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VOL. I.

Paper VII.

# TARGETS FOR INFANTRY FIELD FIRING.

Translated from the German Regulations

BY

CAPTAIN R. F. EDWARDS, R.E.

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## CONTENTS.

Turme on moments								PAGE					
INTRODUCTION								9					
DADE I DESCRIPTION													
FAMI ITARGETS.													
General Remarks								7					
(a). Infantry $\dots$		••						8					
(b). Cavalry								9					
(c). Artillery								9					
General Remarks								14					
(A). Appearing and Disappearing Targets.													
		(a).	Infan	try.									
Targets on Large Beams with Handles								15					
Small Beams with Handles to take Balloon Targets								19					
Targets held up out of a Ditch								23					
Targets on Pivoted		24											
		(b).	Caval	ru.									
Targets on Large Beams or Baulks								25					
10.000 00 000 000 000													
		(c).	Artille	ery.									
Targets on Large Beams with Lever Arms								26					
Frames with Pulling Mechanism								27					
	(P	Mor	The T	Incore									
~	(D	). MOV	ING 1	ARGET									
General Remarks							••	30					
		Stores .	Requis	red.									
Sleighs to take the	Targe	t Fram	es					30					
Wire Rope								32					
Pullevs								34					

## CONTENTS.

#### Erection.

							PAG
Fixing the Target Fran	nes and pl	acing	the Sle	ighs			35
Laying out the Wire R						37	
Fixing the Pulleys						38	
Methods of Applying I	Power for	Pullin	g				41
Diffine	nt Things	of Me	mina 7	Camaete			
Differe	ni Types	0) 140	neng 1	urgees	•		10
(a). Targets on Small S						42	
(b). Targets on Large	sleighs						44
	(C). FIX	ED TA	RGETS.				
General Remarks	(0)						46
(a). Infantry							46
(b). Cavalry							46
(c). Artillery				·			46
PART 1	IIFIRI	FROM	1 THE	TARGE	TS.		
( ) This from Tafantas	Tanata						47
(a). Fire from Infantry $(h)$ Eige from Antillow	Targets						41
(0). Fire from Aromery	Largets						40
(a)	. Different	t Type	es of P	uffs.			
Roburite or Dahmenite	Puffs						48
Cube Puffs							48
Magnesium Puffs							49
(b)	Different	Mathad	la of T	anition			
(0). 1	Cillerent 1	LECHOO		gauton	•		
Ignition by a Detonati	ng Cap ar	id Frid	etion T	ube			50
Electrical Ignition	• • • • • • •						00
Key-board Apparatus							99
PART I	VSHEL	FER FO	R THE	MARF	ERS.		
General Remarks							60
Equipment and Use							62
PART V	SIGNALLIN	G FOR	SERVI	ICE PR	ACTICE	s.	
General Remarks							60
General Remarks	• ••				•••		02
	Signalling	durin	g Firin	ng.			
(a). Opening and Ceas	ing Fire						63
(b). Appearance and L	nce of	Target	s			64	
(c). Special Measures						67	
(d). Signalling Number	r of Hits						68
APPENDIX -Notes on	the Teen	Dea	ling	Donnet	ab Ste	-	
and Testing of De	tonators	manuf	actured	l at th	e Sna	ndau	
Laboratory		mount	woodfor	1 400 01.	ie opa	actau	70
					111	TTT I	

iv.

## INTRODUCTION.

1. To properly educate troops in shooting it is necessary to make the objects fired at resemble those they would encounter on service.

2. Such representation only fulfils its purpose when these objects approximate to the reality in their appearance as well as in the method and rapidity of their movements; and when due regard is had to their proper dimensions, and they are erected in accordance with correct tactical principles suitable to the ground where they are used.

3. Such representation must also make it possible to take account of the many demands which the conditions of an action impose on the education in shooting.

4. The information contained in the following treatise on the representation of objects of fire is to be regarded in the nature of general directions. Exceptions may be permitted for motives of economy.

5. The officers responsible for the musketry training are also responsible that the targets used represent the objects of fire as they would appear in action.



## TARGETS FOR INFANTRY FIELD FIRING.

## PART I.

## TARGETS.

## GENERAL REMARKS.

6. Targets are constructed of wood, pasteboard, or linen with paper pasted over it. The latter obtain the necessary support by means of wooden frames or cane props. Inflated balloons may also be used to represent head targets.

Pasteboard targets have the following advantages over those most generally used :—They have greater solidity and durability, are more easily handled, of less weight, and, when they have been made water-proof, are impervious to damage from wet. Linen targets with cane props are very light, and may therefore be advantageously used for moving targets.

The dimensions of targets should be such as to give a correct representation of the figures of men and horses as well as the shapes of guns and ammunition wagons. On the side fired at should be painted a picture of the object they are supposed to represent, or they should be painted an appropriate colour. The details of the features, clothing, and equipment may be omitted.

Feet are fixed on to the targets so that they may be planted in the F.S., 7.

earth or attached to the necessary mechanism. Light, low targets may be nailed straight on to this mechanism. Stationary targets may be nailed or tied on to posts, stumps, or stakes driven into the earth. The use of metal should be restricted as much as possible, both in the targets themselves and in the appliances necessary for their movement or erection.

## (a). INFANTRY.

7. Complete figure target and constituent parts.



## Fig. 1.

Complete figure target and constituent parts.

8. Other types of targets. For firing at short ranges (independent fire as in action) and for instructional purposes other types of targets may be used, such as infantry lying down (Fig. 2), or crawling, or infantry and bicyclists moving forwards, backwards, or to one side.



Infantry soldier lying down, viewed from the side.

9. Balloon targets.



India-rubber air balloon.

Balloons filled with air are especially suitable for representing head targets.

(b). CAVALRY.

10. Cavalry targets. Figs. 4 to 8.

## (c). ARTILLERY.

11. The gun detachments, gunners, and dismounted riders, supposed to be facing the enemy, may be represented by targets showing the whole figure, the figure from the knees upwards, body or breast targets.

12. Profile figure targets (Fig. 9) are used to represent those men of the gun detachment supposed to be facing the gun.

Targets representing mounted men are shown in *Figs.* 6 and 7.
Targets representing horses are shown in *Fig.* 10.

Fig. 4.

## Cavalryman in motion, viewed from the front.



Cavalryman in motion, viewed from the side.



Viewed from the front.

Cavalryman at the halt.

From the rear.

15. Targets representing guns.

(a). Complete. Fig. 11.(b). Showing top half only. Fig. 12.

(a). Half-profile targets fastened separately on to the beams. (b). Breast targets (See also Fiq. 26 (b)).

NOTE.—Hits on the gun are to be counted separately from hits on the figures; hits on figures in rear which have passed through the gun target are not to be counted; but shots which have penetrated two figures in line with each other are to be counted as hits on both.

11



16. Targets representing limber or ammunition wagons.

(a). Complete wagon. Fig. 13.

(b). Top half of wagon. Fig. 14.

The detachment to be erected as in Fig. 14.



Target representing complete gun.





Half ammunition wagon and detachment (to be erected on level ground behind the battery, with mechanism to fold it down or to turn it round sideways out of sight).

(a). Body targets fastened separately on to the upper and lower wooden props.

For counting hits see note to Fig. 12.



Target representing complete limber or ammunition wagon.



Target representing top half of a limber or ammunition wagon.

## PART II.

#### OBJECTS OF FIRE.

## GENERAL REMARKS.

17. Firing lines lying down may be formed of balloon targets or of portions of figure targets, usually head or breast targets; advancing or retreating firing lines may be formed of three-quarter length targets with intervals; lines in close order advancing or retreating of three-quarter length targets with little or no intervals. Cavalry may be represented by rows of cavalry targets.

Artillery in position may be represented by a collection of figure and profile targets and portions of both of them, of targets representing guns and wagons, and, if the teams are assumed to be visible, of targets representing profiles, figures, horses, riders, and wagons.

As a rule artillery in position will be assumed to be as much under

14

cover as possible, and therefore be represented by half battery targets. If, in an exceptional case, whole battery targets are made use of, they should be erected in rear of irregularities of the ground, so as to ensure that they appear as they would in reality, and with their upper portions showing above the cover provided ; but in that case the target will not usually be made to appear suddenly, but will be kept fixed.

18. The appearance of the targets will be more in accordance with actual conditions if head or breast targets at uncertain intervals<sup>6</sup> are employed to represent firing lines lying down, and in the case of moving targets the upper edge of each target should not be of the same height, and the intervals between the different figures should vary.

19. The most common type of target to use is either one that appears and disappears, or a moving one.

On open ground, especially if supposed to be acting on the defensive, disappearing targets with cover for the markers are most suitable; but the number of butts may be much reduced if several targets are worked from the same butt by means of lines, etc.

In practising the attack over undulating ground fixed targets may, by taking advantage of irregularities of the surface, be frequently so erected that they suddenly become visible to the firing party. In this case the supply of cover for the markers may be dispensed with if the men told off to record the results accompany the firing party.

It should be borne in mind when arranging practices on the troops' ordinary drill ground that the surface must not be disturbed; and therefore those disappearing targets that demand the erection of earthworks can as a rule only be employed in positions permanently chosen for that purpose.

#### (A). DISAPPEARING TARGETS.

#### (a). Infantry.

20. Large size beams with handles.

Stores.—Large beams (a) of seasoned wood creosoted (Figs. 15 to 17), about 20 feet long,  $2\frac{1}{2}$  inches thick, and 3 inches broad, with two holes (b) at each end, about an inch in diameter; these holes are placed at the same distance from each other on every beam; also

\* According to Regulations, the interval should be from one to two paces.

pins of fairly hard wood (c) about 6 inches long to join the beams together.

Cross-pieces of wood or rollers (d), stakes (e), a handle (f) or lever (*Fig.* 20), and the required number of targets.







Joints at ends of beams (target turned down).

*Erection.*—Lay out the beams from the butt at right angles to the direction of fire, so that the first beam projects into the butt, and the pin-holes about cover each other.

Lay out the pins, cross-pieces, and stakes at the junctions of the beams and distribute the targets; lay the cross-pieces under the points of junction, drive in the pins, fix the cross-pieces by driving in the stakes, and nail on the targets. Put the handle into the end of the first beam which projects into the butt.

Pasteboard targets at irregular intervals are the best to use; they should be fixed to the upper surface of the beam by two small nails (Fiq, 18).

The nails are driven in through a small piece of pasteboard or several folds of linen, so as to prevent as much as possible any damage to the targets when taking the erection to pieces. Pasteboard targets higher than the above and targets made of a single





Shelter

Targets with wooden props.

If the target is to the side of the butt it can be made to appear and disappear by one or more men, according to its length, working the handles (*Fig.* 16); if it lies in front of or behind the butt it must be turned up and down by lines fastened to a lever arm (*Fig.* 20).



Though it should be avoided as much as possible, it may be necessary to raise the whole or parts of the target so as to make it visible to the firing party on uneven ground or ground with a high growth of vegetation on it; in this case the beams must be laid on trestles (Fig. 21), and the surface of the ground be formed into a glacis up to the height of the trestles.



(b). Seen from the side Large beams on trestles.

A set of targets 100 yards long can be set in motion by one man, and can be erected by eight men in about ten minutes. The beams adapt themselves very well to irregularities of the ground, and the stores take up but little space in transport. Sets of targets of this description may be erected on either side of the same butt, so that about 200 yards of targets may be worked from the same one.

If from long usage the pin-holes in the beams become too large, the pins can either be wrapped in grass, heath, and so on, or small wedges may be inserted in the holes.

In order to represent the reinforcement or the losses in a firing line, several rows of beams are laid out behind each other, the whole being provided with only as many targets as there would be in one row if used by itself. In this case the targets, as seen from the front, should not hide each other either wholly or partially.

If a reinforcement of the enemy is to be represented, first one row, then a second, and, if desirable, even a third should be turned up; to represent losses rows may be turned down in a similar way. In order to distinguish the hits at each distance when advancing in extended order, each row of beams should be provided with the full number of targets, and during each advance the set of targets already fired at should be turned down, and another set not yet fired at be exposed.

The same object may be attained with only one beam by digging a small ditch, and laying the beams in it on trestles, having nailed targets on to three sides of the beams. In the same way, as several beams are worked from one butt to represent the reinforcement of a set of targets, this method may be used to show changes in the number of the targets.

For instance, if it were intended to show a firing line lying down rise up in order to advance, body targets should be fixed on the second beam and be exposed for a short time, the smaller targets being at the same time folded down.

The change from deliberate to magazine fire and back again may be practised in this way, especially when firing by groups, when the same number of larger targets are exposed that there were small ones previously.

If several beams behind each other are used at the same time, the front row of targets is always turned down to the front, and the second to the rear, so that the two beams may be placed close to each other.

21. Small beams with handles for use with balloon targets (Fig. 22). Stores.—A ditch, 2 feet 9 inches broad and 1 foot 6 inches deep, to hide the balloons when the targets are turned down. Beams (a),  $1\frac{1}{2}$  inches thick and  $2\frac{1}{2}$  inches broad, with two holes in each end, 1 inch in diameter, which must be equidistant from each other on all the beams. Wooden pins (b) about 6 inches long to join the beams together; cross-pieces (c) at least 4 feet long, as supports at the joints (or earth supports not dug out); stakes (d) to keep the beams and supports in place; the required number of balloons, in which the openings at the foot are provided with two binding threads of suitable length.

*Erection.*—Dig a ditch of the length required for the set of targets. The earth thrown out is not to be made into a parapet by the side of the ditch, but is to be spread out flat.

These are supposed to represent head targets in a shelter-trench. All stones immediately in front of the targets to be removed, to prevent splinters from the bullets.

Place the supports at the points of junction of the beams fix  $B^2$ 

them by means of the stakes, and lay out the connected beams on the supports.

Inflate the balloons, having regard to the following precautions :--

(a). Do not commence to inflate the balloons until the rest of the apparatus has been fixed, and as far as possible carry out practice against this type of target in the earlier part of the exercises.

The balloons can be inflated or deflated after being fastened to the beam.





Balloon targets to the side of the butt.

(b). The balloons should never be blown up with the mouth, but by a bellows or air-pump; the air should not be introduced by jerks, but by a slow, even motion.

(c). The mouth of the balloon is provided with an air-valve, which is opened by turning it to the left, and shut by turning it to the right.

(d). If, in consequence of one of the plasters failing to stick, or for any other reason, a balloon does not seem to be properly air-tight, it should be put on one side, and one of the reserve balloons which are always taken be used in its place. As regards the preservation and handling of balloons, see instructions in para. 22.

The balloon targets should be tied on to the beams at the required spots in such a way that the mouth of the balloon is on the side turned away from the firer.

Method of Working.—The beam is turned by a handle, which projects into the butt. In order to make the target appear and vanish, two quarter turns are to be given each time.

If the target lies in front of or behind the butt or at a considerable distance from it, it is set in motion by means of cords fastened on to a weighted lever (*Figs. 23a* and *b*). Another weighted lever at the other end of the target facilitates turning it up and down.



(a). Plan.



(b). Sectional elevation. Balloon targets in front of or behind the butt.

The balloons must be treated with care when taking the target to pieces as well as when erecting it, so as to prevent their receiving any injury.

Balloon targets are more difficult to make out than live ones, and, therefore, make greater demands on skill in shooting; their use makes the practice more interesting to the firer, as every hit is at once noticed. The firers see the result of their shots and learn to notice gaps in an enemy's firing-line, and to concentrate their fire on the remaining groups.

Those superintending the management of the firing are practised in giving orders as they would have to under war conditions, and, if attacking, can see the proper time to advance in extended order or to charge with fixed bayonets.

22. Preservation and treatment of balloons :---

The balloons should be two-thirds inflated, and kept in a dry and fairly warm room hanging up by the binding-threads. The material deteriorates in too great a heat, in a hard frost, or if wet; also by being pressed together and packed tightly; or from sand or dirt. Every piece of dirt is to be removed as soon as possible, if necessary, by washing. Damp balloons should be dried with a piece of soft rag. The balloons should be carried to the place where the targets are to be erected with their valves opened. If the temperature is likely to rise before the time of firing, the balloons should only be lightly inflated; but if it is likely to fall, they should be blown up tighter, but it is a mistake to fill them too tight. After the completion of the firing, all valves, including those of the untouched balloons, are to be at once opened and the air allowed to come out, but it must not be pressed out. Cleaning and repair should then at once be taken in hand. If shots have gone through or close to old mendings, the plaster should be removed and the solution washed off with benzine. The part round the bullet holes must be smooth and clean. A grain of sand or even a filament of india-rubber may prevent a mend from being air tight. The plasters, which are cut out of india-rubber, must be round or oval in shape, and should be about as big as a sixpence for a round hole made by a shot ; too large plasters make a balloon too stiff. If two shotholes are close together, they should be mended with one plaster. A new plaster should only be pasted on to an old one when the circumference of the latter projects all the way round beyond the new one. In mending a balloon, it should be placed without stretching it, with the shot-hole upwards, on a smooth wooden knob rounded off to correspond with the size of the balloon when inflated. Then lay on the solution evenly round the shot-hole with a quick circular motion over about as much of the material as the plaster will cover, and then put solution on the plaster as well. Six or eight seconds later lay the plaster evenly over the shot-hole and press it down with the palm of the hand. In the case of shots through the seams the plaster should be firmly pressed with the finger-nail or a small piece of wood between the seams, which should first be filled up with solution, so that the plaster will show where the hole has been. The plasters only remain airtight when they are laid on perfectly smoothly. If any creases appear, the plaster and solution should be removed and the operation begun again. The less air there is contained in the balloon when mending it the better ; the valve must therefore be open during the process. After mending it, expel all the air from the balloon and close the valve; then press the plaster down again, leave the balloon for ten or fifteen minutes, inflate it again, and lay it aside to test it. If it remains practically unaltered for ten hours, re-open the valve and let out some of the air : then close the valve and hang up the balloon. If it loses air in less time than the above, immerse it in a bucket of water, and bubbles will appear from the plasters that are not airtight : take off these plasters, remove the solution, and mend the balloon once more.

The solution is made by pouring six parts by weight of benzine over one part by weight of raw india rubber shavings, and leaving it to stand in a closed tin vessel till the india-rubber is completely dissolved, which takes about eighteen hours.

The resulting solution is a thick fluid. Before using, it is put into smaller covered tins, and enough benzine is added to allow the solution to be easily laid on with a brush. Dexterous and clever men, who are reliable and skilled, are necessary for repairing the balloons.

If the balloon is used many times in quick succession, provisional mends with well-gummed parchment plasters of about the size of a two-shilling piece will be sufficient, and the balloon will remain fit to be fired at for half or three-quarters of an hour.

23. Targets held up from a ditch (Fig. 24).

Required.—A ditch to shelter the men holding up the targets; beams and targets.

Erection.—Dig a ditch provided with a means of entrance.

In using entire figure targets the beams and targets may be provided with holes, so as to allow the targets to show the required extent. A peg is inserted in one of the holes, and rests on a crosspiece (a).

The targets are withdrawn as soon as they are hit, or after a fixed time or on a given signal.

A coat of whitewash on the back of the targets makes it easier for the markers to recognize where the shots strike. As digging the ditch takes a considerable time, this method of showing targets is only employed under exceptional circumstances, more especially on ranges or practice grounds. Also, as each target requires one man to work it, it is only used, as a rule, for individual firing or group firing.

To avoid accidents the ditch should be dug approximately at right angles to the line of fire.



Ditch to shelter the butt party.

24. If in consequence of the weight and size of the targets they cannot be carried on beams, as previously described, pivoted baulks may be employed instead.

Stores Required.—Pivots consisting of an iron stake pointed, or one made of wood (a) with an iron pin (b); a baulk or double beam (c) 4 to 10 yards in length, with a pipe-box in the centre to fit the pin; a ring (d) at each end to make fast the pulling lines to; small stakes for stops (e); and pulling lines.

The dimensions of the baulks and pivots depend on the length of the former and the weight of the targets to be used.

*Erection.*—Drive in the pivoting stake as upright as possible, or dig a hole for it, and press down the earth firmly round it ; place the baulk on the pivot ; tie the pulling lines to the rings ; drive in the stops; nail on the targets, or fix them with their bases in corresponding slits in the baulk, and wedge them in. Equilibrium to be maintained by arrangement of the targets or by weighting one side of the baulk.

The play between the pivots and the boxes must be made as small as possible, to obviate the baulk tipping over when loaded up with targets.

If several heavy targets are nailed on, they are, as far as possible, to be equally divided between the front and back sides of the baulk.

The stops are inserted to prevent the baulk being turned too far when making the targets appear or disappear.

If several baulks are to be put in motion simultaneously by means of one line, the rings at one end of each are to be joined by a line in such a manner that this line is in equal tension between the rings, but it must not be too tight. In this case all the baulks must be of equal length.

Pivoted baulks may be profitably employed for individual firing in all cases where the butt is a considerable distance from the target.

#### (b). Cavalry.

25. Beams or pivoted baulks are the best things to use for one or more cavalry targets (Fig. 25).





26. Large beams and levers.

Stores Required.—As mentioned in para. 20, and lever arms as in Fig. 26.



Besides the above the following are required to represent a complete battery :—6 (4) whole or half gun targets; 3 (2) whole or half

 $\ast$  The stores previously mentioned can be used, but it is better to employ those about to be described.

ammunition wagon targets; 18 (12) profile, figure, or body targets; 12 (8) three-quarter or breast targets; 23 (16) figure or body targets.

Ammunition wagons on large beams or pivoted baulks, as in Fig. 25. Erection.—Lay out and connect up the beams as in para, 20 ; con-

nect on the lever arms; lay out the pulling lines, and nail on the targets. If using pivoted baulks, erect as in para. 24. The gun and

wagon targets are nailed on to small beams, and the other targets are provided with light wooden props.

This method of representation is simple and easily handled; but the figure targets are not in the position in which they should be, as they are all in one line.

27. Frames with pulling mechanism (Figs. 27 to 31).

Stores Required.—Frames to take the targets representing guns and wagons, made of large beams, as in Figs. 27, 28, 29, and 30; also the necessary targets, pulling lines, stakes, hold-fasts, and pulleys.



Plan of gun target (turned-up position).

The figure targets representing Nos. 1 and 2 of each gun detachment, the sub-division commanders, and the men at the wagons are nailed on to cross-pieces let into the long sides of the frames, and are supported by small boards screwed on to them. The cross-piece carrying the gunners Nos. 3 and 4 lies on two wooden bearings (k, Figs. 27, 28, 31), and can be removed by taking out two iron pins. The cross-pieces for the guns and wagons rotate on iron pivots. A stop is fixed on the back side of the frame (g, Figs. 27and 28), which prevents the target being turned too far forward. The same object is attained for the wagons by a stop on the rear cross-piece of the frame (g, Figs. 29 and 30).



General appearance of gun target.

*Erection.*—Place the frames on the spots where the guns and wagons should be; insert the cross-pieces for the sub-division commander and No. 3, and pin them in ; fix the pulling mechanism.

At each gun and wagon the targets are tied together by lines of length suited to the distance apart of the targets. The lines to be used for making the targets appear are made fast to the gun targets, or, in the case of wagons, to staples fixed on the front figure targets, and are from there led to the butt round stakes or pulleys, so that the power is applied at right angles to the targets. Another line is used to make the targets disappear, and is fixed to one of the rear targets, led round the hold-fast b, and from thence



General appearance of wagon target.

Fig. 31.



Hard wood bearing.

under the frame, round the pulley l (Fig. 27), to the butt. To prevent this line chafing against the surface of the ground a small channel should be dug underneath the frame.

If the butt lies in front of the battery, the pulling mechanism is to be arranged as shown in *Figs.* 27 to 30; if it is in rear of the battery, the hold-fast b must be fixed in front of the guns and wagons.

It is best to have the butt in front of the battery, as the targets can in that case be more easily pulled up.

Taking Down.—Loosen all pulling lines, and remove the crosspieces for the sub-division commander and No. 3. All the other cross-pieces remain in the frame, and the targets are turned down backwards.

By this method of representation the detachments for the guns and wagons can be placed in the positions laid down in the field artillery drill regulations. Changes in the positions of the targets can easily be carried out.

#### (B). MOVING TARGETS.

#### General Remarks.

28. Moving targets are represented by target frames fixed on sleighs, and set in motion by pulling them.

#### Stores Required.

29. Sleighs to take the target frames.

The sleighs (*Figs.* 32 and 33) consist of two corrugated iron runners (a) about 10 feet or 12 feet in length, turned up at the ends, so as to run more easily over rough ground.

A wooden block (b) is bolted on to each runner about 4 or 5 feet from the rear end; to prevent the runner from being torn, the bolt is run through a piece of iron 8 or 12 inches long, an inch in breadth, and about  $\frac{1}{10}$  th inch thick, lying under the central corrugation. The two runners of a sleigh are joined together by two wooden stays (c) of the same length as the distance between the runners (3 or 9 feet), and these are fixed to the wooden blocks (b)in such a manner that there is a space of about 4 inches between them. To prevent the target frame being jolted off the sleigh, bolts (d) are fixed to the ends of the stays (c). The ends of the runners are also joined together by the stays (c). In the case of the larger type of sleigh (12 feet long by 10 broad), whose use is only recommended on smooth turf, the ends of the runners should be stayed to the wooden blocks by iron bars or old gas pipes, to prevent the runners getting bent.

Iron staples (f) are driven into the front surfaces of the blocks (b) in such a way that the ends of the staples point inwards. In the middle of the front stay (e) is a ring hanging downwards, or a wire loop (g). A wire (h) has its ends made fast to the staples (f), and is tied in the middle to a loop (i), which is drawn through the ring or wire loop (g).

Fig. 32.



Small sleigh for moving targets.



(c). Gas-pipe and stay.

Large sleigh with gas-pipe stays for moving targets.

(b). Plan.

If the target is to be drawn at right angles to the line of fire, the stays (c) to take the target frames are placed parallel to the runners (a) on the cross-pieces (k, Fig. 34).



Sleigh for targets to be drawn across the line of fire.

The small sleighs can be used to carry targets representing firinglines of 8 targets, columns of 17, and cavalry advancing of 7 targets; the larger ones take 11 firing-line targets, 23 in column, and 11 for cavalry advancing.

By attaching two lengthening-pieces the number of figures can be increased by about 50 per cent. The number of targets that can be carried on a moving sleigh depends on the surface of the ground, the weight of the targets, the strength and direction of the wind, and the amount of power available for traction.

The small sleighs can also be used to carry targets representing artillery advancing or passing across the front. In the case of a battery advancing, each gun is to be shown by two targets representing mounted men and one horse target on each sleigh (Fig 65). In the case of artillery passing across the front the targets representing each gun are carried on two sleighs bound together with wire; on the front sleigh are two targets representing mounted men, while one of these and one gun-target are fixed on to the rear sleigh (Fig. 66).

30. The wire rope for pulling.

A wire rope is used to apply the power to the moving targets.

A rope made up of 5 or 7 strands is the best for this purpose.

A drum is used to wind up and to preserve the wire rope (Fig. 35), and can be mounted on a cart for purposes of transport (Fig. 36). Pliers (Fig. 37) should be provided to handle the wire rope when coiling or uncoiling it, and also for laying it out on the ground.



33

Care must be taken when laying out the rope that it always remains fairly taut; otherwise it easily forms into loops, and is liable to get broken or kinked in undoing them. The same care must be taken when winding the rope on to the drum; if a kink has been made or even if a strand is broken, the rope should be cut at that spot and joined together again in the following manner:—

At each end of the wire make small loops (a), and twist the remaining part (b) about eight or twelve times round the standing end (c); then unstrand the end of the wire, and twist each strand separately round at the point (d).

31. Pulleys.

Pulleys (Fig. 39) are used to lead the wire rope in the desired direction. They consist of :---

An iron stake (a). An iron sheave (b). Two washers (c). A split pin (d).





34

Solid iron sheaves are more durable than if made in separate parts. A special set-hammer (Fig. 40) and a maul (Fig. 41) are required to drive in the pulleys.



Erection.

32. Fixing target frames and arranging sleighs.

The target frames are placed in the space between the two stays (c, Fig. 42), and fixed by wedges (k); the two bolts (d) are pushed  $\odot 2$ 

in and fastened by binding wires, then the cross-pieces (e) are tied with the wire (l) to the top edge of the target frame.



The sleigh before it begins to move is placed with its runners at right angles to the line of fire, the frame holding the targets being thus parallel to this line (Fig. 43).



Sleigh with target frame, ready to be turned round. Plan.

On heavy ground a flat piece of wood (m) is placed under the runners, so that the sleigh may turn more easily when it begins to move, and thus bring the targets into view.

33. Laying out the wire rope.

Mark by pickets those points at which the sleigh is required to turn, and at which the wire rope is to change direction, either on account of the direction in which the power is to be applied or on account of the formation of the ground.

Place the sleigh as in *Fig.* 43, drive in the pulleys at the points marked d in *Figs.* 44 to 47 (see para. 34), make the pulling wire fast to the sleigh, lay it out round the pulleys and to the power; at the same time look for kinks or breaks in the wire rope.



37

Small ditches dug in the direction of the line of fire, and more especially in those stretches where the power is applied at right angles to this line, diminish the chance of the rope being shot through.



(In order to allow the sleighs to turn at the same time, their distance from the pulleys must be alike ;  $x=x^1=x^2$ ).

Three sleighs advancing.

34. Driving in the pulleys.

The iron stake, after removing the sheave and washers and fixing the set-hammer, is driven vertically into the earth by means of the mauluntil the lower washer can rest on the surface of the ground. Press the earth down firmly round the stake, put on the sheave and washers, and insert the split pin.

To allow the sleigh to turn the pulleys are sunk, if in firm ground, in a shallow ditch, which is gradually smoothed off to the surface (Fig. 50). This ditch is just deep enough to let the top of the stake be on a level with the ground; by this means the wire can jump off the pulley and the runners travel over the ditch.



Three sleighs, first one behind each other, and then alongside each other.



Battery moving across the front.

Up to a distance of 25 yards from the pulley the wire should not pass over any large projections, as it might in that case easily jump out of the sheave before the sleigh reached it.



Ditch and pulley.

In order to give the stake a better hold in soft ground, a wooden block about 3 feet long, with a hole through it of the same size as the stake, is sunk in the ground to such a depth that the top of the stake after passing through the block is on a level with the surface. The block is fixed down by small stakes, and is laid down in an oblique direction, as shown in Fig. 51 ( $\alpha$ ).



## 35. The power.

It is recommended that practice grounds and large ranges be provided with steam or other machines for generating power, which turn drums. The wire is laid out from the drum, round the pulleys to the place where the run is to commence, and is made fast to the mechanism of the sleigh. Motors or steam engines are preferable to winches set in motion by horse-power, as by their means the targets can be moved quicker, and more sleighs and broader ones can be put in motion at the same time.

Four to eight horses would be necessary to work a winch, the number depending on the shape of the ground.

the number and size of the sleighs to be drawn, the length and friction of the wire rope, and the velocity required.

On smaller ranges, and when shooting in open country, the sleighs can be pulled by horses harnessed to splinter bars, carts, or limbers. In using a splinter bar the end of the wire rope is made fast to a hook which is inserted in the ring of the splinter bar, which is held up by a man until the horses are in full motion. If a cart is used, the wire rope is made fast to the rear axle.

The wagon carrying the drum (Fig. 36) may  $\mathbb{C}$ also be used to pull the sleighs by fastening the ends of the wire ropes to the rear side or to the axle. The wire is laid out in the same manner as when working with a winch. The end of the wire rope to which the power is to be applied is made fast to a stake. If several sleighs are to be pulled at the same time, the ropes must be of equal length. The power is to be applied slowly, so that the sleighs may remain upright and gradually attain the required velocity, and the wire not zet torn.

The distance ab (Fig. 52) which the sleigh has to traverse before it changes direction is measured off in the direction of the pull from the point c at which the power is applied, and the distance is marked by a stake at d. About ten vards before reaching this point the velocity



is to be decreased, so as to prevent the frames or the sleigh from being damaged.

36. Different types of moving targets (Figs. 53 to 66).

## (a). Targets on Small Sleighs.









Hook A

Lengthening piece for a small sleigh.





To obviate the possibility of the targets on the sleighs being recognized before the firing commences by men not exactly in the line of fire, it is recommended to fix the targets on the sleighs

45

in such a manner that they are only pulled into an upright position by the application of the pulling force. This can be easily done on smooth ground, and also on heavier ground if steam power is used.

## (C). FIXED TARGETS.

37. Fixed targets are as a rule to be only used where there are difficulties in using disappearing targets; they should as far as possible be erected in such positions that they would only become visible to the firing party when such would actually occur in reality.

#### (a). Infantry.

38. Firing lines are shown by balloon, head, or breast targets. The balloon targets are tied on to a wooden beam laid on the ground, the head or breast targets nailed on to a beam or pointed stake driven into the earth.

## (b). Cavalry.

39. Cavalry at the halt are shown by several targets representing mounted men placed close together.

#### (c). Artillery.

40. Stores required to represent a battery in action :--Targets representing 6 (4) guns, 6 (4) limbers, 3 (2) ammunition wagons, 18 (12) figures in profile or half-figures, 12 (8) figures from the knee upwards or breast upwards, 23 (16) whole or half-figures, full-face.

The relative position of the several targets in accordance with field artillery drill is shown in *Figs.* 67 and 68.

The targets shown in Figs. 1 and 9 to 14 are to be used.



0 Horse-targets

## Battery in action, six guns, three ammunition wagons.



Battery in action, with wagons and teams behind the guns.

## PART III.

## FIRE FROM THE TARGETS.

41. Fire from the targets should be made to resemble as much as possible the actual fire of an enemy, both as regards the report and the appearance of fire and smoke.

## (A). INFANTRY FIRE FROM THE TARGETS.

42. When firing by groups the reports of the shots of the firing party would drown the noise of the firing from the object aimed at, so that infantry lire from the targets is as a rule only represented when practising individual firing, and is most easily carried out by the men in the butts firing blank; it may be also used when firing by detachments if it is a question of calling the attention of the firing party to targets which might else be overlooked.

## (b). Different Methods of Ignition.

Ignition of Puffs by No. 3 Percussion Cap or Detonating Cap in conjunction with a Friction Tube.

47. This method of ignition can be used for all puffs, except the magnesium ones, which are always fired electrically. It has the advantage of economy, but is not quite free from danger.

The following are required to ignite a puff :----

1. Friction Tube.



Friction tube.

## 2. Detonating Cap.

A large amount of damage may be done by a premature explosion of the detonating cap. These should be carefully stored and used (see Appendix).

Fig. 75.



Percussion cap No. 3, or detonating cap.

## 3. Igniting Line.

Should be at least as thick as a lead-pencil, and have a spring-hook fixed on one end.



Spring-hook and igniting line.

## 4. Wooden Stuke.

Puffs are laid out and fired as follows:—A stake should be driven into the ground for each puff at right angles to the direction of the pull and in front of the targets, so that about  $3\frac{1}{2}$  inches project out of the ground; the firing lines are then laid out from the shelter to the stakes.

Then insert the friction tube in the detonating cap, and insert it in the puff; pass the wire plug of the friction tube through the slit in the stake (*Fig.* 78); tie the puff to the stake, and hook the spring-hook to the eye in the friction tube.

The puff is fired by pulling the line from the shelter.











Battery target and puffs.

To prevent accidents the following points should be attended to :--

1. The slit in the stake must be big enough to allow the wire of the friction tube to be inserted easily. Any force in inserting it or pull on the wire is to be absolutely avoided.

2. The insertion of the friction tube in the puff is to be carried out with great care. The friction tube must not be pushed too far in or be turned round.

3. The erection and working of fire from the targets must only be in hands of experienced non-commissioned officers.

4. The spring-hook is to be attached by a non-commissioned officer after everyone else has got under cover. In cold weather numbed fingers should first be warmed. The wooden stakes are blown to pieces on firing, and splinters will fly about 80 yards.

5. Puffs that have not been fired are to be carefully removed at the end of the firing, the hooks being first taken off or leads disconnected. If the friction tube is stuck in the stake, it is not to be forcibly removed. In this case it is recommended to fire off the puff separately.

## Electrical Ignition of Puffs.

48. All puffs can be ignited electrically, either by high or low-tension detonators.

#### Ignition by High-Tension Detonators.

49. The following are required :----

1. A dynamo electric machine.

The machine is in a small wooden case provided with a lock, and a leather strap for convenience of carriage.

## Ignition by Low-Tension Detonators.

50. The following are required :--

1. One or more cells (Fig. 86); the cells lose their electrical power after about two years.

2. A detonator for each Roburite, Dahmenite, or cube puff (Fiq. 87). See the remarks on detonators in para. 49.

3. The lead required for each puff to connect the battery to



the igniting apparatus in the puff, and a cable if several cells are used with a switch-board (Figs. 88 to 92).



Fig. 89.



r. Return connection. l. Lead. rl. Return lead. End elevation of the case.

The puffs are laid out in the same way as when using hightension detonators (see para. 49). To ignite a puff, one end of the lead is made fast to the terminal on the cell, and the explosion takes place as soon as the other end of the lead touches the wire from the other pole of the battery. The length of the lead should not exceed 20 yards if only one cell is used; if puffs are to be fired at a greater distance, two or three cells connected together are necessary.

The cells should be connected together, as shown in Figs. 88 to 92.

All the leads are then combined into a cable (*Fig.* 92). To bring about ignition the ends of the leads are then connected to the terminals on the top of the case (*Fig.* 89), and the connection on the





Key on cover of box.



Connections to puffs laid out.

end of the case screwed up. By pressing on the keys (Fig. 91) six puffs can be fired in succession, and with such rapidity as may be desired.

## Keyboard Apparatus.

51. The keyboard, only to be used for low-tension detonators, consists of an inductor and a keyboard, with keys and terminals, which are connected to the leads by copper wires. *Fig.* 93 shows such an apparatus connected up for 12 puffs.



Keyboard seen from above.

The puffs are laid out as already described. The ends of the leads in the shelter are connected to the terminals on the keyboard in such a manner that one end of each double lead is screwed down under one terminal. After all the puffs have been connected up in this way, the inductor is screwed on to the copper plates (p) at one end of the board, and is thus connected to the keyboard.

The handle of the inductor remains in the care of the non-commissioned officer in charge of the apparatus, and is only fixed on when the firing commences. If a puff is to be fired, the handle is given one short turn and the key pressed at the same time. To prevent sand, etc., getting into the keys, it is recommended to keep them covered with a watertight material.

The apparatus is kept in a light locked box and the inductor in a leather case, with straps for carrying it.

## PART IV.

#### COVER FOR THE MARKERS.

52. Shelters for the markers must be so constructed that there is no danger from stray shots or ricochets; the sides are to be as steep as possible, and the shelters are to be as little raised above the ground level as possible, and should not be in striking contrast to the colour of the rest of the ground.

A shelter should only be considerably above the level of the ground when it is impossible to choose a completely hidden situation for it, such as in rocky or marshy ground. The height of a shelter, which allows the markers to stand up (8 feet), may be reduced to 5 feet by using a roof; this compels the markers to remain sitting. A roof should also be fixed in cases where the markers are to remain standing if the shelter is in the line of fire, as it keeps the earth shot away from the parapet from falling into the shelter, and thus increases the feeling of security on the part of the men inside.

On larger practice grounds shelters may be permanently erected at certain spots, so as to prevent unnecessary digging in different places. As these grounds are also used for drill, it is necessary to ience in these shelters, so as to prevent accidents, the fences being removed before firing. It is advisable to revet the sides of permanent shelters with corrugated iron, boards, hurdles, or masoury. The number of permanent shelters should be kept as low as possible, as several targets, even if a considerable distance away, can be easily worked from one of them (see p. 18).







(c). Roof. Shelter for the markers.

The parapet thrown up should not differ in colour from its surroundings, and should, therefore, be covered with turf, weeds, or branches on the side turned towards the firing point.

## EQUIPMENT AND USE.

53. The following are necessary for the equipment of a shelter :— One reflector with mirrors (*Fig.* 95), which is inserted through as small an opening as possible in the roof, and can be fixed so that the observer is not always obliged to hold it; also one reserve reflector, materials for fixing and gumming the targets, and a white and a red and a white flag on frames (see Part V., Signalling).



54 The party in each shelter will consist of at least one non-commissioned officer and one man; one observes the firing party through the reflector and looks after the signalling, the other has charge of the targets.

Three men are required in a shelter if the target, after a sleigh has been turned away, is to disappear without a special signal being given. In this case the third man should observe the sleigh with the reserve reflector.

If puffs are to be fired from a shelter, another non-commissioned officer is required.

## PART V.

#### SIGNALLING.

## GENERAL REMARKS.

55. Flag signals are used for communication between the officers in charge of the firing parties and the range party. To avoid risk of accidents to the markers, and to ensure that the targets appear and disappear without interruption, the signalling must be thoroughly regulated, and be practised before firing commences.

The regulation of the signalling is a matter for the officer in charge of the targets. The men told off to work the flags are to be placed under the command of the N.C.O. entrusted with the signalling arrangements.

The range party are to be instructed in their duties by the officer in charge of the targets before the beginning of the practice, as also in the precautions that are to be taken. The markers should know at what points they should look out through the reflectors for the flags; these should be so placed that they are as plainly visible to the range party as possible; the light and the background make a considerable difference in this respect.

Every endeavour should be made that the firing party see nothing of the targets before the firing begins; the former should, therefore, be kept out of sight as much as possible. If this is not practicable, the previous practice in signalling must be completed before their arrival. No flags should project from the shelters so as to be visible to the firing party except when indicating targets that have been hit.

The markers for targets that have not been hit are to remain in their shelters, even when hits on other targets are being signalled.

The following stores are required for signalling :----

1. Two reflectors in each shelter, and a white flag; also a red and white flag for marking.

2. With the non-commissioned officers personally responsible to the officer in charge of the targets, two black and white, one white, and one red and white flag (flag-station).

If the situation of the practice ground in any way permits of it, one shelter, from which all the others must be visible, is used as chief shelter or a special chief shelter is built, which gives the necessary signals for commencing and ceasing fire; it is manned by one non-commissioned officer and a bugler, the former being provided with a telescope.

## SIGNALLING DURING FIRING.

## (a). Opening and Ceasing Fire.

56. Before the firing begins, and as soon as the markers are in their shelters, the white flag is shown from each shelter so as to be visible from the chief shelter and from nowhere else. When the firing is to commence, the flag-stations show the two black and white flags in the "attention" signal (*Fig.* 96), and the red and white flag is erected close to them. At the same time the buglers, if used, will blow the "Fire," which will be replied to by order of the non-commissioned officer in the chief shelter.



On this signal all the markers will enter their shelters, and the noncommissioned officers will take down the white flags; after this has been done, and the non-commissioned officer in the chief shelter has satisfied himself that all the white flags are in, and the markers, therefore, all under cover, he will visibly expose a red and white flag from the chief shelter as a signal that firing may commence.

When the practice is over, and the last shot fired, the red and white flag at the flag-station will be taken in, and the white flag shown instead : the "Cease Fire" will also be blown, and answered by the bugler in the chief shelter, by order of the non-commissioned officer.

After the red and white flag from the chief shelter has been replaced by the white one, and the markers are aware of it, they may leave their shelters by order of their non-commissioned officers.

If during the firing the commander desires a pause, either for marking or for holding a conference, the flag-station will hoist the white flag instead of the red and white, and at the same time the "Halt" will be blown, which will be answered by the bugler in the chief shelter, by order of the non-commissioned officer. After this the markers will take cover, the white flags be taken in, and after this is done, the red and white flag exposed from the chief shelter, by order of the non-commissioned officer.

#### (b). Appearance and Vanishing of the Targets.

57. The orders to the markers to cause the targets to appear or to vanish are communicated from the flag-station by means of the two black and white flags kept there; these flags have a black bar on one side, and white and black squares on the other; the material must be opaque, so as to avoid mistakes which might arise if the light were shining brightly from behind them. For service volley firing the flags should be about 4 feet square, for independent firing about 3 feet square. The larger flags are provided with windslits and one or two cross-pieces (*Fig.* 97) for easier handling in a strong wind.

65



Each set of targets is numbered, and when any particular one is to appear, the required number is communicated by the different relative positions in which the two flags are held (*Fig.* 98). As soon as the target has appeared the flags resume the position of "attention," and the same signal is again shown to cause the target to disappear.



Flag signals for service firing.

The following points may be noted as aids in remembering the above combinations :---

Targets 1 to 4.—Both flags showing the black bar.

Targets 5 to 8.—One flag showing the black bar and one the black and white squares.

Targets 9 to 12.-Both flags showing the squares.

#### Also-

Targets 1, 5, and 9.—One flag upright and one leaning toward it. Targets 2, 6, and 10.—One flag upright and one leaning away from it.

Targets 3, 7, and 11.-Both flags leaning toward each other.

Targets 4, 8, and 12.-Both flags leaning away from each other.

It is recommended that the markers should have in their shelters a copy of the signal referring to themselves, which should be fixed above or below the reflecting mirror.

Small oval flags of different colours are the best means of communicating orders to the men told off to work the iron sleighs.

Under certain circumstances a target will not appear at the prearranged signal; but a special arrangement will be made, as, for example, a target representing a firing line will appear as soon as a sleigh has turned away from the line of fire, and disappear again as soon as the next sleigh shows. Special arrangements should also be made if a decrease or increase in the size of a target is to be carried out.

## (c). Special Measures.

58. Although when carrying out larger service practices the signals for opening or ceasing fire should be given by bugle-calls, for smaller practices or for individual service firing only flag signals need be used.

To commence firing, give the signal "Fire" (Fig. 99).



When firing is going on and it is desired to report results, give the signal "Halt" (Fig. 100).



After the practice is over, signal "Dismantle."



#### Signal " Dismantle."

59. If in very thick or foggy weather the flag signals cannot be recognized through the mirrors, it may be necessary to cause the different targets to appear and disappear by signals previously agreed on. In this case it is, however, distinctly ordered that the

markers, to prevent accidents, must not leave their shelters on the signal, but only by order of a mounted officer. The communication of orders to the markers by bugle calls has the disadvantage of letting the firing party know when a new target is to appear.

60. Detachments should never be withdrawn by bugle call.

61. As soon as the safety of the men in a shelter is imperilled by any occurrence, or if both reflectors have been hit, the white flags in the shelters are to be waved to and fro visibly during the firing ; as soon as this signal has been recognized by the firing party, and the red and white flag at the chief shelter has been lowered, the markers may leave their shelter by order of the non-commissioned officer.

62. If the conditions of the ground do not allow of a chief shelter, it may become necessary for each shelter to show a red and white flag during the firing; this system has, however, the disadvantage that the firing party knows where the occupied shelters are placed, and has, therefore, the opportunity of estimating the range.

63. If the conditions of the practice ground are such that one chief shelter cannot be laid out, and the extent of the ground is so great that the signals from it cannot be understood by all the shelters, the markers are either to be notified by a mounted officer that firing is to commence, or else before the firing begins each shelter is to show a white flag, which is visible to its flagstation. The disappearance of the white flags and showing the red and white instead will notify the officer in charge of targets that all the markers are under cover, and that firing may commence.

Special circumstances may always render it necessary or advisable to depart from the above regulations; but in arranging suitable conditions for the practice the commanders must always remember their responsibility that no accidents occur.

#### (d). Method of Marking Hits.

64. The method of showing the number of hits is generally carried out by means of a white and a red and white flag.

After the hits have been counted, both flags are shown in the "attention" position; as soon as the signal for the particular target is shown by the flag-station the hits are signalled in the following order:—

1. Direct hits.

2. Ricochets.

3. Number of figures hit.

4. With artillery targets, number of hits on the accessories (guns and wagons).

Between 1 and 2, 2 and 3, and 3 and 4 a double circle should be described with the white flag. For each hundred hits a cross (X) is made with the red and white flag; the red and white flag is lowered and raised to denote tens, and the white flag lowered and raised to denote ones. If there are no direct hits or no ricochets on the target, the white flag is held horizontally; if the target has not been hit at all, both flags, as soon as their signal has been given, are at once laid on the ground from the "attention" position.

Under certain circumstances it may be advisable to have the number of hits written down by the markers and fetched by a mounted officer.

The signals for field artillery firing differ from those for the infantry; when these arms are practising in conjunction it must be decided, having regard to the conditions of the place and the nature of the practice, whether special signalling arrangements are necessary to prevent accidents.

## APPENDIX.

NOTES ON THE ISSUE, PACKING, DESPATCH, STORAGE, AND TESTING OF DETONATORS MANUFACTURED AT THE SPANDAU LABORATORY.

### Issue.

Detonators may be drawn by the troops from artillery depôts on repayment. Commanding officers are to send in by the 15th August a requisition to the nearest artillery depôt for the amount required for the next year's practice. The detonators received are taken on charge with the practice ammunition.

In order that there should be a sufficient supply of detonators the artillery depôts are to keep enough in store until the beginning of the musketry year for a year and a-half's practice, reckoned by the amount expended in the previous year.

#### Packing, Despatch, and Storage.

The detonators are to be packed in tin cases with wooden partitions and sliding lids; twenty-five detonators are in each case, made up in two bundles of ten and one bundle of five. Before packing, the detonating caps are separately wrapped in wadding, and each bundle is tied together by two india-rubber rings; a layer of wadding is also placed above and below the detonators.

For transport the cases are packed in a wooden box holding four of them, and the space between the cases and the box is filled with wood fibre.

When forwarding detonators by railway, the instructions laid down in the Orders for Military Railways and the Traffic Regulations for German Railways, Appendix B, para. XXXVIA, relating to the transport of powerful explosives, are to be adhered to. Detonators are never to be sent by post.

Detonators are to be stored in cool, dry rooms; they are to be carefully protected from damp, as otherwise the detonating caps would lose their power.

Detonators may be stored in the same room as metal cartridges, but must be kept locked up in a separate cupboard or press.

Detonators should neither be packed with, kept in the same room,

or forwarded in the same carriage as high explosives, such as Roburite, Dahmenite, guncotton, etc.

#### Testing.

The testing of detonators is only to extend to examining their outside appearance. Any further tests, and especially cutting them open, are on no account to be undertaken by the troops. Doubtful or useless detonators, and all detonators that have failed to fire, are to be returned to the artillery depôt on the next opportunity without cost to the public.

