AWM 27 8

320/4

Notes on Field Defences

No. 4.—Notes on Field Defences.

NOTES ON VISIBILITY OF TRENCHES FROM THE AIR.

The following notes have been extracted from a report of the R.F.C.:—

"Long regular trenches are more easily seen than those laid out in groups.

Straight lengths of trenches are the most conspicuous.

Trenches dug across ploughed fields are very easily seen; those against hedges are almost invisible.

Straw at the bottom of trenches is very visible, but it is difficult to decide whether trenches are occupied or not.

It is difficult to determine whether guns are in position in an emplacement or not. Wheel tracks leading up to gun emplacements are always very conspicuous. It is suggested that tracks should always be made leading up to dummy emplacements. Similarly it is easy to trace the tracks of infantry across grass fields."

1st Printing Company, R.E. G.H.Q. 194.

HEADQUARTERS, No. 3 ARMY
No. 76
4 NOV. 1914
COLONEL, R.E.

PTO

12 Bde

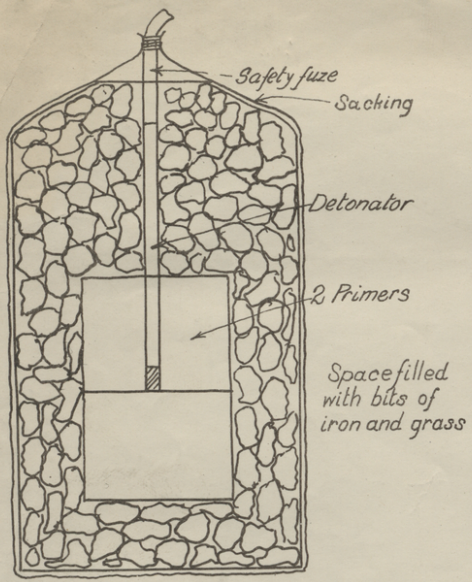
The notes overleaf are solely made out from the point of view of what can be seen from the air. The tactical point of view must however not be lost sight of and continuous trenches should be constructed as they have been found by experience to be tactically much stronger than trenches laid out in groups.

6th Nov.1914.

Lt.Col.
Gen.Staff, 4th Div.

No 5 – Notes on Field Defences.

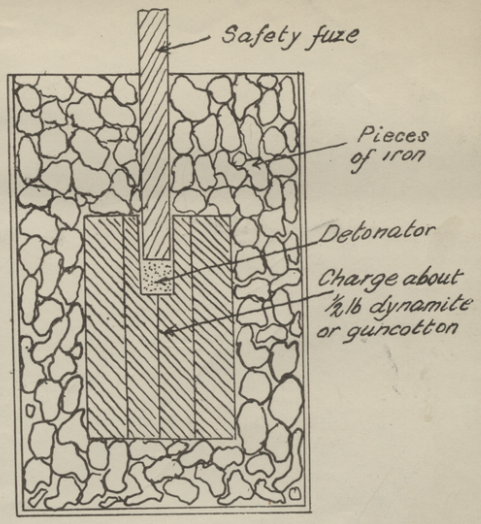
JAM TIN BOMB.
with sacking envelope



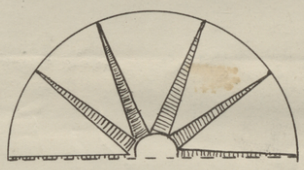
Jam Tin Bomb–
Charge 2 primers – and pieces of iron made up to an easy weight to throw.
Any spare space to be filled with grass.

Sketch of Hand Grenade made of one jam tin with a tin envelope

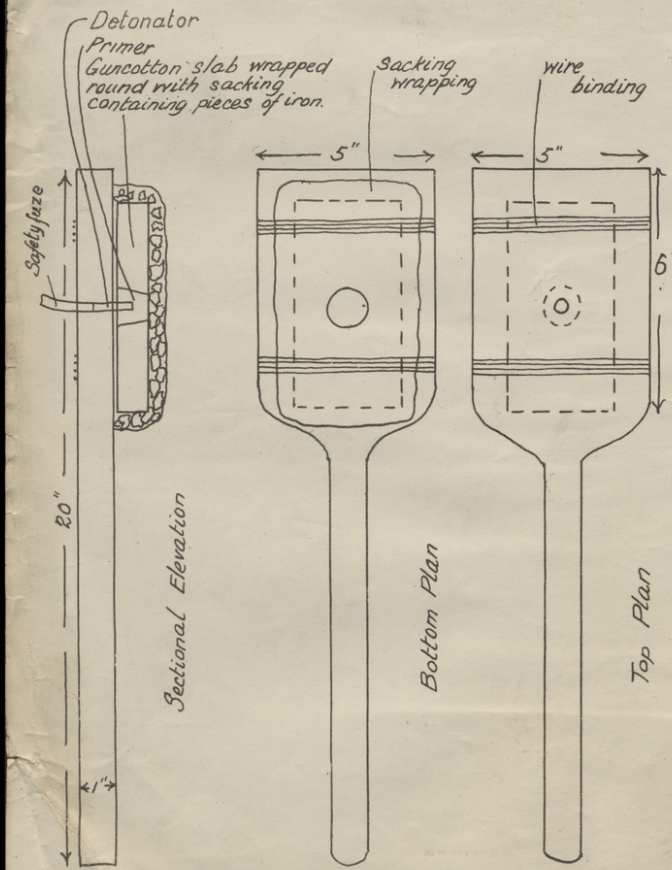
Section



Half Top Plan.
Showing how top of outside tin is cut and folded over the charge to hold it in.



HAIR BRUSH BOMB



The accompanying sketches illustrate various forms of hand grenades extemporised from materials found locally and used with effect during the present trench fighting.

These grenades are all fired with safety fuze and detonator. The fuze should be cut so that there is no chance of the bomb being picked up and thrown back.

The size and weight of the bomb should be limited to what a man can throw easily.

1st Printing Coy, R.E., G.H.Q. (No 295).

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

No. 6.—Notes on Field Defences.

NOTES ON FRENCH MILITARY EXPLOSIVES.

1. As opportunities of using French Military Explosives may sometimes occur, the following brief notes are published for the information of those concerned:—

2. Powder and Melinite are the only two Service Explosives.

3. Melinite is a high explosive, about 2½ times as powerful as gunpowder. It is manufactured in two forms, viz.:—

(i.) Powdered Melinite.—This consists of small straw-coloured crystals, very bitter to the taste.

(ii.) Ground Melinite.—A compact mass, of yellow, grey or brown colour.

Melinite is not sensitive to shock, and it can be set alight in the open without detonating, but it is inadvisable to do so.

Powdered melinite is detonated either by means of a detonator or of a detonating fuze.

Ground melinite, on the other hand, cannot be detonated with any certainty by the above means, and a certain amount of powdered melinite should be added.

Melinite should not be placed in contact with alkaline substances, especially lead and its compounds.

Damp considerably impairs the detonation. Damp melinite assumes a very characteristic sharp yellow colour.

Melinite is generally used in the form of cartridges or petards, i.e., it is placed in strong watertight cases, which can be stored in any kind of receptacle.

The only difference between the cartridges and the petards is the amount of the explosive and the shape of the case; the cartridges are cylindrical and the petards rectangular.

4. The cartridges (Fig. 1) are made up of 3½ ozs. of powdered melinite, in cylindrical brass cases, 5 1/6 in. by 1 1/6 in., tinned and varnished on the inside with a cover soldered on. This cover has a hollow copper tube (Fig. 4) on the underside which is bedded into the explosive, and is intended for the reception of either the detonator or detonating fuze.

The petards (Fig. 2) contain 5 ozs. of melinite in rectangular cases 6 in. by 1 1/3 in. by 1 in.

5. In addition to the above two forms of charges, there is a smaller priming charge (Fig. 3) containing 2 ozs. of melinite, in a case of the same section as the petard but only about half the length It has a copper-lined perforation right through it. This priming charge can be used for joining two lengths of detonating fuze (Fig. 6), or for igniting the detonating fuze at the firer's end.

6. For large mines charges of 44 lbs. (Fig. 5) and 22 lbs. are used. The larger charges are contained in cases 1 ft. 7 in. by 7 in. by 7 in., the cases of the smaller charges being half the length. The 22 lb. charges are not often met with.

7. There are two kinds of fuzes in the Service, (i.) Bickford's Safety Fuze and (ii.) the detonating fuze.

8. The various descriptions of melinite charges can be used in a similar way to guncotton slabs, i.e., they are placed untamped on surfaces.

9. The detonating fuze consists of a melinite core about 1/8 in. to 3/16 in. diameter enclosed in a tin tube about ¼ in. diameter. Rate of burning about 7,600 yds. per second.

It is advisable to keep away from the fuze when it is fired as pieces of the tin tubing are apt to fly.

The tin tube is watertight, and damp can only get at the uncovered ends. These should, therefore, have about 4 in. cut off the ends to reach the dry melinite, which can be recognised by its pale yellow colour.

The detonating fuze is easily handled; it will not bear any great weight, however, and should not be drawn taut. It is very pliable and can be easily coiled and bent. It will not detonate as a rule by being set fire to or when subjected to shock.

When first issued the ends are covered by brass caps (Fig. 7) filled with waterproof composition.

This fuze must be fired by a detonator at the firing end; at the other end it need only be inserted into the powder or melinite charge.

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

10. When the detonating fuze is uncoiled, kinks, knots, etc., should be avoided, and one portion of a lead should never touch either its own lead or another lead, otherwise the detonation of one portion will cut another portion and prevent the detonation of the latter. The detonating fuze can be laid along the ground, suspended above ground or embedded in a groove, casing, etc.

11. The detonator (Fig. 8) is a small copper tube, ¼ in. in diameter, and 1 4/5 in. long, containing 21 grains of fulminate of mercury. The portion containing the fulminate is painted black. Detonators should never be carried near melinite charges or detonating fuze. 30 detonators are packed in a cylinder.

12. The detonating fuze is fired by the juxta-position of two detonators, tied together, the detonating fuze inserted into one detonator and a piece of safety fuze into the other (Fig. 9).

13. If the detonating fuze cannot be pressed home in the detonator the tin tubing of the former can be gently scraped.

14. If there are not sufficient detonators, one only need be used by baring the detonating fuze about ½ in. from the end so as to expose the melinite for a length of about ¾ in. and a width of 1/16 in. (Fig. 10), or the detonating fuze can be tied along the whole length of a petard fitted with a detonator (Fig. 11), or two petards can be joined together (Fig. 12).

15. Detonating fuzes can be joined together by any of the following methods :—

(i.) Twisted joint, care being taken not to damage the tubing, but there must be no play (Figs. 13 and 14).

(ii.) A priming charge (Fig. 6).

(iii.) A cartridge or a petard (Fig. 15).

(iv.) Two petards (Fig. 16).

16. Branching off.—If several charges are to be fired simultaneously there should be one main fuze with branches off it, but in order to avoid failures one main fuze should never have more than two branch fuzes. If more than two charges are to be fired the fuzes must be arranged as shown in Fig. 17.

17. A watertight joint between the detonator and the fuze can be made as shown in Fig. 18 by means of a waterproof solution 6 parts tar, 3 pitch, 2 resin, ½ linseed oil, ½ tallow. This composition is squeezed on, but should not touch any of the black painted portion of the detonator.

18. Figs. 19, 20 and 21 shew various methods of fixing charges.

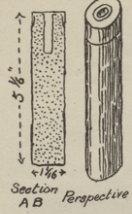
19. Melinite can be fired electrically by means of an electric detonator and exploder not unlike the methods used in the British Service.

1st Printing Co., R.E. G.H.Q. 246.

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

No 6 - Notes on Field Defences

Fig. 1
Cartridge 3½ oz.



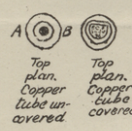
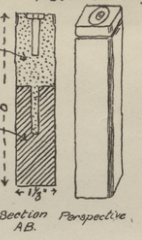
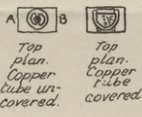


Fig. 2
Petard 5 oz.





Priming Charge 2 oz.

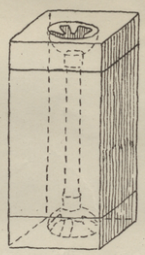


Fig. 3

Copper tube

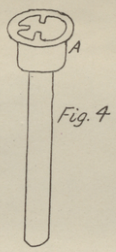


Fig. 4

44 lb. Charge

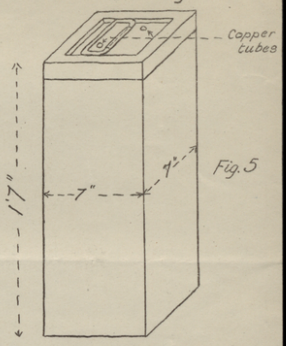


Fig. 5

Fig. 6

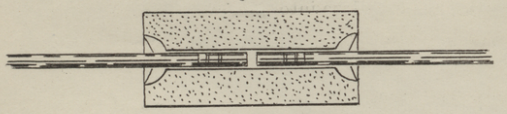


Fig. 7

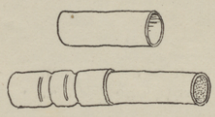


Fig. 8

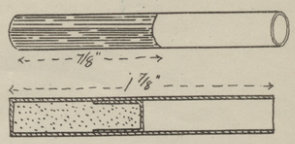
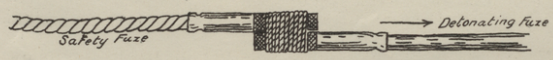


FIG. 9.



Priming of the Detonating Fuze.

FIG. 10.

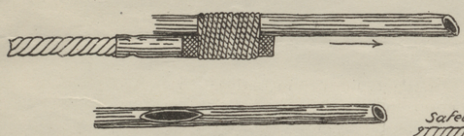


FIG. 11.

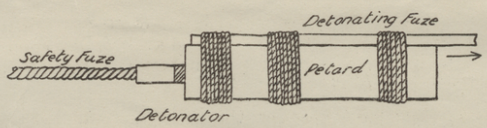


FIG. 12.

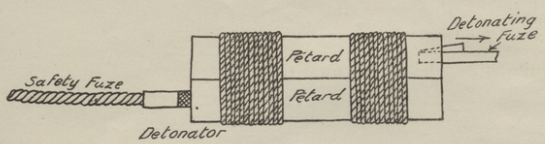


FIG. 13.

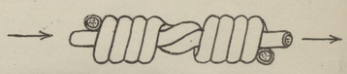


FIG. 14.

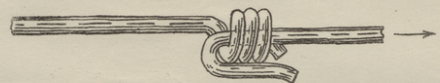


FIG. 15.

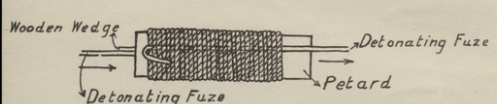


FIG. 16.

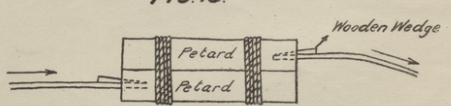


FIG. 17.

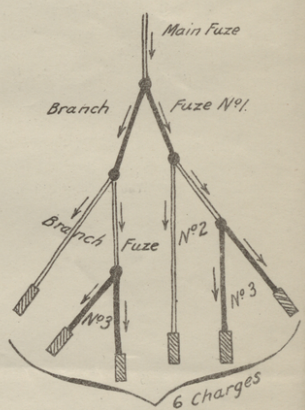
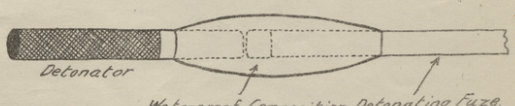


FIG. 18.



1st Printing Coy, R.E., G.H.Q. (No 247)

AUSTRALIAN WAR MEMORIAL
AWM2020.8.1641

FIG. 19.

Firing Arrangements of a Petard

FIG. 20.

Joints, Branches and Preparations of Charges.
When not for immediate use.

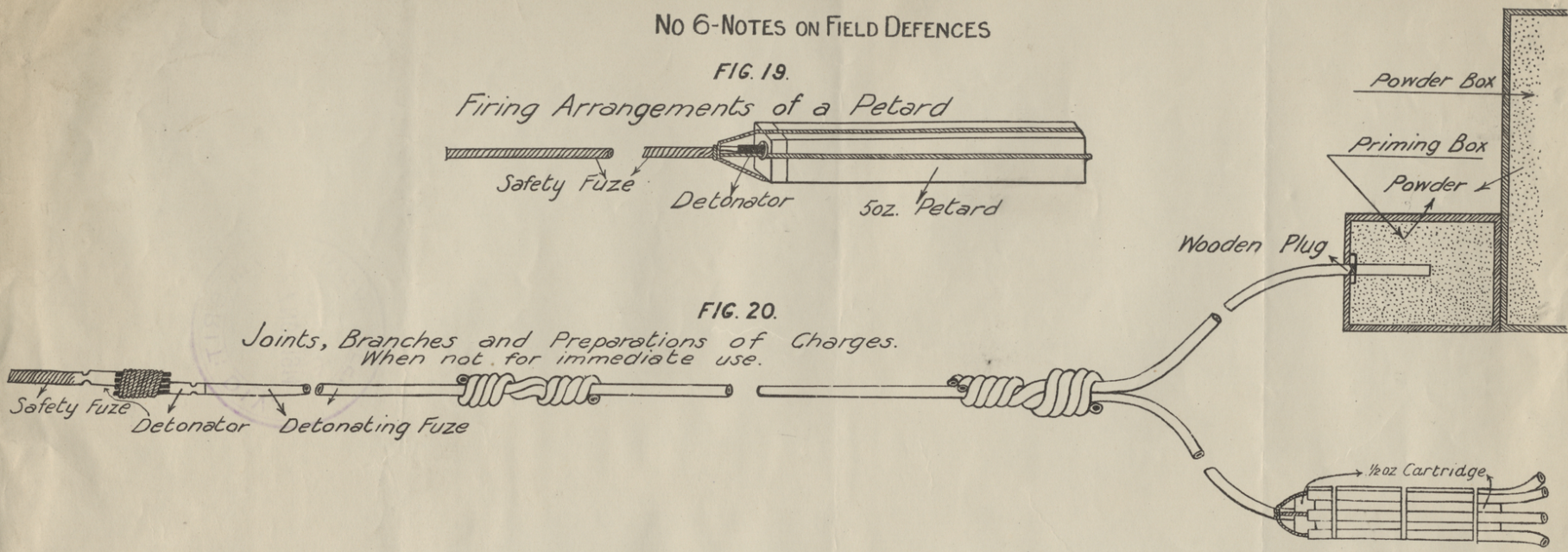
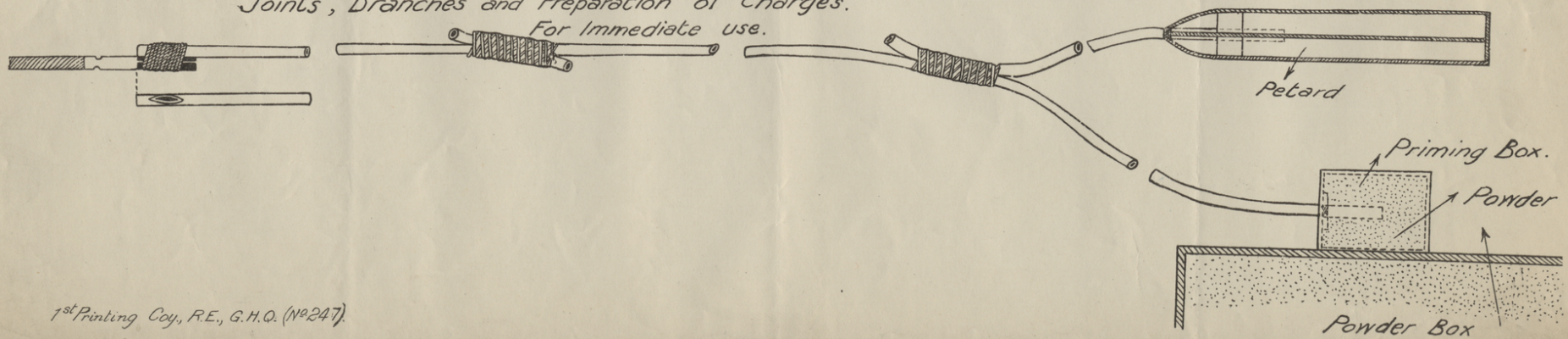


FIG. 21.

Joints, Branches and Preparation of Charges.
For Immediate use.



1st Printing Coy., R.E., G.H.Q. (No.247).

AUSTRALIAN WAR MEMORIAL
AWM2020.8.1641

To Inf Bde

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

No. 7.—Notes on Field Defences.

MACHINE GUN EMPLACEMENTS. (From a French source).

These should be sited with the greatest care on the flanks, and as much as possible under cover; they should not be unmasked until the latest possible moment.

DEFENCE OF WOODS. (From a French source).

Trenches sited a few yards within woods have been proved useless. Their field of fire is quickly masked by trees and branches brought down by high explosive shells, especially where the wood is of small extent, and where its edge is entirely swept by hostile artillery.

It is better to hold the ground by trenches well in advance, say 100 to 200 yards away from the wood or even on the edge of the wood provided that the trenches are provided with strong overhead cover.

DEFENCE OF AN ENTRENCHED POSITION.

2. Small supporting points established close behind the general line of trenches have been found to break up a successful attack on the trenches, and to contribute considerably towards the delivery of a successful counter-attack.

These points should be wired in all round, and the garrison should be from 20 to 40 men under an officer or a specially picked N.C.O.

3. The following notes are issued in view of the rapid transition of the present operations to siege conditions:—

RESISTANCE TO ATTACK BY SAPPING, ETC.

To resist attack by sapping or covered approaches the following methods have been adopted by the defence in various campaigns:—

(i.) A vigorous policy of counter-approaches.

(a) To keep the enemy's approaches at a standstill and to regain lost ground.

(b) To gain particular spots from which to enfilade the enemy's approaches.

(c) To gain a position from which to obtain accurate fire observation.

(d) To isolate blocks of the enemy's approaches by cutting them at some point away back from the front.

(e) To destroy by mining certain points in the enemy's approaches.

(ii.) A policy of interruption.

(a) By concentrated fire on the head of all approaches.

(b) By grenades, bombs, etc., thrown by hand, rifle or mortar.

(c) By incendiarism induced by throwing bundles of burning tow, rags or fireballs followed by a jet of oil or petrol thrown by a powerful pump.

(iii.) By sorties.

PROTECTION AGAINST BOMBS THROWN BY HAND. (From a French source).

The grenades and bombs used are of various patterns, some of which are round, and if they are not thrown far enough to lodge in the trench may roll along the ground and so reach it.

The protection suggested is the erection of a grill of wire netting in front of the trenches, arranged at such a slope that the majority of grenades which pass over the top of the grill will fall clear behind the trench (Fig. 1).

Precautions should be taken to prevent bombs from rolling into the trenches from the front, where the parapets are low and the exterior slope very flat, and also against the possibility of bombs rolling back into the trenches after having passed over it.

Such precautions are suggested in the sketch.

A sandbag "hurter" is shown as a stop in front, while the surface is sloped away from the trench in rear.

A space must be left between the lower side of the wire netting and the top of the parapet to allow free use of the rifle.

Wire netting 1 metre wide 1½ in. mesh is sold in 50 metre rolls.

It should be remembered that this form of protection prevents the men from using their bayonets, which is a grave objection; wire netting should therefore be used in places where this disadvantage is not apparent, such as machine gun implacements, cover trenches, etc.

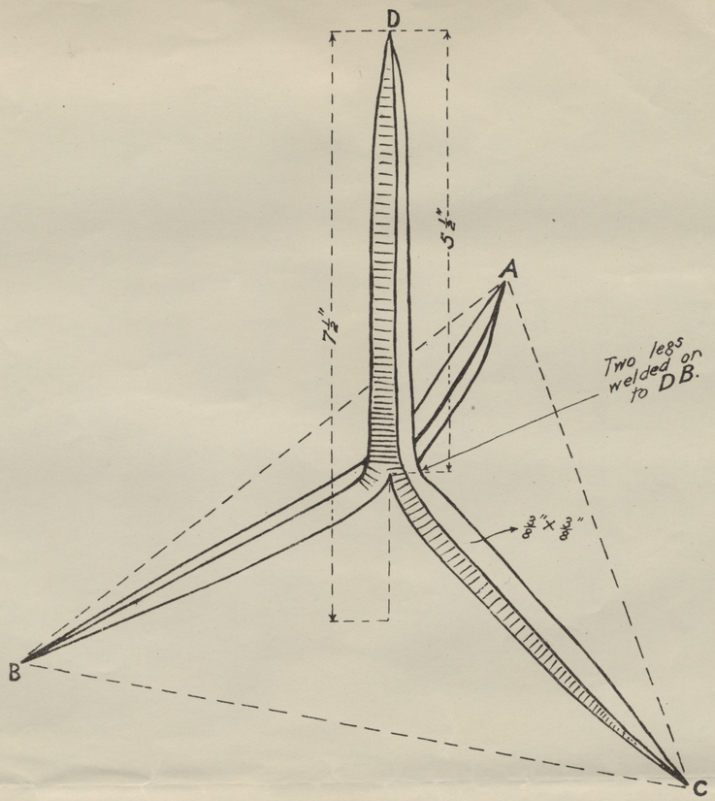
CROWS FEET.

Crows feet (Figs. 2 & 3). and planks studded with nails add to the efficiency of the barbed wire obstacle.

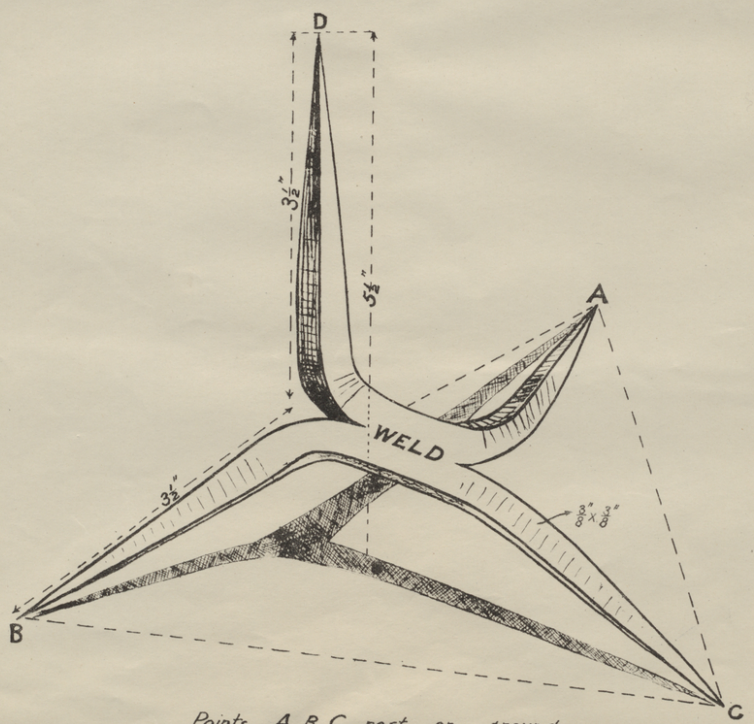
1st Printing Co., R.E. G.H.Q. 277.

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

No 7 - Notes on Field Defences.



Points A B C rest on ground.
Point D points upwards.

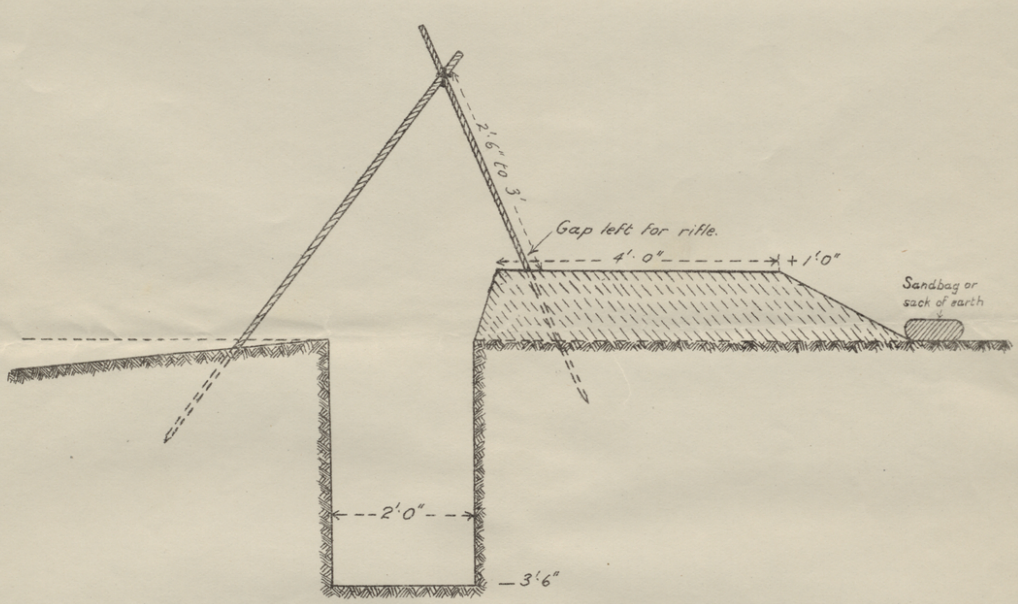


Points A, B, C rest on ground.
Point D points upwards.

1st Printing Co. R.E. G.H.Q. (276).

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

-No7- NOTES ON FIELD DEFENCES.



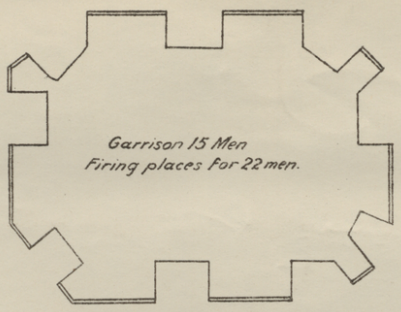
1st PRINTING Coy, R.E. G.H.Q.(276a).

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

Confidential

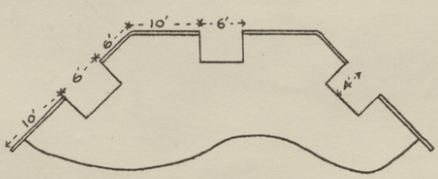
No 8 — Notes on Field Defences.

Trace of Supporting Works actually constructed - screened from Artillery Observation.



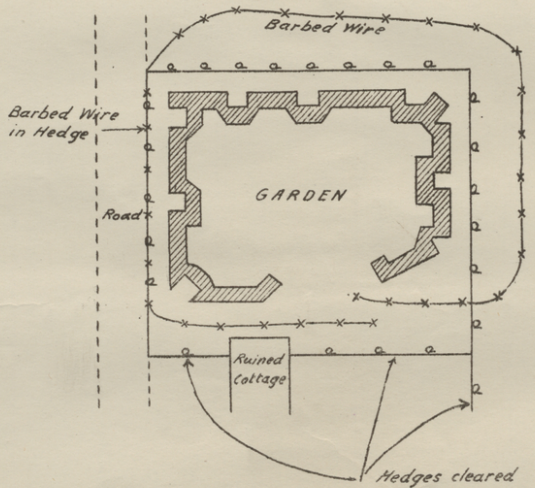
Parapet 1' high. Parados everywhere 1'-6" high.
All trenches 3'-6" deep, 2' wide.
Traverses about 6' by 4'.
Completely enclosed by barbed wire 15' wide about 15' from parapet.

Trace of Supporting Work - as actually constructed.



Fire trenches (shewn double) = 3' wide, 3'-9" deep. Parapet 3' high with earth heaped up to 15" between rifles.
Communication Trenches 2' wide, 3' deep at least with earth thrown up on either side to about 1'.
Traverses 6' along, 4' back.

Sketch Plan of Supporting Work which successfully withstood attack of Prussian Guards on 11th November 1914.



The work was constructed behind the thick hedges of a garden, roughly about 20 yards by 12. Owing to the roadway the usual barbed wire ring had to be kept quite close to trenches on left side.
The garrison was about 40 men and parados was provided everywhere.

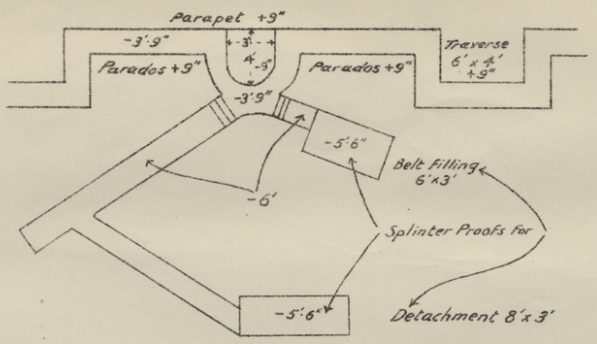
1st Printing Coy R.E. G.H.Q. (334).

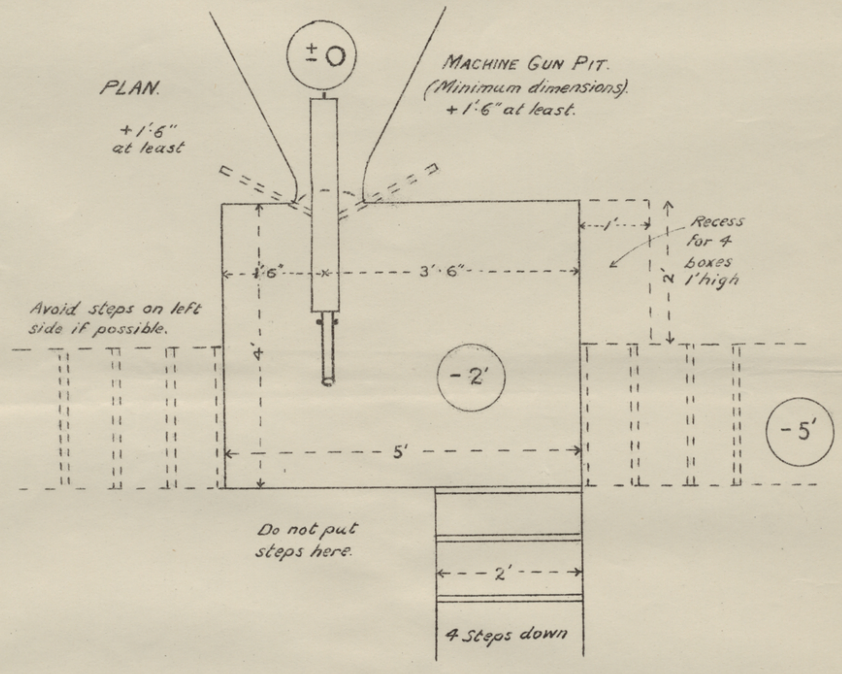
AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

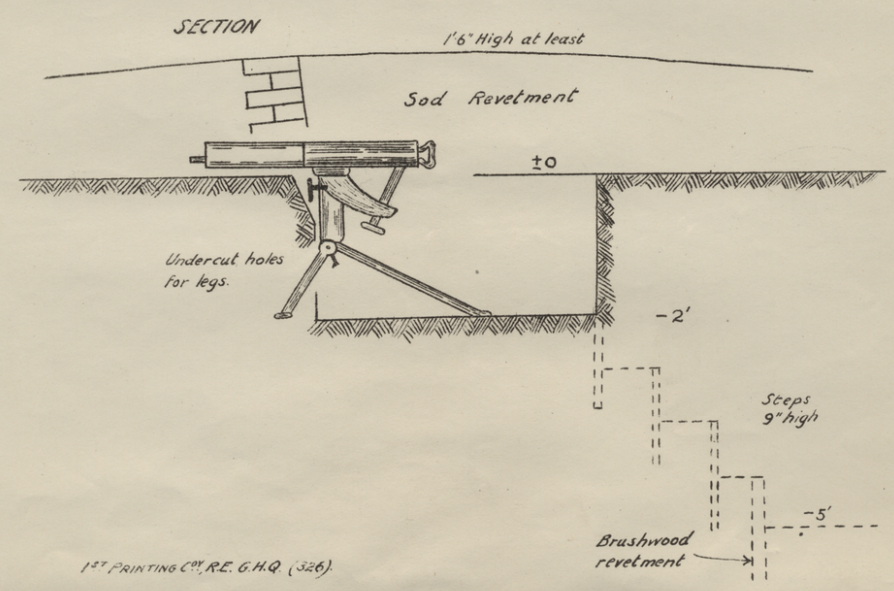
Confidential

No 9 — Notes on Field Defences.

Machine Gun Pit in Line of Flank Trenches.







1st Printing Coy, R.E. G.H.Q. (326)

No. 10.—Notes on Field Defences.

DESCRIPTION OF A FRENCH HAND GRENADE.

Hand Grenades.—Instructions of 27/2/07. Engineers are trained in the use of the Fortress Artillery Grenade. This grenade consists of a hollow cast iron ball 3, 3/16 in. (81·2 m.m.) diameter, walls 3/8 in. (9 m.m.) thick, with a ¾ in. (19 m.m.) diameter perforation for the reception of the fuze. Weight empty, 2·3 lbs. (1·04 k.g.). Loaded, 2·6 lbs. (1·2 k.g.). Charge 4 ozs. (110 grs.). Powder M.C. 30 (Saltpeter 75, Sulphur 12·5, Charcoal 12·5).

Grenade Fuze, Mark 1882.—Used for lighting the charge after release of hand grenade. Consists of a strong friction tube let into a wooden fuze. The fuze composition burns for 5 seconds, and there is in addition a small charge of sporting powder. The fuzes are to be stored separate to the grenades.

Method of throwing.—For throwing the grenade, a leather strap is placed round the wrist; this strap has a piece of rope attached to it ending with a swivel hook. Tear off the paper cover round the fuze as far as the surface of the grenade. Place the friction bar in the direction of the axis of the fuze by moving it out of its notch avoiding an upward pull. Attach the swivel hook to the ring of the friction tube, seize the grenade in the right hand, with fuze pointing to the rear; throw the bomb with the arm fully stretched out, and do not bring the arm back until the friction bar is pulled out.

Average range over parapet 20 metres.

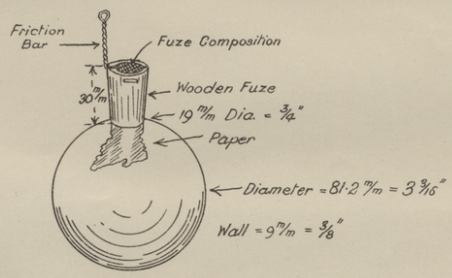
A sling can also be used. A trained man can throw the grenade as far as 50 metres.

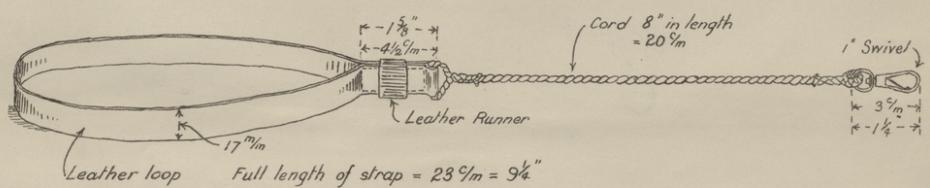
1st Printing Company, R.E. G.H.Q. 352.

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

Notes on Field Defences No. 10.

HAND GRENADE AND STRAP.





1/3rd Actual Size.

1st Printing Coy., R.E., G.H.Q (No 351).

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

320

No. 11.—Notes on Field Defences.

AMMONAL.—NOTES ON THE USE OF AMMONAL AND BICKFORD'S DETONATING FUZE.

It is claimed by the manufacturers that:—

(1) Ammonal No. 5 is considerably stronger than guncotton or picric acid.

(2) It is not sensitive to a bullet or a blow.

(3) It does not freeze.

(4) It cannot be detonated except by a detonator.

Ammonal, being hygroscopic, must be kept in air-tight cases. The greased paper cartridges (supplied in the 5-lb. tins) will suffice for temporary purposes.

Ammonal can be fired with No. 6 Commercial detonator, but No. 7 or No. 8 gives greater certainty.

BICKFORD'S DETONATING FUZE OR CORDEAU DETONANT.

Bickford's detonating fuze or Cordeau detonant is a soft lead tube filled with Trinitrotoluene (T.N.T.) and is a detonator. The detonating wave is said to travel along the fuze at a rate of 6,560 yards per second. This fuze will fire a tin or cartridge from the outside if simply tied to or wrapped round them.

The latter method is used under water. Two or three turns of Cordeau are wrapped round the tin containing the charge, which is then lowered to its proper position.

A detonator is required to fire the Cordeau. The detonator is fixed to the Cordeau as follows:—Split the end of the lead tube of the Cordeau with a knife, place the head of the detonator on the surface of the T.N.T. at A. (Fig. 1); bring back the ends BB., which should still contain some T.N.T. on either side of the detonator and tie them with string or wire. It is most important that the base of the detonator should be in contact with the T.N.T. of the Cordeau.

The detonator is fired in the usual manner with safety fuze. (Fig. 2).

A detonator tied to the outside of a length of Cordeau will not detonate it. (Fig. 3).

One length of Cordeau will detonate any number of charges on branches arranged as C, C, C, C (Fig. 4), but if the main length which conveys the detonating wave from the detonator is connected as in Fig. 5, the fuze will be cut at A. and the branches will not be detonated.

The connection between the main length and the branches are made as in Fig. 6. Great care must be taken to secure a good joint at A., i.e., the tube of the main length should be in contact with the T.N.T. in the branch.

Two lengths of Cordeau may be connected as shown in Fig. 7.

Fig. 8 illustrates a suggestion for the use of Ammonal and Cordeau in a rapidly constructed land mine on the surface, which could be placed in position at night.

1st Printing Company, R.E. G.H.Q. 264.

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

No. II - NOTES ON FIELD DEFENCES.

Fig. 1.

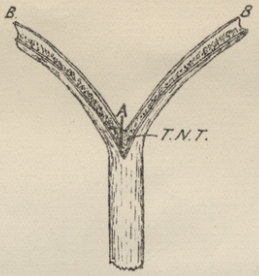
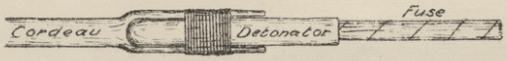


Fig. 2. - right.



Connection of Cordeau with Detonator.

Fig. 3. wrong.

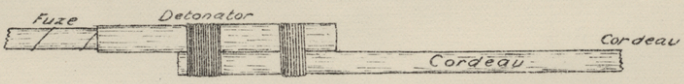


Fig. 4. right.

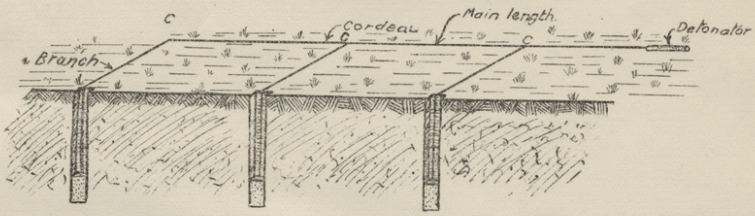


Fig. 5. wrong.

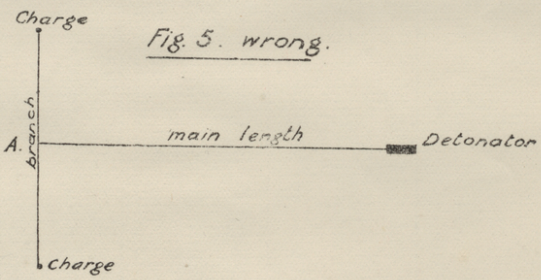


Fig. 6.

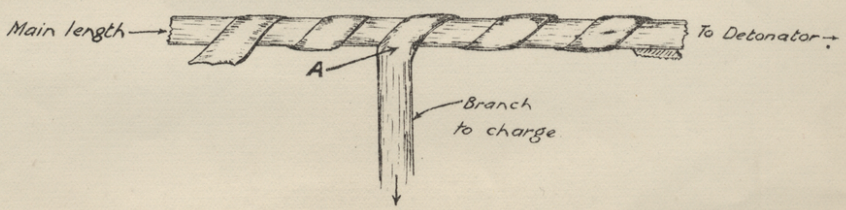
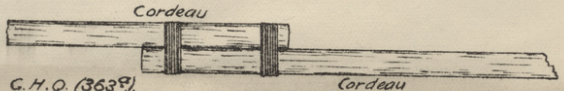


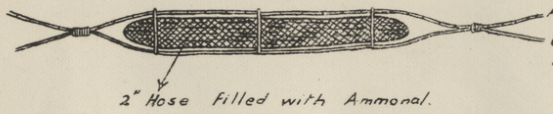
Fig. 7.



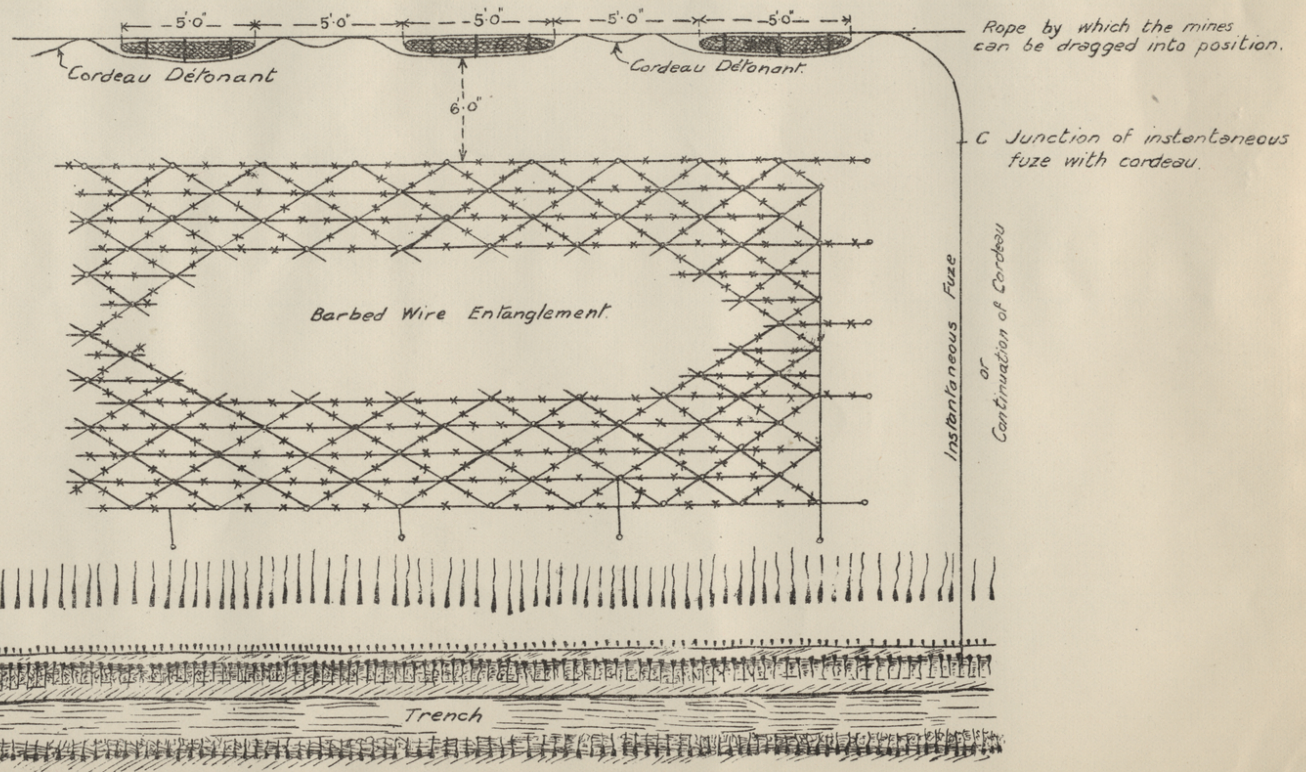
1st Printing Co. R.E. G.H.Q. (3638).

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

No. 11.— Notes on Field Defences.



— Surface Mine. —



N.B. The cordeau should be in contact with the charge for its whole length. For clearness it has been shewn detached in the drawings.

1st Printing Co. R.E. G.H.Q. (363 B)

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

320

No. 12.—Notes on Field Defences.

The following notes have been prepared as the result of the experience gained during the present conditions of trench fighting:—

1.—Siting of Fire Trenches.—Fire trenches should be sited to fulfil as many of the following conditions as possible:—

(i.) Concealment from the enemy's artillery observers.

(ii.) Concealment from air craft.

(iii.) Screened communication from fire trench to rear.

(iv.) Freedom from water in wet weather.

(v.) No ground to be within 200 yards of the defence line which is not under effective rifle fire from some portion of the line.

The following methods are some of those adopted by which the above conditions have been complied with:—

(i.) (a) Siting on reverse slopes.

(b) Construction of advanced posts in front of main line, thereby keeping the enemy's snipers and observers at a distance.

These posts have been placed at 50 to 100 yards in front and held by 5 to 10 men. They must be carefully connected with the fire trenches by communication trenches.

(c) Construction of alternative lines of fire trenches.

(d) Construction of dummy trenches.

(ii.) (a) Construction of light cover of brushwood, etc., to hide newly excavated earth and the shadow thrown by the excavation.

(b) Deception by means of dummy trenches, and by the arrangement of branches or bundles of straw arranged to give the idea that they hide trenches.

(c) By utilizing features such as edges of existing quarries, etc.

(iii.) (a) Intelligent use of folds in the ground, and lines of hedges.

(b) Construction of screens to resemble hedges.

2.—Design.—Fire trenches should be wavy in plan and as deep and narrow as is consistent with:—

(i.) Effective use of the rifle.

(ii.) Easy communication.

They are usually made continuous, but not necessarily prepared for rifle fire throughout, e.g., a series of strongly held points connected by communication trenches.

Figs. 1 and 2 shows in section the development of a trench which may be considered as satisfying the present conditions of warfare which gives the maximum of cover with a minimum of width. The firing step must be revetted.

Traverses, 6 feet wide, 12 to 15 feet apart, should be placed in all trenches. The length of a traverse should overlap the width of a trench by 2 feet at least (Fig. 3 A.A).

Undercutting the parapet of a fire trench should not be encouraged, unless the excavation is shored up, otherwise the parapet will collapse.

Head cover or loopholed plates should be provided for snipers, observers and look out men.

Overhead cover interferes with the use of rifles and bayonets.

Some means of rapid exit from fire trenches are necessary to allow the assumption of the offensive.

Figs. 7 and 8 show a method which has been found successful.

Figs. 3, 4, 5 and 6 show a variation of the continuous trench which has been used with success.

3.—Cover Trenches.—These should be considered under two heads. Cover for the firing line and supports, and cover for the reserves.

Cover for firing line and supports may be provided by means of shelters actually in the fire trenches or in cover trenches from 15 to 50 yards in rear—the distance depends upon the proximity of cover in which the enemy can collect for a rush, but should not be so short that one H.E. shell can wreck both fire and cover trench.

Shelters in cover trenches should accommodate at least 2/3rds of the firing line and supports.

Some arrangements for cleaning rifles, storage of rifle oil, etc., are desirable.

Cover Trenches for Reserves.—These may be of a more elaborate nature, giving opportunity for men to lie down and rest. Every advantage should also be taken of natural cover.

4.—Communication Trenches.—These are required between the cover trenches and fire trenches, they should admit of rapid and easy passage to the latter, and they should be laid out in zig-zags to secure protection for the troops using them against enfilade fire. Passing places at frequent intervals must be provided.

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

5.—Field of Fire.—30 yards to 100 yards has been found sufficient to hold up the most determined attacks.

The two following points require consideration :—

(1) The shorter the field of fire the more efficient must be the obstacle.

(2) The longer the field of fire the less the protection from the enemy's snipers and observers.

6.—Defence of Woods.—If a wood is in a defensive line it is generally best not to occupy the front edge as the artillery can obtain the range with accuracy.

The best alternatives are :—

(1) About 200 yards in front.

(2) In the centre of the wood if a short field of fire can be cleared and the front is well wired.

(3) Behind the wood.

The two latter are the least favourable for the enemy's observers.

7.—Defence of Buildings.—The garrison of any buildings prepared for defence should be well provided with dug-outs for occupation during the day and periods of shelling.

Communications above ground through villages under fire are generally impossible. Efficient covered communications can, however, be made by tunneling from cellar to cellar, or by the skilful adaptation of the debris of houses.

All buildings which command the trenches of a line, from the enemy's side within a range of 600 yards, are a source of danger on account of the cover they give to the enemy's snipers and machine guns.

8.—Hedges.—Hedges present the same disadvantages for defence as the front edges of woods. It is better to site the fire trenches behind, using the hedges as screens and obstacles.

When there is little choice, and there are two parallel hedges, the front one should be thinned and strengthened with wire, giving the impression that it is a badly grown hedge, while the one behind may be used as a screen.

9.—Points d'appui or Supporting Points.—These have been found valuable in holding up an attack which has been successful on the trenches, and also in supporting the counter-attack.

They should be sited in a well-concealed position from 50 to 100 yards in rear of the line, provided with a good obstacle, and designed for a garrison of 15 to 20 men for all-round defence and well provided with ammunition, food and water. Fig. 9 shows an idea for the organization of a defensive line, including a supporting point in rear of the line.

10.—Obstacles.—Obstacles should be placed from 20 to 50 yards from the trenches. The destruction of wire entanglements by both hostile and friendly rifle and machine-gun fire is very rapid, but can sometimes be minimised by the skilful use of the folds of the ground when siting the obstacle.

11.—Machine Guns.—Sites for machine guns must be selected with the greatest care, so as to give cross or flank fire.

The emplacement must be concealed, and every effort must be made to ensure protection for the gun and detachment and surprise for the attackers.

Sites for frontal fire can only be used successfully in very exceptional circumstances.

The emplacements should be provided with overhead cover, wire netting protection against bombs, etc., and easy ramp or steps as exit.

Alternative emplacements should be provided.

Printing Company, R.E. G.H.Q. 420.

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

No.12 - Notes on Field Defences.

Narrow Fire Trench improved.

Fig. 1.

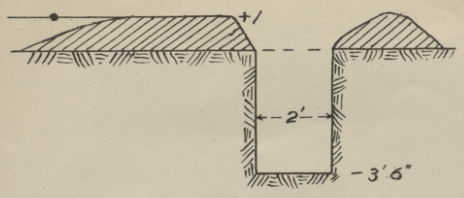
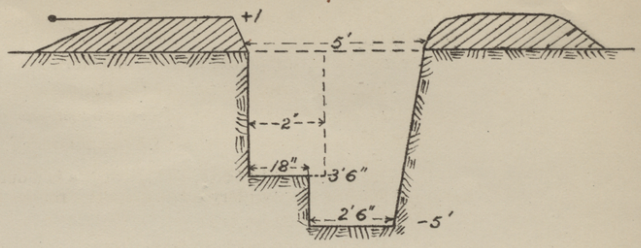


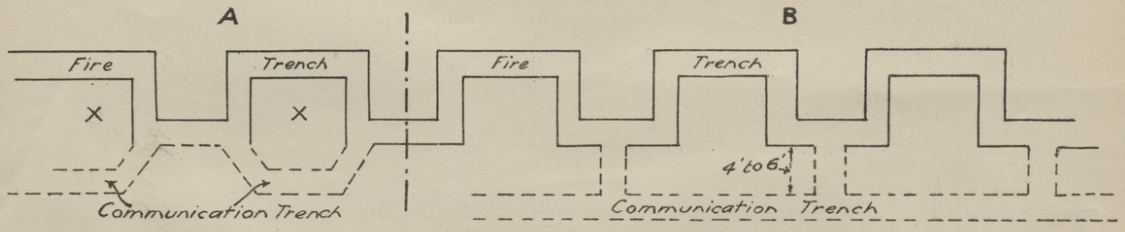
Fig. 2.



Communications in rear of Fire Trenches.

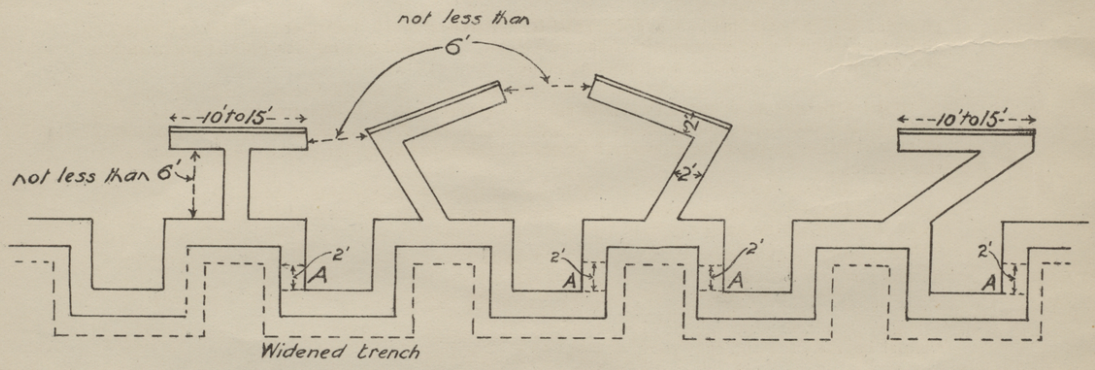
Fig. 3.

Plan.



Two methods of making communication behind existing Fire Trenches.
Method A should not be used when the ground is likely to become very wet.

Fig. 4. - Plan.



An existing fire trench can be widened into this form, or a trench can be dug of a suitable trace, traversed or Zig-Zag as a communication trench, and the T or L fire trenches dug or sapped out from it.

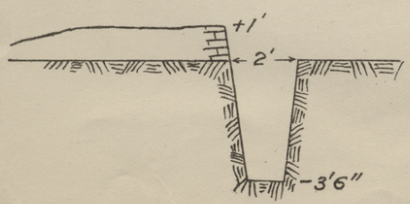
Fig. 5.

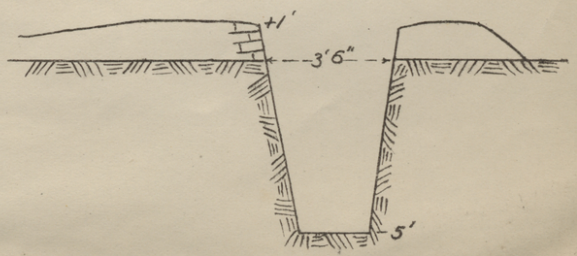
Original Trench

Fig. 6.

As widened and deepened.

Sections.





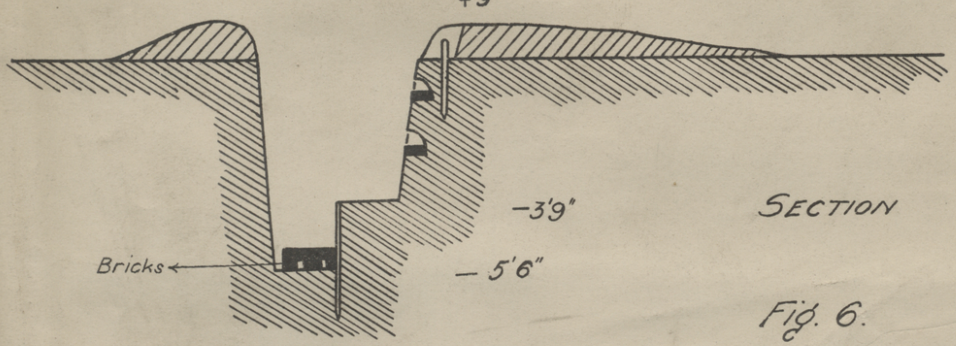
1st Printing Co. R.E. G.H.Q. (419a).

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

320

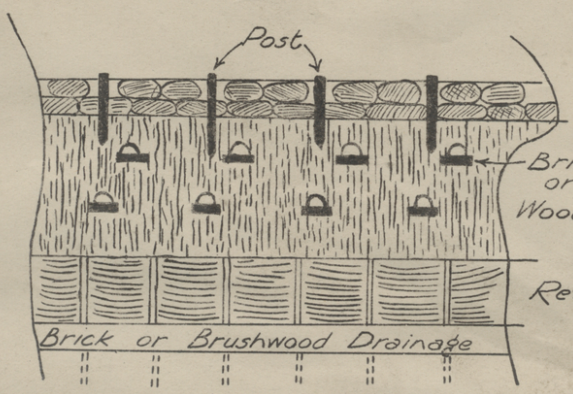
No. 12 - Notes on Field Defences.

"Sortie Steps" in Fire Trenches.



SECTION

Fig. 6.



INTERIOR ELEVATION

Fig 7

One stout post to be driven into parapet about 1 foot in front of trench and 2 steps to be cut in interior slope as shewn, for each man.

Hold rifle in right hand, place left foot in lower step, pull up with left hand grasping post, place right foot in upper step then left foot on top of parapet.

1st Printing Coy., R.E. G.H.Q. (419b).

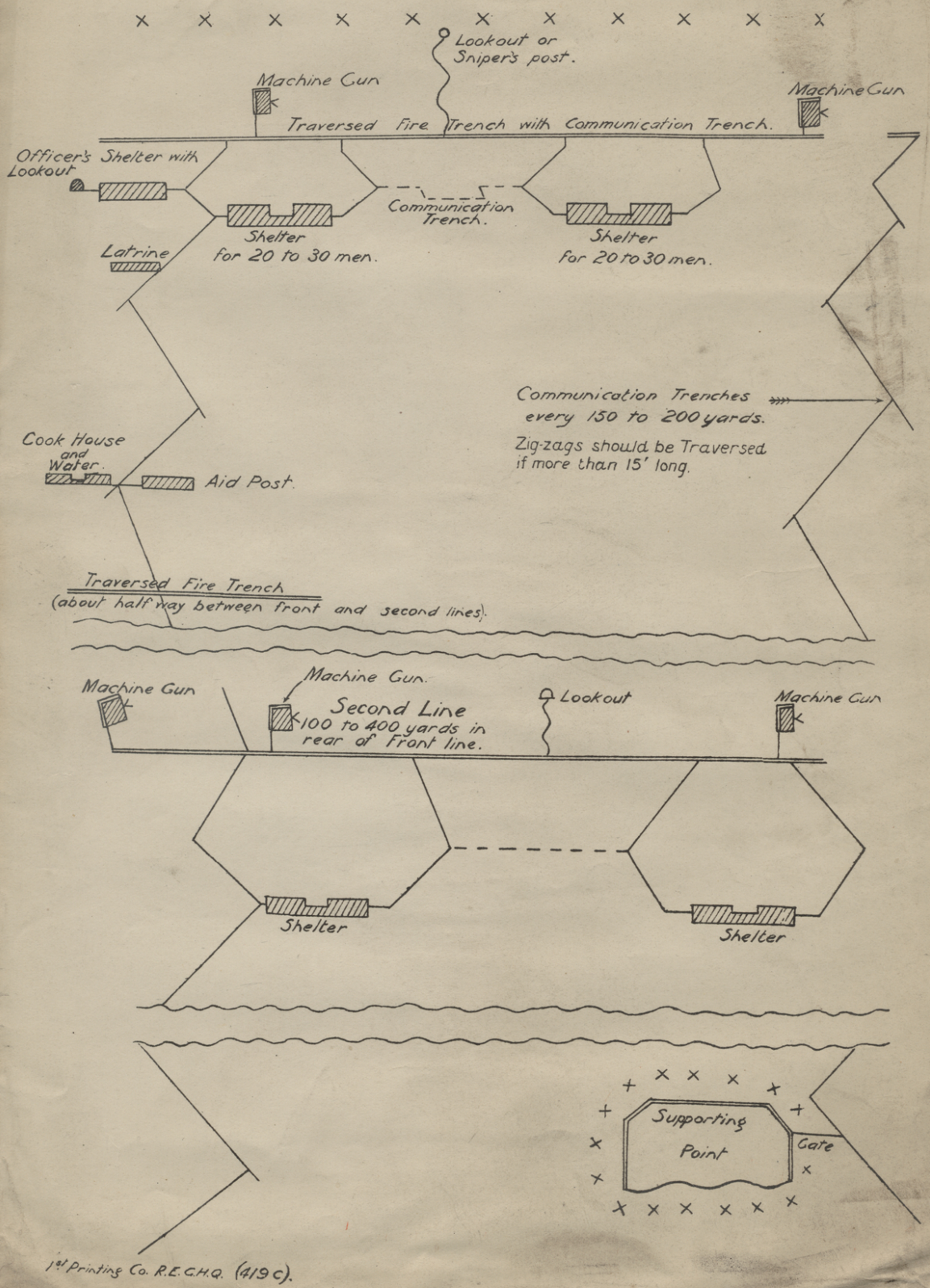
AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

No. 12 Notes on Field Defences.

Diagrammatic Sketch of the Organization of a Defensive Line.

Fig. 8.

Advanced trenches on lines of approach.



1st Printing Co. R.E. C.H.Q. (419c).

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

370

No. 15.—Notes on Field Defences.

I.—TREATMENT OF SUBSTANTIAL BUILDINGS.

The treatment of substantial buildings, which are so close to a line selected for defence that they must be included in it, or demolished, is a very difficult question. They cannot be held in the old-fashioned way, nor are they absolutely untenable on account of the fire of H.E. shell, and to be avoided at all costs. Even with the support of artillery fire it is most difficult to dislodge troops from them, and they may be very valuable when the enemy is at close quarters. It will be seldom necessary to demolish them, but if this is done they must be laid absolutely flat so that they can be of no use to the enemy.

Fire trenches with the usual shelters should be provided near them from 30 to 50 yards in front, and sometimes also in rear for occupation during periods of shelling, but unless the buildings are very substantial, wing trenches are preferable to trenches in rear (Fig. 1).

Covered approaches and communications to the trenches outside must be provided. The wing trenches should be connected to the front trench, and should lead direct into the buildings.

The ground floor of the buildings themselves should be prepared for defence, if not completely at least as regards sniping positions, loopholes for machine guns in the cellars as well as above ground, and look-out posts. These should be made in the ruins, if the house is demolished by shell fire.

The ground line of a building is a weak spot against shell fire, especially if it is provided with a cellar.

Houses exposed to shell fire which are occupied either as defences or billets, should be protected by means of an earthen parapet about 6 feet high thrown up against the exposed faces (Fig. 2).

If the buildings are in front of the general line and prominent, it is advisable only to hold them by night, if a good cross fire across the front of them can be secured by day. If not, the wing trenches should be fairly long, and the buildings should be prepared for all round defence with a strong all round obstacle.

II.—ORGANIZATION OF A DEFENSIVE LINE.

Fig. 3 shews an arrangement of trenches and communications that may be applicable on certain sites where drainage is possible. The water in the 6 foot level can be carried off in pipes laid on the sole of the trench or under grating or planks.

The special features of the arrangement are :—

(i.) Every fourth bay of fire trench is made deeper and loopholed for use of the men on look-out ; it is intended that the other men on duty in the firing line should be kept close at hand in the deepened trenches, or in the bomb proofs behind the traverses, or in parados blindages.

(ii.) A supervision trench is provided.

(iii.) The traverses in the communication trench are loopholed.

It is suggested that when the fire trenches are very close to the enemy, and the importance of protection from artillery fire decreases, that every alternate traverse in the fire trench should be cut away, and the remaining ones loopholed, in order to stop the advance of enemy's bomb throwers who may get into the trenches.

III.—NOTES ON EXPERIENCE GAINED IN EXCAVATION OF TRENCHES DURING THE WINTER.

(i.) Trenches must, if possible, be sited with regard to natural drainage of ground as well as to field of fire, and drains must be dug to carry off water.

(ii.) If possible, the drains should be dug before the trenches are commenced, but, in any case, the work on them should keep pace with the excavation of the trenches. If water is allowed to accumulate in trenches, they will commence to fall in as soon as it is drawn off.

(iii.) Care must be taken that the work on each section of trenches corresponding to a drain is completed throughout to an even depth before work ceases each day. If part of a trench is left shallower than another, water will accumulate during the night and cause damage.

(iv.) If the sides of a trench are to stand unrevetted they must be left with a batter not less than 4/1.

(v) Until the sides are revetted a berm of about 18 inches width should be left, otherwise the weight of the excavated earth on the edge of the trench may cause it to fall in.

(vi.) Communication trenches and drain trenches should not be combined if this can be avoided. If there is running water in a trench, pipes to carry it off should be laid.

[P.T.O.

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

IV.—LOOPHOLES FOR SNIPERS.

Figs. 4 and 5 illustrate a loophole constructed obliquely to the general line of the parapet, the object being to minimize the chance of the firer being exposed to direct fire from the enemy, and at the same time to give greater concealment to the loophole.

The whole of the ground in front of a trench may be brought under snipers' fire from the oblique loopholes by placing them pointing to the right and left alternately.

This design admits of considerably larger openings without making the loopholes conspicuous.

Concealment may be further improved by the addition of a curtain of sacking, which should be large enough to cover the head and shoulders of the firer when the loophole is in use.

V.—MACHINE GUN PITS.

Three types of Machine Gun Pits are represented in the diagrams.

The gun should not be placed on a pedestal of earth, as this is apt, even when well revetted, to give way after the gun has been much in use in bad weather. The pits should, if possible, be blinded. Accessories such as recesses for ammunition boxes, shelters for the detachment, and belt filling rooms should be provided.

Drainage should be carefully attended to.

Figs. 6 and 7 show the minimum sized pit for firing in one direction. No. 1 sits on the ground behind the gun and the loader lies or sits on the right hand side. The steps should be on the loader's side of the pit.

Fig. 8 shows a pit of minimum size, which allows of the gun being slewed round on its tripod so that it can fire in either direction, right or left.

Figs. 9 and 10 represent a pit for a machine gun fitted with a hyposcope. No. 1 cannot conveniently squat on the ground behind the gun when a hyposcope is used, he can fire best when standing. This, however, would require the trench behind the gun to be over 5 ft. deep, which is practically out of the question in winter, for drainage reasons. The pattern shown provides cover sitting with a 3 ft. 6 in. trench.

The crest of the parapet is 2 ft. or more high at side and back of gun and 6 ins. lower where the gun fires over it.

The legs of the tripod of the gun are placed in an equilateral triangle of 4 ft. side; the front leg being under the parapet. The apex of the triangle should point along centre of the line of fire; this will allow about 20 degrees traverse on each side.

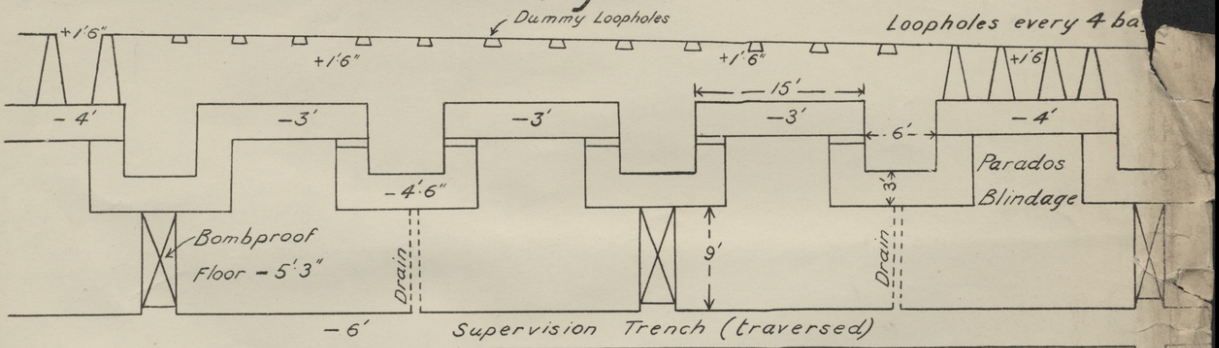
1st Printing Co., R.E. G.H.Q. 575.

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

No. 15 - Notes on Field Defences.

Organization of a Defensive Line.

Fig. 3.



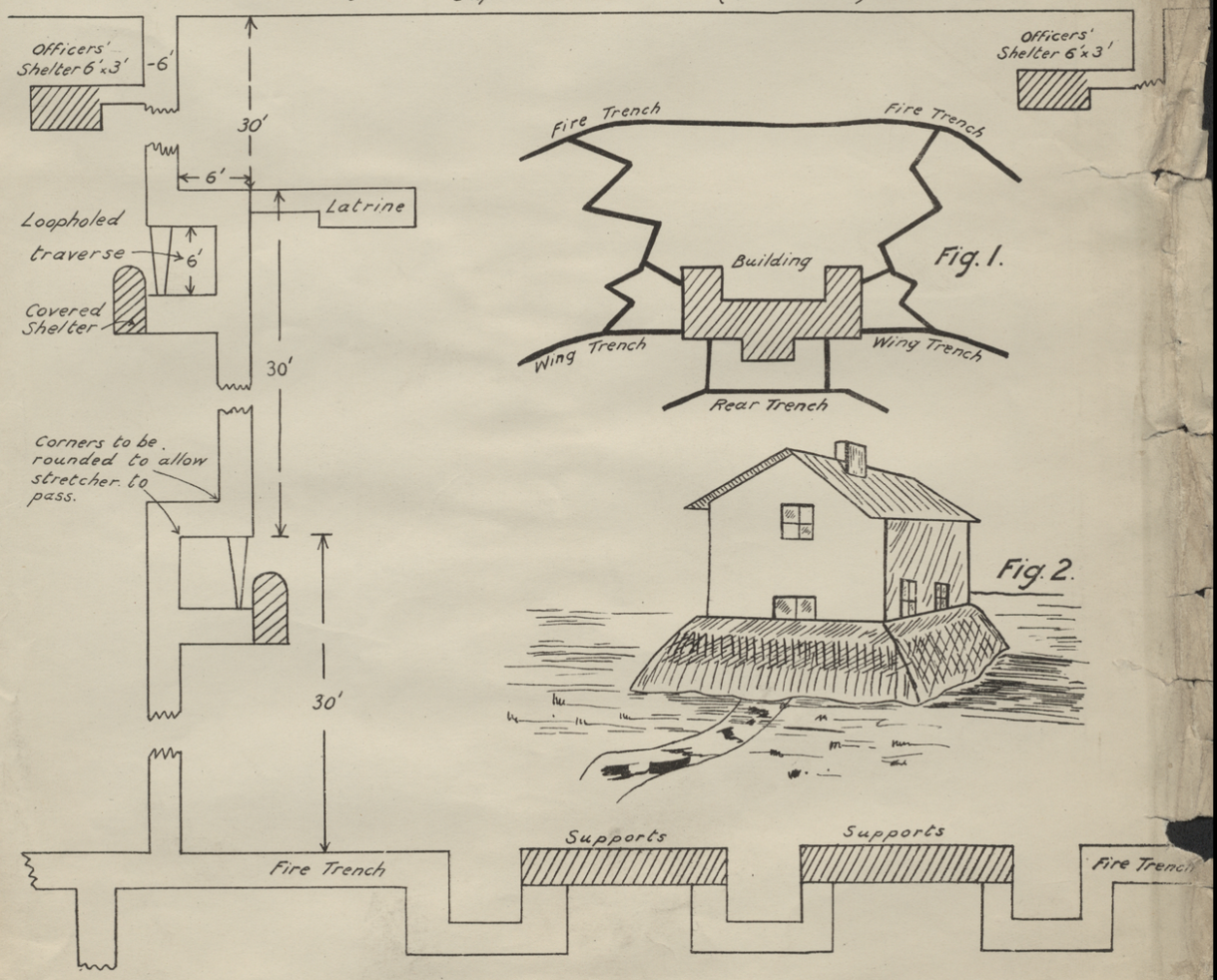


Fig. 1.

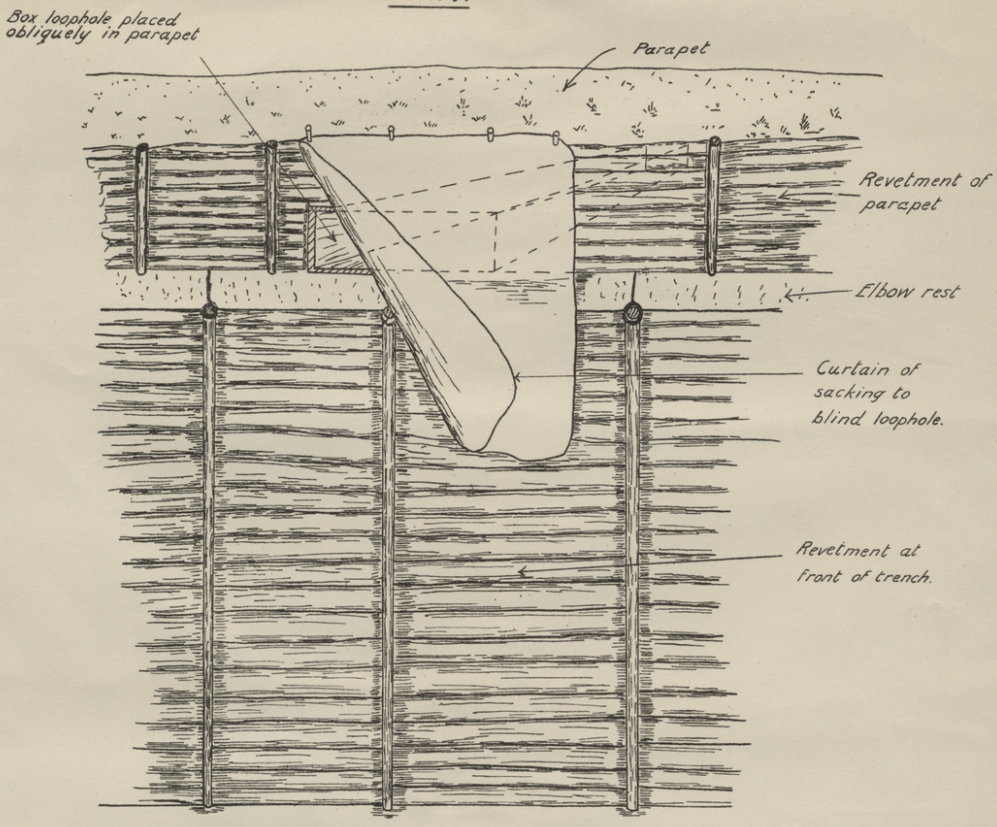
Fig. 2.

1st Printing Co, R.E. G.H.Q (574a).

No. 15 - Notes on Field Defences.

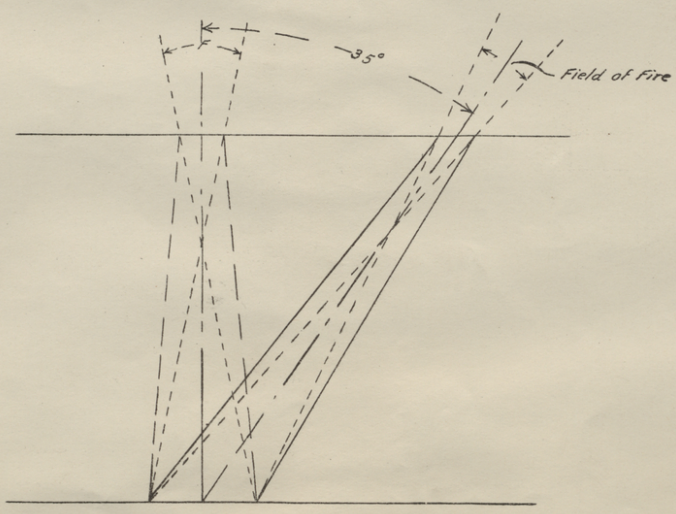
LOOPHOLE TO GIVE OBLIQUE FIRE FOR SNIPING.

— FIG. 4. —



ELEVATION.

FIG. 5.



PLAN.

1st PRINTING Co., R.E. G.H.Q. (574b).

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

No. 15 - Notes on Field Defences.

TYPES OF MACHINE GUN PITS.

FIG. 6. PLAN.

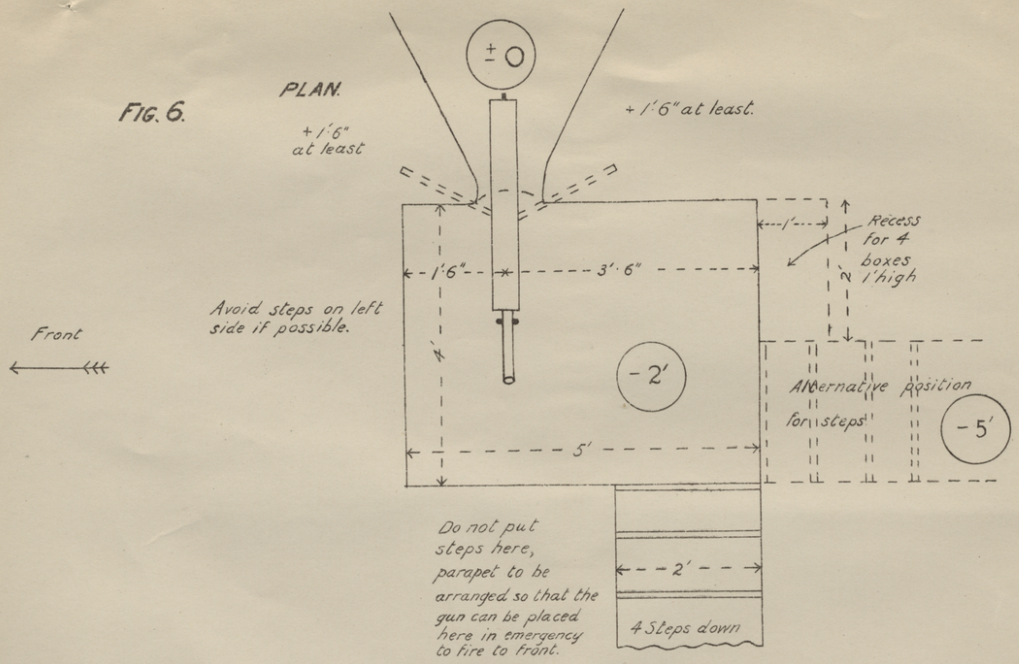
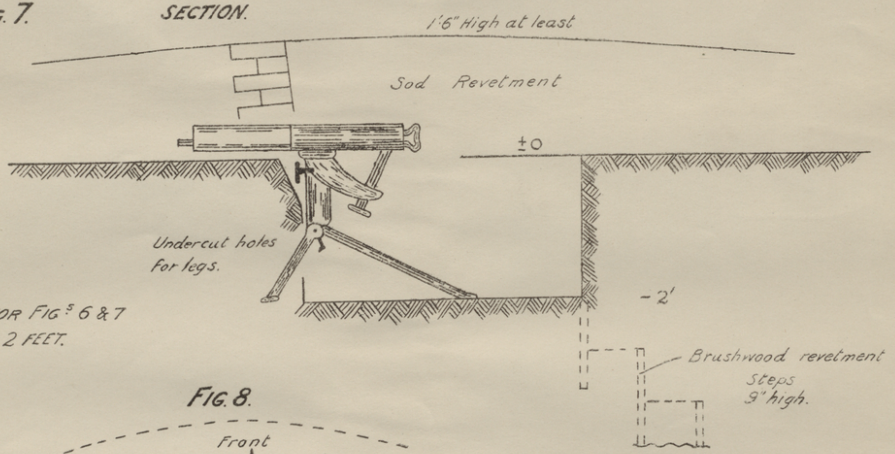
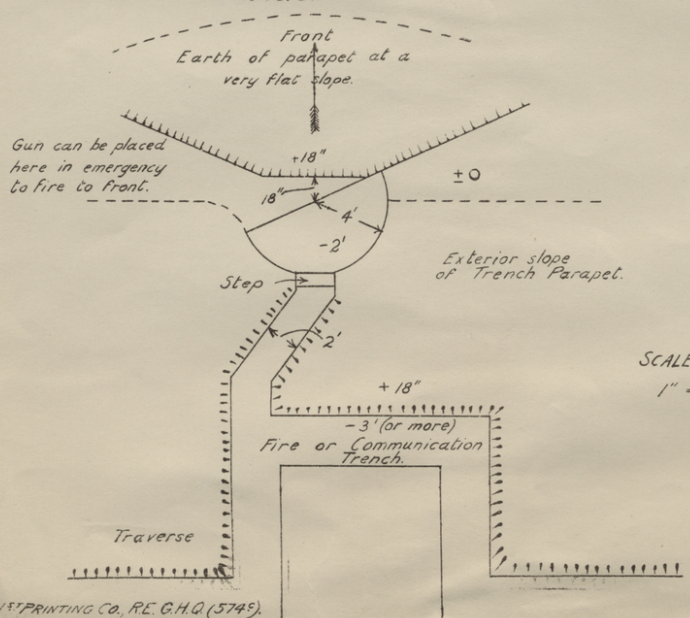


FIG. 7. SECTION.



SCALE FOR FIGS 6 & 7
1" = 2 FEET.

FIG. 8.



SCALE FOR FIG. 8.
1" = 8 FEET.

1st PRINTING CO. R.E. G.H.Q. (5745).

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

No. 15 - Notes on Field Defences.

FIG. 9.

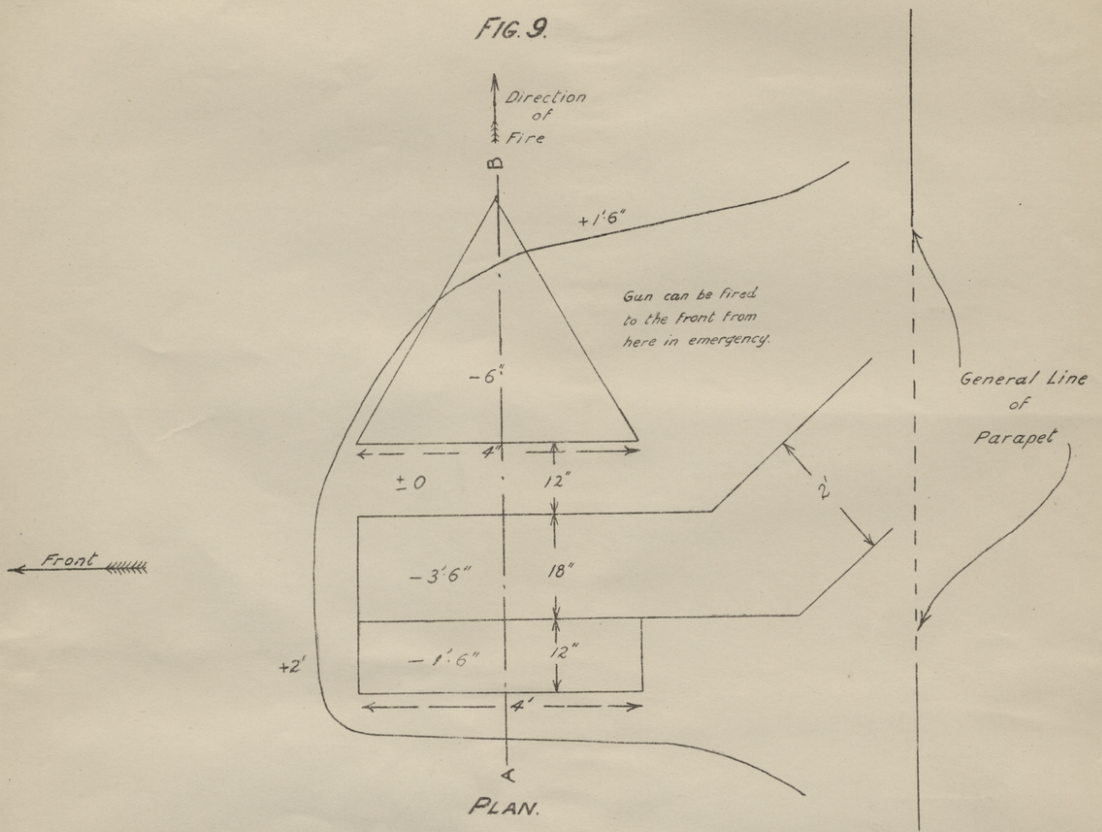
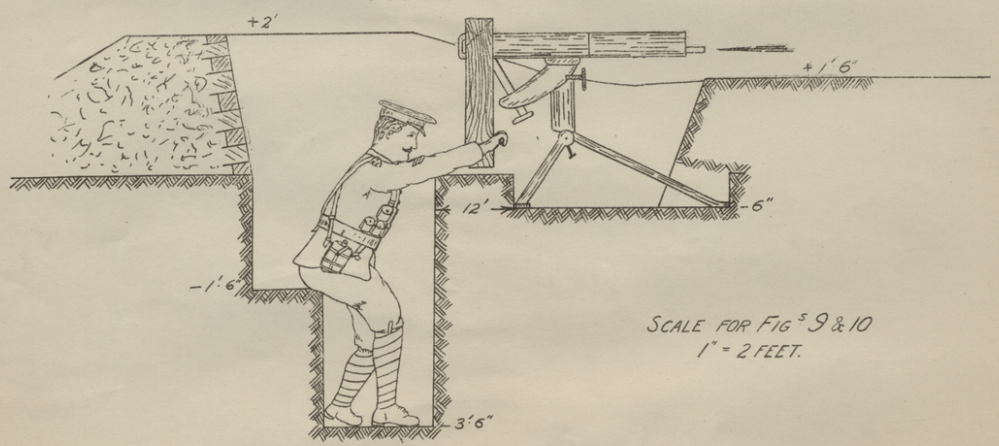


FIG. 10.



SCALE FOR FIGS 9 & 10
1" = 2 FEET.

SECTION ON A-B.

1ST PRINTING CO., R.E. G.H.Q. (574d).

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

No. 17—Notes on Field Defences.

Issued by the General Staff.

* MINING.

Object.

1.—Mining, like every other operation, should be undertaken with a definite object and on a definite plan settled by the Commander after consultation with his technical adviser, for instance:—

(a) to gain ground by forming a series of craters which can be occupied and connected;

(b) to destroy enemy's trenches, or buildings occupied by him;

(c) to ascertain whether the enemy is mining;

(d) to stop the enemy's advance by trench and sap above ground at vital points;

(e) to recapture lost trenches.

Plan.

2.—The plan of attack should be formed on accurate information of the enemy's trenches, based if possible on aeroplane photographs. Local information with regard to buildings and ground may be of use. Information on the various geological strata likely to be encountered can usually be obtained at the Sous Préfetures, where maps of the subsoil are kept. In French and Belgian Flanders only clay and sand, and occasionally chalk, will be encountered.

Surprise.

3.—Surprise is essential to success and all work should be pushed forward as rapidly as possible. This is also a measure of precaution, for the rapidity will enable the enemy's countermining to be anticipated.

Control.

4.—The Corps C.E. or Divisional C.R.E. concerned should keep general control of the whole of the work in his sector through the daily reports forwarded to him by the Engineer Officers in charge. After consultation with the General Staff he should issue any instructions required as to changes of plan or direction, countermining and firing of charges, etc.

Attack.

5.—In the attack of the enemy's mining system it is essential to get below him; as a rule only Camouflets should be fired against him. They should be placed, if possible, so as not to damage our own galleries. When the mining is for the purpose of dislodging the enemy from his trenches a carefully timed operation should be planned. Heavy gun and rifle fire should be opened on the trenches in question, so as to induce him to bring up his supports in anticipation of attack, and the charge fired at a suitable moment.

6.—If it is intended to occupy the enemy's trenches thus cleared, or the craters formed, the Infantry attack should be launched the moment that the explosions have taken place and before the earth has all fallen down and the smoke cleared off. When buildings are blown up some interval should be allowed and care taken that the storming party are sheltered from fragments at the moment of explosion, but the casualties caused by falling debris are insignificant compared with those occasioned by the enemy's machine guns if he is given time to recover from the surprise of the explosion.

7.—In mining operations against buildings, it may be desirable to assist the expected demolition by the use of trench mortars. Housebreakers and engineers with explosives should accompany the storming party to complete the demolition. Tools and sandbags must be taken to consolidate the position. Grenade throwers, with the usual party to deal with any resistance in adjoining trenches and to erect side barriers, should accompany the Infantry attack.

Premature firing.

8.—The firing of charges short of the objective should be carefully avoided. It encourages the enemy, damages the ground for further operations and may form craters in front of the enemy's lines to which he may advance and make a lodgement. In one case a charge was placed and fired in a gallery that had not been driven far enough; it happened to be under a road; the result was that it acted as a fougasse towards our lines and the road metal thrown up injured a number of men. When the Germans have fired mines prematurely, short of our lines, and with unnecessarily large charges it has been regarded by us, perhaps not without reason, as a sign of panic and demoralization.

9.—When the enemy has fired a mine prematurely, from nervousness or for the purpose of rendering the ground useless for mining, the best and safest course is to mine straight towards the crater and then to work round it. Similarly, to resume the advance a deviation should be carried round any camouflet that we have made. (See Fig. 1).

10.—When the enemy fires two mines some distance apart he may be expected to run out an attack gallery between the craters. In such a case it may be advisable to place charges in the branches which are nearest to his expected line of approach and to continue mining to meet him. In a particular example (see Fig. 2):—

The Germans fired a large charge at A and a small one at B, the distance between them being about 150 feet. The British galleries Z—Y, X—W, being in existence, the best course would appear to be: first to place charges at W and U and then to continue out to T and S, shift the charges there and listen. Z—Y might be carried round B towards r and r for attack purposes.

* See also No. 16—Notes on Field Defences.

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

Listening.

11.—To secure any useful results from listening the following precautions must be observed :—

(a) The listener must be divested of all accoutrements, for it has been found that the creaking made by these when he is in a cramped position has been mistaken for mining.

(b) Listening should be conducted at certain specified hours, or on some pre-arranged signal, and for a definite period. During these periods everyone within the listening area, including the trenches, must remain absolutely motionless—there must be no talking, moving, working or noise of any sort.

12.—Should a crater or enemy's trench be occupied listener galleries should be run out to protect it as soon as possible.

13.—It must not be forgotten that the gallery used to fire a mine may still be serviceable within a yard or two of the edge of the crater. Consequently if the enemy were to make a crater at A (see Fig. 3) and we were able to seize it, it might be advisable in the first place to occupy the edge B—C; for if D—E were entrenched before listener galleries were run out, it would be easy for the enemy to mine it from his original gallery.

14.—It may be necessary to sink deep shafts with short listener galleries to detect attacks at low levels, and where deep main galleries have been run to dig listener shafts upwards; or it may be sufficient for listening purposes to make only blinded saps.

15.—If the enemy is known to be mining, but the direction of his attack has not been detected, the listener galleries pushed out towards him should be joined up laterally about 20 yards in front of our trenches.

16.—At the end of all listener galleries, whether headings or cross galleries, 6-inch or 10 inch bore holes, 12 to 20 feet long, should be made with the standard earth auger, so that if the enemy is detected mining or countermining a charge of 50 or 100 lbs. of ammonal can be put in and fired when his heading is close enough. At least 200 lbs. of ammonal or gunpowder should always be on hand available for this purpose.

17.—Listener galleries should never be left without a sentry.

18.—The Infantry manning a trench can assist listening by digging a small pit 6 feet deep below the trench and running out a bore hole 20 feet. This can be done in 6 or 8 hours.

Precautions against attack.

19.—When any section of our trenches appears to be in danger of mine attack, a new trench should be dug behind it to enclose the threatened part. This rear trench must be occupied, only such garrison as seem necessary being left in the front line. If an explosion takes place in the front trench, the men in the new trench should at once rush forward again.

Long galleries.

20.—Galleries have been driven over 300 yards. In such cases it is advisable to go deep in order to avoid all chance of being interfered with by countermines.

On arriving near the objective branch galleries can be run out to cover it; and small corkscrew shafts, just big enough to allow a man to crawl up them, should be driven upwards to a suitable level and the charge placed.

21.—In a long gallery it may save time to lay a line of train rails and use trucks to remove the earth. Passing places are, of course, necessary. The maximum number of trucks that can conveniently be used is said to be four.

If it is found necessary temporarily to abandon part of a long gallery a charge should be placed in it to be fired in case the enemy break into it. Tamping should be arranged on the enemy's side with alarm bell and firing circuits, so that by pulling away the first sandbags the enemy will close the bell circuit and warn our miners, and by removing others will set friction lighters in action which fire the charge. The usual firing arrangements should also be provided.

Galleries should be deep enough to save them from injury by Minenwerfer shells.

Rapid progress.

22.—In order to facilitate rapid progress the first half or two thirds of a gallery should not be less than 4 feet high, 2 feet at top and 3 feet at bottom (see para. 34). After this distance the size of branch galleries can be reduced.

Ventilation.

23.—In galleries over about 100 yards in length, or whenever the air in a mine is too foul to be successfully overcome by one air pump or bellows and fan, two or more of these machines may be connected up with the air pipe by means of a 3-way union and suitable hose or tubing.

24.—Metal pipes may be used in place of hose or rubber piping for conveying air along a gallery. They will reduce the loss of air by friction, but are more easily damaged by rough usage and thus lose their efficiency more rapidly.

25.—When the gallery is of a considerable length, say 100 yards and more, ventilation may be improved by placing at the bottom of the shaft a small stove to cause a draught. Great care must be taken to ensure that the fumes of the stove are conducted to the top of the shaft by properly conducted stove pipes. If the shaft is small, a recess should be cut for the stove.

26.—A draught may also be induced by the following method :—

Fix stove piping from half-way from the head of the mine along the top of the gallery to to the top of the shaft. Heat this pipe by means of a stove at the bottom of the shaft. The draughts caused by the hot air issuing from the stove will carry up the bad air and cool air will be drawn into the gallery from the shaft.

27.—Single and double acting positive air pumps and 3-foot forge bellows are now being supplied for the ventilation of mines.

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

28.—Forge bellows have been used in West Africa and found effective for ventilating 4 feet x 3 feet prospecting shafts, 100 feet deep, with a "drive" of 50 feet either way. The advantage of this simple type of bellows is that any breakage may be easily repaired by tacking on soaked raw hide.

29.—Ventilating shafts to galleries may be made by utilizing the 2-feet lengths of 2-inch steel tubing shown on page 8 of Army Form G. 1098—129. The procedure is as follows:—

Place in the top of the first length of piping a top shaped wedge, or driving point, then jack the piping up through the roof of the gallery by means of a small jack or bottle jack. As the piping is pushed upwards, fresh lengths of tubing are added until the surface of the ground is reached, when the top shaped wedge should be gently pushed until it falls off. If this is done in two or three places in the length of a mine, the ventilation will be considerably improved. It is inadvisable to rely on this method in open ground in view of the enemy, as the columns of hot vapour escaping from the gallery will, in cold weather, condense in the form of steam, and will indicate to the enemy the presence of a mine; but the shafts can be made, kept corked by day and opened at night to assist ventilation. By connecting the end in the roof to a small square bellows the shafts can further be used without danger to draw in fresh air.

30.—Unless they are located in a cellar or some closed place blowers of a large size should not be used to ventilate a gallery over 150 feet in length, because when worked to send air this distance their continuous "whine" is easily recognised and is a sure indication that mining operations are in progress.

31.—Bad air accumulates in galleries and shafts in which work has been discontinued. No one should therefore be allowed to enter such galleries or shafts until all risk of asphyxiation has been removed. (See pamphlet on "Poisonous Air after Mine Explosions" already issued).

Shafts.

32.—When from the nature of the mining scheme, e.g., the attack of a salient, it has been decided to make two "long distance" galleries, it should be considered whether it is not possible to commence both from the same shaft (see Figs. 4 and 5). It is generally advantageous to do so because the sinking of the shaft takes considerable time and is more difficult than driving galleries. Although the distance between the heads of the galleries may be required to be 50, 70, or even 100 yards, before the branch galleries are commenced, it may in favourable ground, be quicker and safer to sink one shaft and run both galleries from it, in spite of the length of gallery then necessary being greater than if two shafts were sunk. The size of the shaft will vary with the nature of ground and work.

Galleries.

33.—A straight gallery with even floor requires less mechanical ventilation than a badly driven one with slight changes of direction and slope. In one case a gallery of the latter type required an air pump at 40 feet in, whereas in a straight driven one in similar ground no pump was used until a distance of over 100 feet was reached.

The heads of the galleries can be spread out by means of branch galleries, as the objective requires, by any of the methods shown on Fig. 6 or others.

34.—When timber cut for frames has not been provided and has to be fashioned locally, it is advisable to change the standard 4 ft. by 2 ft. sets to the pattern shown in the Fig. 7, placing the frames 4 ft. or 5 ft. apart. This pattern allows of passing; 4 ft. by 2 ft. is not a very convenient size for a long gallery unless passing places are made, say, every 50 feet, using the 4 ft. timber to widen out to a section of 4 ft. by 4 ft., as in Fig. 8. 4 in. by 4 in. is the scantling usually required, but the ground in many places is too good for close timbering, and in such localities 4 in. by 2 in. timber, of which there is a plentiful supply, can be utilized.

35.—It should be borne in mind that blue clay at first appears to require little or no timbering. After about a week it weathers, and if not timbered it breaks away, and falls occur. If it is once allowed to fall, big slides quickly follow. Yellow clay does not appear to behave in the same way.

Haulage.

36.—In soft ground headings can usually be driven faster than the soil can be removed. The quickest and simplest method of removing soil is to make the floor of the gallery smooth and to haul direct in bags from the head of the shaft by a locally made windlass, with a snatch block at the bottom of the shaft on the level of the gallery. The hook can be made fast to a frame (see Fig. 9).

37.—There must be a man to open the snatch block when the full bags reach the bottom of the shaft.

38.—This method is almost noiseless, it saves double handling, reduces the number of men necessary in the galleries, so that less air is required, and is quick.

39.—To facilitate the filling of the sandbags, a ring of ½-inch round iron with a handle should be provided. (See Fig. 10). This will serve to keep the mouth of the bag open and permit of its being filled without loss of time.

Reliefs.

40.—The following system of reliefs has been tried in dry sandy clay where very little casing is required, the roof being cut to an eliptical arch and self-supporting. 8 sappers are employed in 8 hour reliefs for each gallery. They work in parties of 4, parties changing every hour. In each party one man scoops the earth away at the head of the gallery, the second shovels it back, and the other two fill sandbags with the spoil. They change round under their own arrangements, so that the man at the head is always fresh and working hard. Infantry fatigue parties, varying according to the length and size of the gallery, carry or pass the bags along, whilst others take the bags from the entrance and empty them in concealed positions in rear of the supply trenches, in old trenches, in craters, etc. The empty bags are then passed back again.

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

The average rate of progress is 8 yards a day; 6 yards is considered poor; as much as 12 yards a day has been done. Where frames are required the men can sometimes excavate 4 to 6 feet ahead and then place a frame. The sheeting can be driven from the rear of the last case, on the top of which wedges have been placed to give the necessary space for the plank, for when it is driven forward it displaces them.

Microphones.

41.—Various forms of microphones for listening are under trial. The French water-bottle with a binaural stethescope attached to the smaller mouthpiece by indiarubber tubing has been found effective for the purpose. It should be filled to the level of the bottom of the smaller orifice. It must be set square on its bottom with side towards the direction from which the sounds are expected. (See Fig. 11).

Earth Borers.

42.—Burnside drills are being sent to advanced parks. These drill a 6 in. hole noiselessly, and should be useful for work at places where, owing to shallow ground or time, the ordinary method of mining is not possible. From the end of the saps or shallow tunnels several splayed bore holes can be run at an angle sufficient to get beneath the enemy's trench.

43.—An experimental bore-hole 10 ft. long and 5 ft. 6 in. below surface has been made by an untrained squad in two hours. A charge of 9.25 lbs. of ammonal in five carbide tins was put into the hole, tamped with clay and water, and then fired with a detonator and length of safety fuze. The resulting explosion proved very effective, making a crater 12 ft. wide and 5 ft. deep, and sending clods of earth quite 40 ft. into the air.

44.—It is claimed that these machines should be able to bore a distance of at least 30 ft., and may be able to do a good deal more. The rate of progress should be from 6 to 8 feet an hour.

Charges.

45.—The following experience has been gained from the charges fired :—

(1) Shaft 16 ft. deep, length of gallery 236½ ft., German trench estimated to be not less than 5 ft. and not more than 10 feet from charge. Charge placed in chamber 3 ft. x 3 ft. x 3 ft. at side of head of gallery; amount 1,000 lbs. guncotton. Tamping of sandbags 7 ft. solid, plus 5 ft. air, plus 1½ ft. solid. Result: 80 yards of German trench destroyed or filled up.

(2) Shaft 16 ft. deep; length of gallery, 221 ft. Charge in chamber, 2 ft. x 3 ft. x 3 ft.; amount, 650 lbs. gunpowder. Tamping 7 ft. solid, plus 4 ft. air, plus 5 ft. solid, plus 5 ft. air, plus 5 ft. solid. Result: Junction of communication trench with main trench destroyed and 30 yards of trench rendered useless.

Firing Mines.

46.—It is advisable to arrange for the firing of a mine by both electricity and safety fuze. If the former fails the latter means can be used. Leads and fuze should be stapled to the side of the gallery.

Ammonal.

47.—Special instructions on the use and care of ammonal and blastine have been issued separately.

48.—When large charges of ammonal are required it should be used in the 10 lb. tins in which it is supplied. Care should be taken to see that the caps of the tins are screwed tight, particularly in wet ground. The tins should be placed in close contact, and when the charge does not exceed 60 lbs. (6 tins) the detonator and fuze should be inserted through a hole punched in the cap of the last tin.

49.—Where a larger number of tins is required, up to, say, 100 lbs. (10 tins), it will probably be better to place the detonator and fuze in a centre tin, care being, of course, taken that all tins are in intimate contact.

50.—In the case of still larger charges, it will be advisable to place detonators in every tenth tin and fire simultaneously by electricity or Bickford cordeau detonant. Ammonal can be exploded by means of the ordinary Service or electric detonator or by the No. 8 Commercial detonator. In the event of No. 6 or No. 7 Commercial detonators alone being available, the detonator may be inserted in a guncotton primer; this will ensure complete detonation of the charge. The fumes of ammonal are quite innocuous.

Blastine.

51.—Blastine is supplied in ¼-lb. and 1-lb. cartridges, wrapped in paraffined paper and packed in wooden boxes, each containing 50 lbs. It can be fired by the ordinary Commercial (No. 8) or Service detonators.

The poisonous gases liberated by the explosion of blastine underground are much the same as those of gunpowder, and precautions must be taken accordingly.

1st Printing Co., R.E. G.H.Q. 925

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641

No 17. NOTES ON FIELD DEFENCES.
ISSUED BY THE GENERAL STAFF.

FIG. 1.

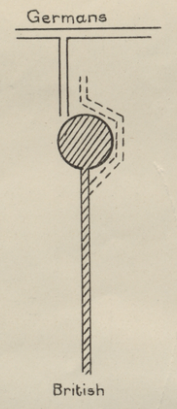


FIG. 2.

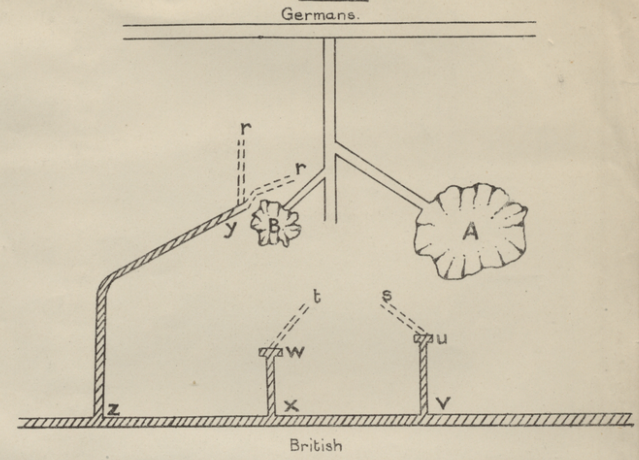


FIG. 3.

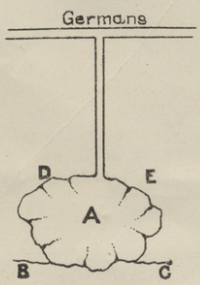


FIG. 4.

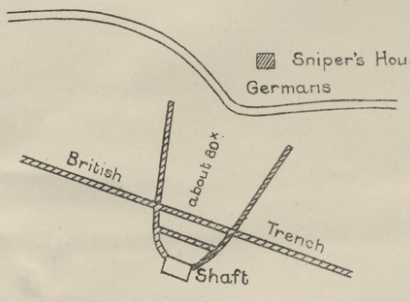


FIG. 5.

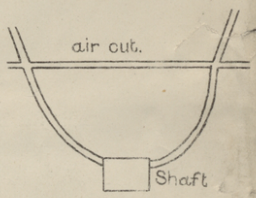


FIG. 6.

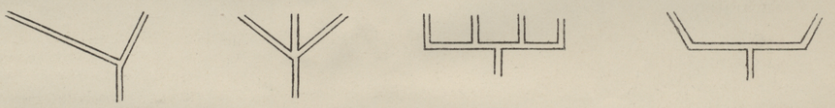


FIG. 7.

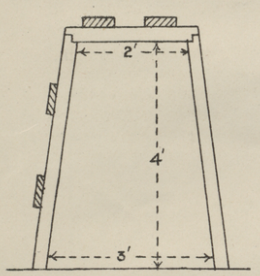


FIG. 8.

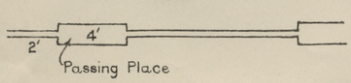


FIG. 9.

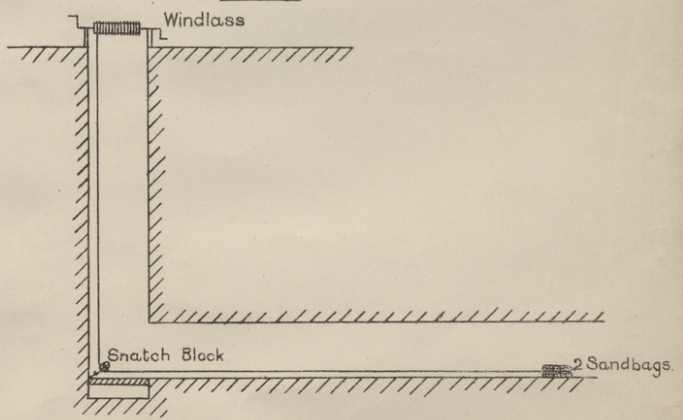


FIG. 10.

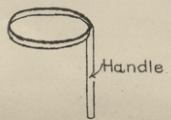
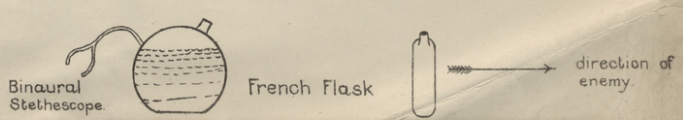


FIG. 11.



1st Printing Coy., R.E. G.H.Q (926).

AUSTRALIAN WAR MEMORIAL
AWM2020.8.1641

O.A. 2/128 E.

NOTES ON FIELD DEFENCES, No. 18.

Employment of Tunnelling Companies, R.E.

Issued by the General Staff at G.H.Q.

1. The number of Tunnelling Companies being limited, care must be taken that their personnel is employed to the best advantage, and that full use is made of the professional skill of the men in driving long galleries to attack the enemy's trenches and strongholds.

Every possible assistance in the way of labour should be given them so that no skilled man need be employed on work that a less skilled man can do. Listeners selected from men of the units occupying the trenches should be trained so that they can be used to relieve the R.E. personnel in listening galleries where no attack is going forward.

It has been pointed out in No. 17 "Notes on Field Defences," Mining, para. 18, that short listening galleries can be run out from the trenches by the infantry under their own officers.

2. There can be no successful passive defence in mining, a network of listening galleries may merely provide the enemy with ready-made approaches towards our trenches; even if the ground is shaken up and made difficult for mining the enemy can work round or underneath it; the best defence is to go forward and meet the enemy as far out from our own line as possible.

3. Special care must be taken that mines are not fired except for a definite purpose as detailed in para. 1 of No. 17, "Notes on Field Defences"—"Mining"; and that, even when a charge has to be fired in a gallery before the objective is reached (for instance, because the enemy has been encountered underground), advantage should be taken of the explosion, if it is expected to form a crater, to gain ground nearer the enemy's trenches.

General Headquarters,
June, 1915.

1st Printing Co., R.E. G.H.Q. 1055

AUSTRALIAN WAR MEMORIAL AWM2020.8.1641