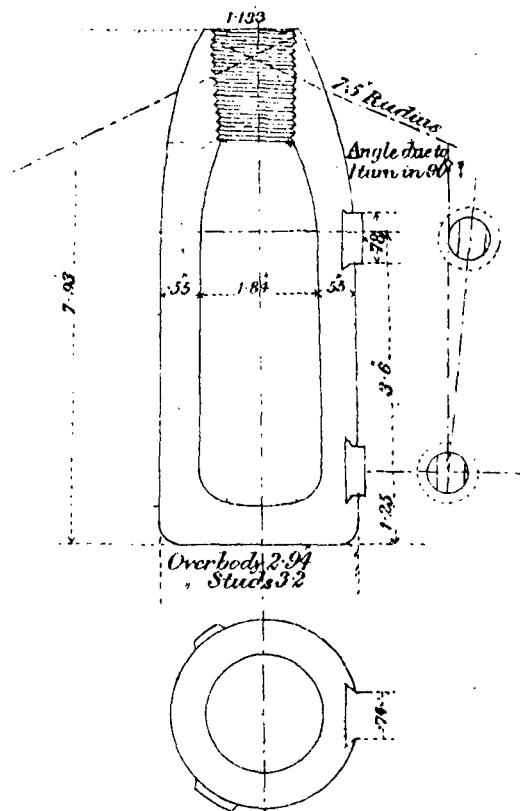
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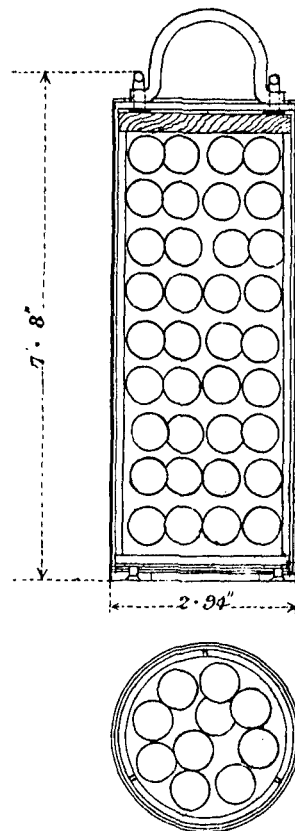
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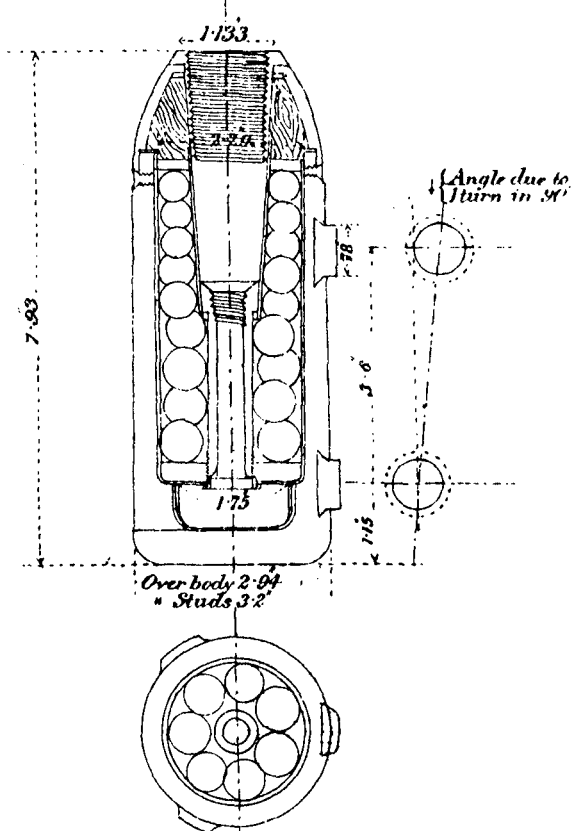
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SHOT, R.M.L., CASE, 9 PR, V.

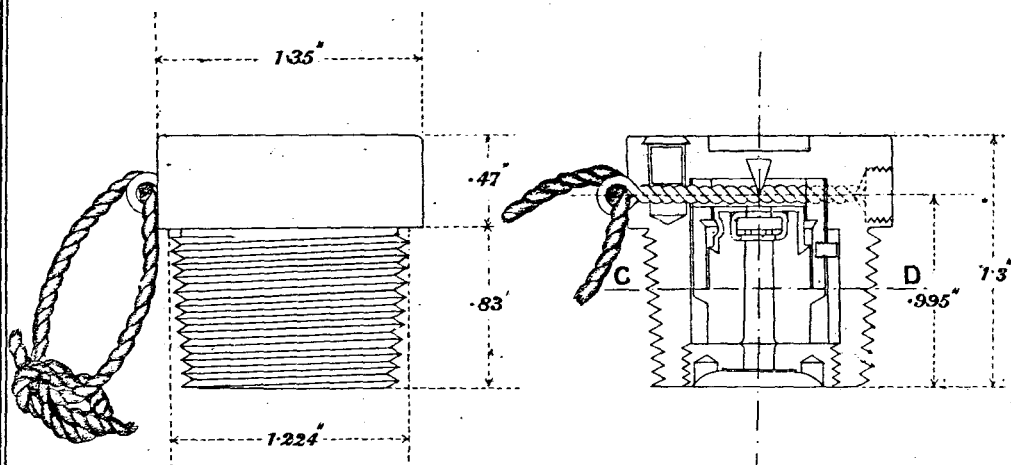


SHELL, R.M.L. SHRAPNEL, 9 PR, VIII.



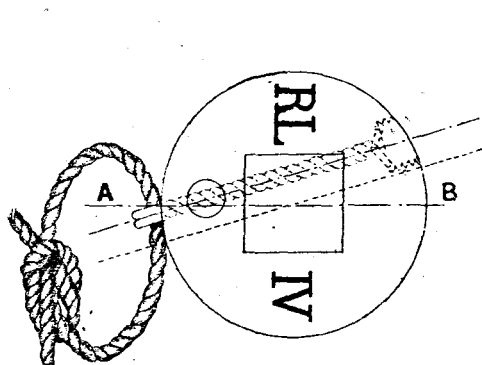
FUZE, PERCUSSION, R.L, N° 7, MARK IV.

FULL SIZE.

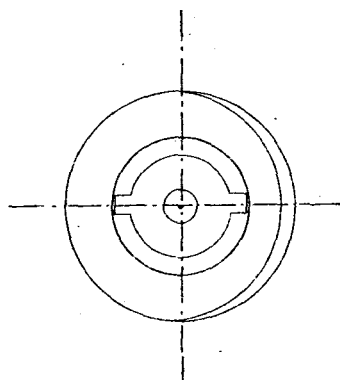


ELEVATION.

SECTION AT A.B.



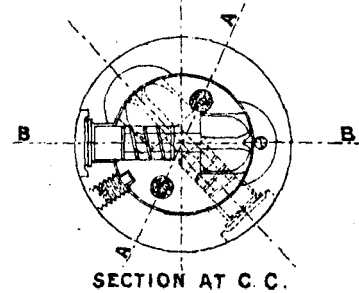
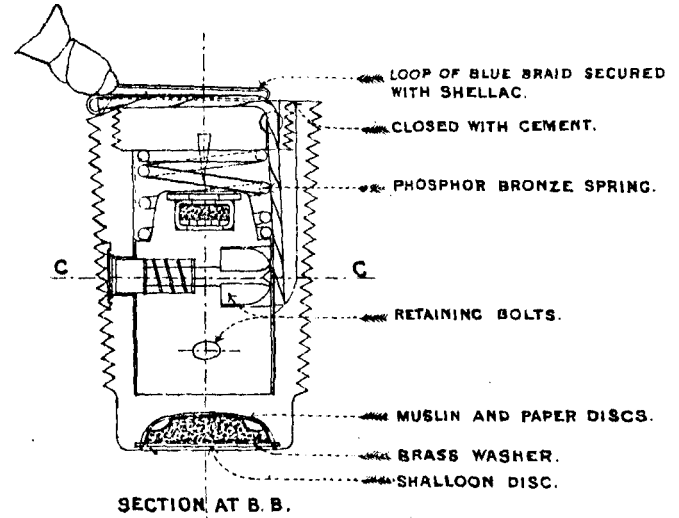
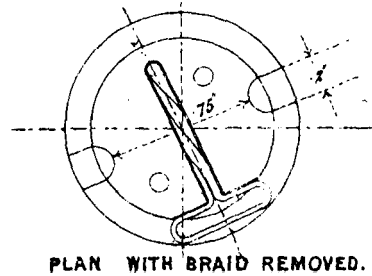
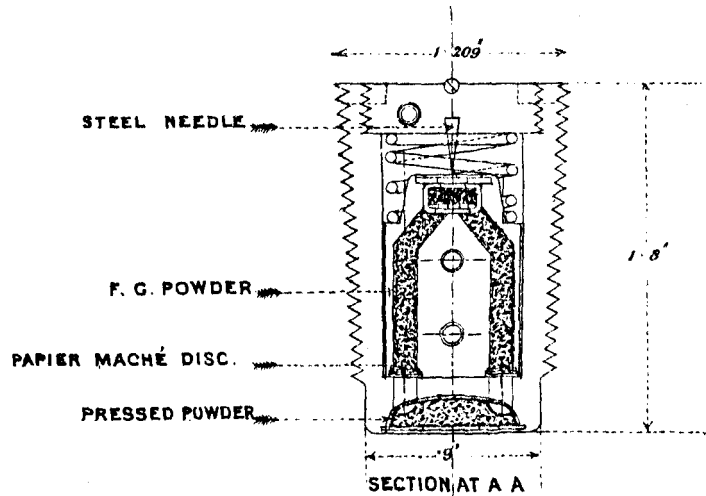
PLAN.



SECTION AT C.D.

FUZE, PERCUSSION, SMALL, N° 8., MARK IV.

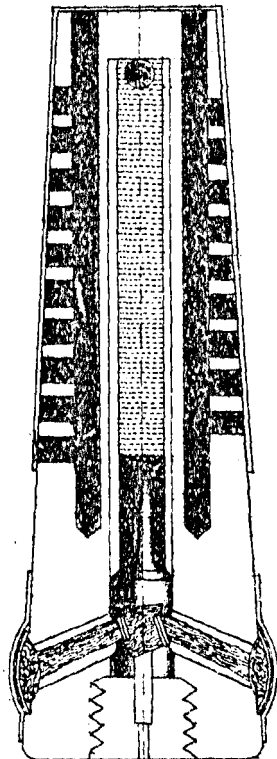
FULL SIZE.



Wyman & Sons, L^{td}, Lith, 3189-6-96

FUZE, TIME, M. L., 15 SECONDS, N° 41, MARK II.

Full size.



DEVELOPMENT OF PAPER SHOWING

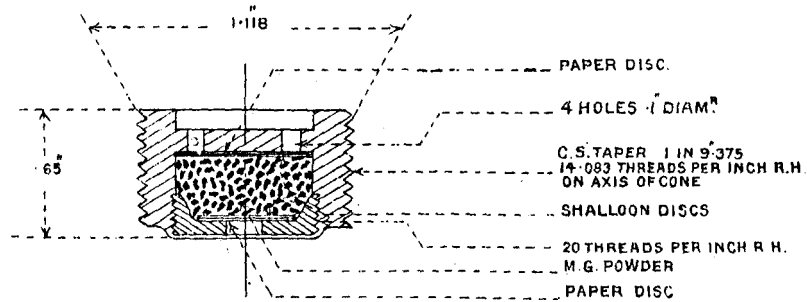
MARKING OF FUZE.

27.5	30	29.5	29	28.5	28
24.5	27	26.5	26	25.5	25
21.5	24	23.5	23	22.5	22
18.5	21	20.5	20	19.5	19
15.5	18	17.5	17	16.5	16
12.5	15	14.5	14	13.5	13
9.5	12	11.5	11	10.5	10
6.5	9	8.5	8	7.5	7
3.5	6	5.5	5	4.5	4
	3	2.5	2	1.5	1

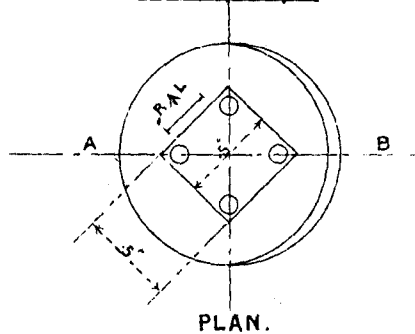
PRIMER, FUZE, PERCUSSION, R.L., N° 7, MK I.

GUNMETAL.

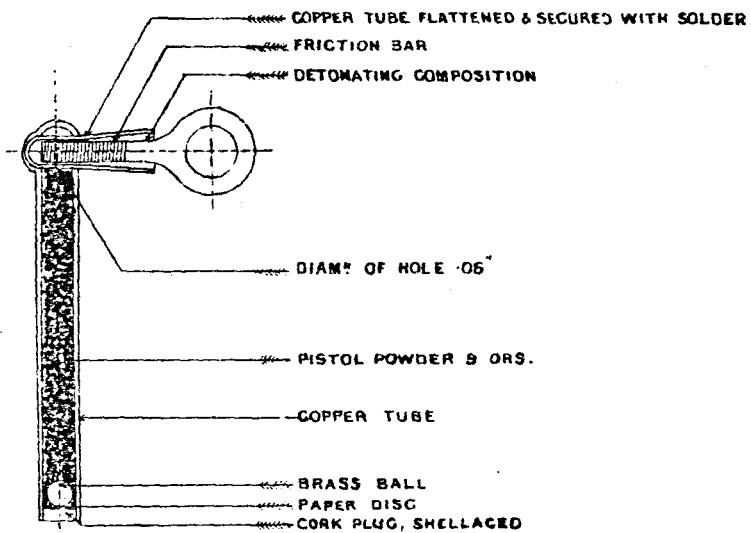
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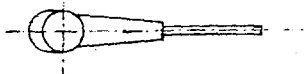
SECTION AT A.B.



TUBE, FRICTION, COPPER, SOLID DRAWN, WITH BALL,
(MARK II.)
Full Size.



SECTION AT A.B.



PLAN.