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NOTES ON FIELD DEFENCES.

COLLATED BY THE GENERAL STAFF.

LONDON:
PRINTED FOR HIS MAJESTY'S STATIONERY OFFICE
BY HARRISON AND SONS, ST. MARTIN'S LANE,
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These "Notes on Field Defences" have been extracted from "Notes from the Front," Vols. I. and II., and consolidated in this pamphlet. They have received certain amendments and additions based on the most recent reports from the Front.

They should be read in amplification of the Manual of Field Engineering and the various Training Manuals.

I.—GUN EPAULMENT.

1. A type of cover for gun detachment is shown in Fig. 1. The wagon and limber are intended to give some protection against the strike back of the H.E. shell. Where the ground permits it will often be advantageous to dig the gun down into a pit to afford additional protection. A small parapet is required in front of the gun shield, 1 foot high. Ammunition can be piled in the trench as required ; if exposed it should not be placed with its axis parallel to the direction of the enemy's bullets.

The width of the trench is determined by the length of fixed ammunition.

2. Inside edge of parapet to be revetted with posts and boughs from any suitable trees. The gun and trail platform to be kept as clear as possible.

The trench for spade is backed with any timber available in order that the thrust of the spade may have a good bearing, and not tear up the ground and allow the carriage to run back.

The bottom of the trenches should be covered with straw or boughs, &c., in order to be comfortable for the men at night, and waterproof sheets stretched across the top to protect the men in rainy weather ; drainage will be necessary.

3. The wagon is unlimbered and placed as shown in diagram in order to afford protection from splinters, from back blast of H.E. shell, especially when burst on percussion. Ammunition can be served from trenches or wagons, and an extra

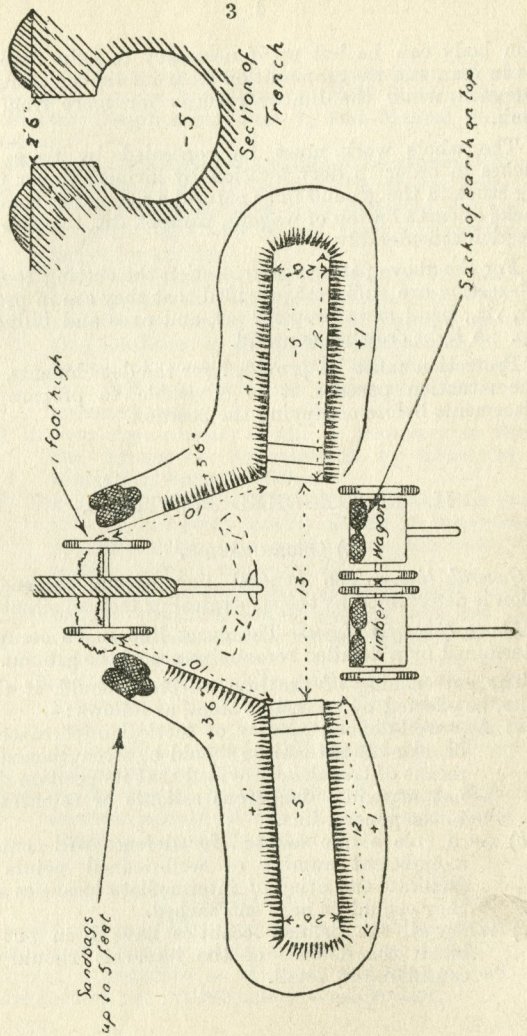


Fig. 1.
TYPE OF COVER FOR A GUN DETACHMENT.

wagon body can be left up if necessary to help close the space in rear, and the ammunition from its limber stored in the trench while the limber returns for more from the column.

4. The whole work must be concealed by trees and branches in order to defy location by airmen, young trees being stuck in the ground in as natural a manner as possible.

Sacks of earth on top of wagons, parapet, &c., increase the protection considerably.

5. For the above pattern of protection the cutting tools of a sub-section are sufficient provided that they are in proper order, viz., hand saws properly set, and axes and billhooks sharp. A light crowbar is useful.

6. Protection must be provided for the detachments, and if the situation permits, it is advisable to prepare the emplacements before occupying the position.

II.—ENTRENCHED POSITIONS.

(i.) Organization.

1. *General line.*—The general line of an entrenched position is determined by the strategical or tactical situation.

2. *Exact line of defence.*—The exact line to be occupied is determined by a detailed reconnaissance of the ground.

3. The entrenching of the line selected should, if time permits, be effected by successive steps, as follows :—

(*a*) Any well-defined locality of tactical importance in or near the actual line should be strengthened by means of trenches, provided that its position does not introduce dangerous salients or re-entrants to the general line.

(*b*) As a rule a line selected for defence will contain a sufficient number of well-defined points to facilitate the siting of intermediate localities and they should be next entrenched.

(*c*) When all the defined localities have been put in hand, the defence of the intervals should be considered in detail.

4. The principles governing the construction of these defended localities are laid down in Field Service Regulations, Military Engineering, Part I., and Manual of Field Engineering.

The following are some of the points to be attended to :—

(*a*) Each defended locality consists of a series of trenches which enclose the area to be defended, but are so dispersed that they do not form a concentrated target for artillery.

(*b*) The localities should be so chosen that the interval between any two adjacent localities is swept by the effective fire of both. The distance between two localities is, therefore, determined by the nature of the ground, but 800 yards may be regarded as a maximum under very favourable circumstances.

(*c*) In very close country it will be necessary to effect the defence of the intervals by means of a continuous line of trenches.

(*d*) The garrison of a locality of course depends upon its area, but every locality should be constructed to accommodate one or more complete units, *i.e.*, section, platoon, company, &c.

(*e*) The works of the defended localities should consist of fire trenches, communication trenches, and cover trenches, and the design should follow the lines suggested below.

(*f*) 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.

(ii.) Preparation.

Siting of trenches.—Whenever possible, trenches should be sited so that they are not under artillery observation.

This point is regarded as of great importance, and an extensive field of fire is a secondary consideration.

Trenches should therefore be sited having regard to possible "observation stations" on ground occupied by the enemy, and not solely with regard to the possible artillery positions of the enemy.

In open country it is better to select "a back position," behind the crest of a hill, with a field of fire of 300 or 400 yards. This compels the enemy to expose his infantry to our rifle and shrapnel fire and affords his guns little opportunity of observation. Such positions were held on the Aisne with slight loss to our troops and heavy loss to the enemy. A field of fire of 100 yards is regarded as satisfactory if it cannot be increased without loss of concealment from artillery observation.

(iii.) Design.

Fire trenches should be of the recessed and traversed type, as described in the Manual of Field Engineering, when time permits. They must be deep, narrow, and with low command. The rifle, when resting on the parapet, must sweep the ground immediately in front. Types of fire, communication and cover trenches are shown on pages 33 to 40.

Strong traverses should be provided every 4 yards or so to localize the effect of high explosive shell falling into the trench, and also to give protection against enfilade fire.

All excavated earth must be concealed. Earth not required for the parapet should be placed behind the trenches to afford protection against the back blast of high explosive shells, provided the trenches are not rendered conspicuous thereby.

Elbow rests should be either dispensed with or made as narrow as possible. Most men, however, prefer making their own niches for the forearm to rest against.

Recesses under parapets must be shored up. The bottom of the recess should be above the level of the bottom of the trench so that in wet weather the seat so formed will remain dry.

Headcover and overhead cover may be provided when concealment is not sacrificed thereby, and when trenches are not in positions liable to be rushed. They must in no case restrict the free use of the rifle. With overhead cover a continuous loophole is the best form.

When other types of loopholes have been used, the tendency has been to make them too small and, more especially, too narrow.

Drainage must be provided.

Hedges.—When siting trenches behind hedges, they should be brought up as close as possible to the front edge of the hedge; to do this the hedge should be trimmed from behind as far as possible to the front, without interfering with the general appearance of the hedge as viewed by the enemy.

Cover trenches.—A second row of trenches should be dug in rear of the fire trenches, to which the men may retire during bombardment, the fire trenches being held by as few men as possible.

These trenches may be of design somewhat similar to that of the fire trenches, and should be connected with them by zig-zag or concealed approaches, and can be quite close to the fire trenches (25 yards).

Latrines and dressing stations should also be provided in these trenches.

The use of overhead cover makes it difficult to ascertain from the air if trenches are occupied or not. Overhead cover is therefore well suited to cover trenches. Dummy trenches are most valuable, especially if they can be made to appear occupied to an aeroplane observer.

Obstacles.—Barbed wire entanglements or other obstacles should be from 20 to 50 yards in front of the trench. In positions where there is a liability of the trench being rushed sentries may be placed in rifle pits *in* the entanglements. Where woods run into the position they should be entangled on the near side as much as possible and the undergrowth cleared.

Field of fire.—When the field of fire is cleared care should be taken that trees are cut down as near as possible to the ground, otherwise they provide cover for the enemy in an attack and at night may be mistaken for men approaching.

Visibility of trenches from aircraft.—Straight lengths of trenches are the most conspicuous. When hedges have been utilized trenches are almost invisible; those dug across the middle of ploughed fields are easily seen. Communication and approach trenches attract the eye of the observer first. The position of a trench has been disclosed on several occasions by straw, ration tins, etc., left lying in its immediate vicinity.

The German trenches are more visible than ours, as they are generally longer and more regular, and their communication trenches are more elaborate.

It is very difficult to see if trenches are occupied or not, especially the German trenches.

It is also very difficult to see if a gun is in position in an emplacement or not, especially if hedges and trees are utilized for concealment. German guns are frequently in the open. Tracks across grass, plough, etc., leading up to gun emplacements are always very conspicuous, and if dummy emplacements are made tracks should be made leading up to them.

(iv) General.

It is essential that all men should be taught to dig quickly with their entrenching tool, by night as well as by day.

The great importance of a proper system of local protection whilst digging has been overlooked on more than one occasion. In one instance, even, a battalion was surprised whilst digging with arms piled and no scouts out.

The effect of shrapnel fire against recessed trenches provided with head cover is very slight. High explosive shell have only a very local effect if traverses and small parados are provided.

(v) German Field Defences.

Entrenchments.—The Germans since the beginning of the war have made the greatest use of field entrenchments. The extent and the strength of the positions which they have prepared entail an attack upon them which approximates to regular siege operations.

The methods adopted in the German positions taken up on our front are in no sense hastily improvised but show a carefully thought out system.

The method adopted is as follows :—

(*a.*) To render the positions as inconspicuous as possible to patrols and aircraft.

(*b.*) To alter the natural surface of the ground as little as possible, and where these trenches cannot be concealed to prepare dummy trenches along the whole front in order to give a uniform appearance.

(*c.*) To hide the trenches and gun emplacements by means of branches, coloured canvas and plants, taking care that such alterations are not conspicuous to an observer.

The difficulties of reconnaissance experienced by aircraft have shown how carefully their system has been carried out.

The design of trench nearly always adopted is a very deep trench with parados and traverses for protection against shell fire and trenches in rear for supports joined to trenches in front by deep zig-zag trenches.

Their trenches have been designed in anticipation of a prolonged occupation with observation posts, certain portions sheltered from overhead fire, drainage arrangements, excavated niches for rations, kit, ammunition, maps, search lights, star shells, &c.

Dummy trenches, or trenches manned by dummies, are also used in front of the true position. The trenches actually occupied are concealed, and between them and the dummy trenches are wire entanglements, swept by fire from the former.

German wire entanglements.—Different types employed :—

(*a.*) Those with very low pickets, 4 inches to 2 feet 3 inches high.

(*b.*) Those with pickets about 5 feet high.

(*c.*) A portable wire entanglement is also used. It consists of three or four wooden crosses, lashed at their centres to a long pole, such as a hop pole, and connected to each other by barbed wire. This produces an obstacle similar to a *chevaux de frise* and always presents a barbed wire face, even if rolled over.

The entanglements are placed about 50 yards from the trench, disguised with branches, straw and grass, and made to look exactly like the surrounding country. They are hidden by a glacis in front.

III. ILLUMINATION OF OBSTACLES AND FOREGROUND.

The lighting up of the foreground and obstacles at night is of great importance.

The lights should be arranged so that they can be put in action instantaneously when the enemy approaches the obstacle ; they must illuminate the whole of the obstacles and the foreground, whilst leaving the defenders in shadow.

Bonfires.

Bonfires are effective when fuel is to be had. They may be built close to the line of the obstacle, with screens behind them.

A bonfire should be so built that it cannot easily be pulled down by the enemy. A stout post may be fixed upright in the ground, and the fuel built up round it in the form of a cone. Or three posts may be erected, three or four feet apart, with sticks nailed to them horizontally so as to form a cage, and the fuel piled inside. A heap of shavings or dry leaves should be placed at the bottom, and means of lighting arranged in connection with it. For this purpose a length of instantaneous fuze may be used, with one end in a small bag of gunpowder, under the heap of shavings, and the other inside the work. But the fuze must be kept in thoroughly good condition. Friction tubes form an excellent means of ignition. They can be fired by the release of a weight which is attached by wire to the eye of the pin. The tubes must be rigidly fixed, and strong wire used for suspending the weight. The blast from a friction tube being considerable, the end of the instantaneous fuze nearest the tube should be one inch away from it. Both ends of the fuze may be packed with quickmatch to ensure ignition. Another method is to arrange a match under the shavings so that by a pull on a cord the match will be rubbed against an igniting surface. The shavings must be enough to make a bright flame at once, and petroleum or pitch should be added to them if available. Materials for renewing the bonfire should be kept at hand. Small pieces of canvas should be fixed over the firing arrangements to protect them from weather.

Lights, Illuminating Wreck.

Lights, illuminating wreck are articles of store. They can be lit with either instantaneous or safety fuze. Instantaneous fuze should be stripped at the end to ensure good contact with the light. They illuminate a circle of about 100 yards diameter and burn for about 20 minutes.

Alarms and Flares.

Where night attacks may be expected, automatic alarms and flare lights are useful adjuncts. They are usually combined with the obstacle. One of the simplest alarms is a row

of tin pots, each containing a pebble, hung on a wire fence so as to rattle when the latter is disturbed. A piece of tin, 2 inches to 3 inches in diameter, such as the top of a jam pot, may be bent round the wire, and will answer the same purpose. Trip wires can be arranged to fire a rifle, or to fire a cartridge which, in its turn, will ignite a flare.

It must be borne in mind that flares lighted within a few yards of the perimeter of a camp, or close to a parapet, are difficult to screen effectively and are likely to be a source of greater danger to the defence than to the attack; they should therefore be used with great caution. At night troops have a tendency to concentrate their fire on any brilliantly illuminated area. A number of flares capable of burning from two to five minutes are preferable to one or two bonfires; a better effect is obtained from flares by placing them at some height above the ground. Convenient trees may be used for this purpose.

Arrangements for automatic alarm signals, in connection with entanglements or intermediate fences, generally have to be improvised on the spot with whatever materials are available.

A trip flare that has been found to work satisfactorily consists of a balanced board fixed in a trench having at one end the flare and at the other a heavy weight which is temporarily supported. The trip wire having been pulled, the support beneath the weight is withdrawn, and the end of the beam falls. By this means the flare appears above ground, and the jerk given to the beam fires a friction tube attached to the flare by instantaneous fuze, and so lights the flare. (*See* Figs. 2, 3 and 4.)

The flare is composed of a mixture of nitrate of potash, sulphur and orpiment (Lights, G.S., long, Mark III).

Figs. 5 and 6 show a similar device for the firing of a mine or bonfire outside the pit. A bonfire composed of straw, dry wood, &c., is readily set on fire by a small one-ounce cartridge composed of five parts white sugar and four parts chlorate of potash enclosed in grease-proof paper, fired by either instantaneous fuze or electrically by No. 14 fuze, with metal cap with the meal powder removed.

AUTOMATIC FLARE LIGHT AND PIT.

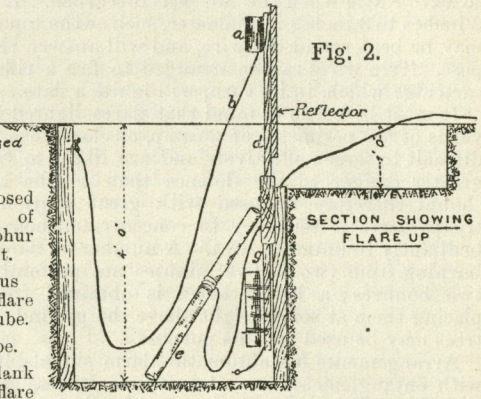


Fig. 2.

a. Flare, composed of nitrate of potash, sulphur and orpiment.
b. Instantaneous fuze from flare to friction tube.
c. Friction tube.
d. Balanced plank carrying flare and weights.
e. Prop stick connected to trip wires.
f. Trip wires.
g. Weights.
h. Lugs.
i. ⅜ round bolt to form hinge.
j. Quick match around friction tube.
k. Pliable wire to fire friction tube.

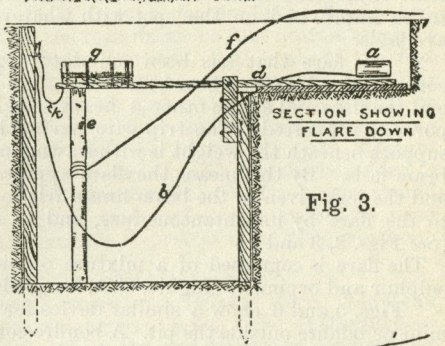


Fig. 3.

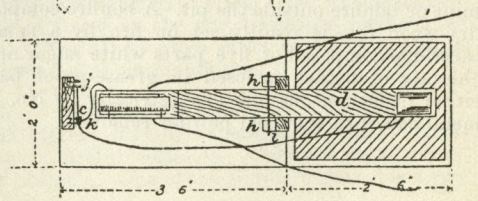


Fig. 4.

FLARE PIT.

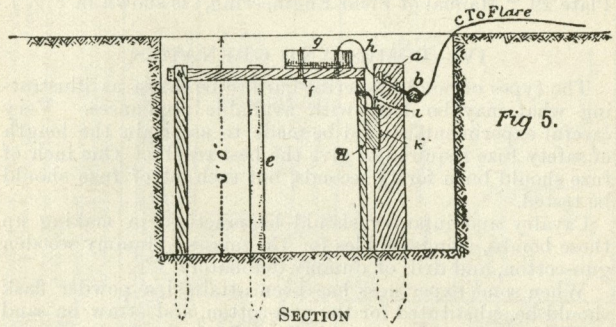


Fig 5.

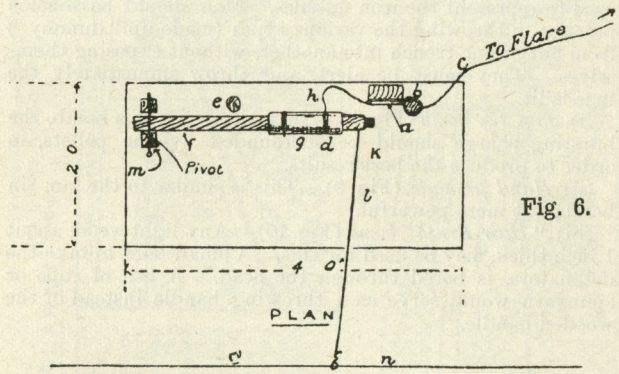


Fig. 6.

REFERENCE.

a. Friction tube placed so that pull comes at a right angle.
b. Quick match.
c. Instantaneous fuze to flare.
d. Prop stick.
e. Guide stake.
f. Pivotted arm 2′ 6″ × 2″ × 2″.
g. Weight attached to arm and connected by flexible wire or spun yarn to friction tube.
h. Flexible wire or spun yarn.
i. Flexible wire or spun yarn from prop stick to weight.
k. Weight connected by flexible wire or spun yarn to prop stick and thence to wire "*l*."
l. Wire connected to "cut" or "trip" wire.
m. Wire pin through two uprights and acting as pivot for arm on which weight "*g*" rests.
n. "Cut" or "trip" wire.

A type of cartridge alarm, similar to that illustrated in Plate 29, "Manual of Field Engineering," is shown in Fig. 7.

IV.—BOMBS AND GRENADES.

The types of bombs described are to be taken as illustrating what may be done with available appliances. Very careful experiments should be made to ascertain the length of safety fuze required to give the best results. One inch of fuze should burn for 1¼ seconds, but each lot of fuze should be tested.

Cavalry and infantry should be practised in making up these bombs, using pebbles for the missiles, dummy wooden gun-cotton, and drill or dummy detonators.

When some expertness has been attained, a powder flask should be substituted for the gun-cotton, and straw or sand used to represent the iron missiles. Men should have some practice in throwing the various types (made up "dummy") from out of one trench into another, without exposing themselves. They must be alert, and throw immediately the fuze is lit.

(i) *Jam tin bomb* (Fig. 8).—In making up this bomb, the bursting charge should be surrounded by the pellets, in order to produce the best results.

(ii) *Hand grenade* (Fig. 9).—This is similar to the jam tin bomb, but more powerful.

(iii) "*Hair Brush*" *bomb* (Fig. 10).—Any light wood, about 1 inch thick, may be used for this. A small hole, to take the detonators, is bored through the head. A tail of rope or spunyarn would serve as a throwing handle instead of the wooden handle.

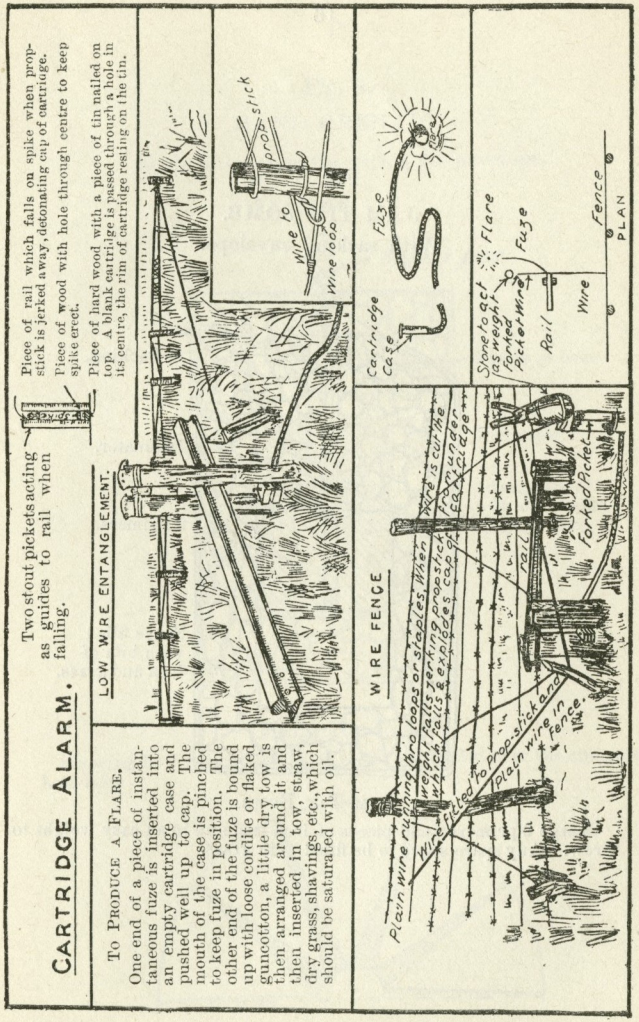
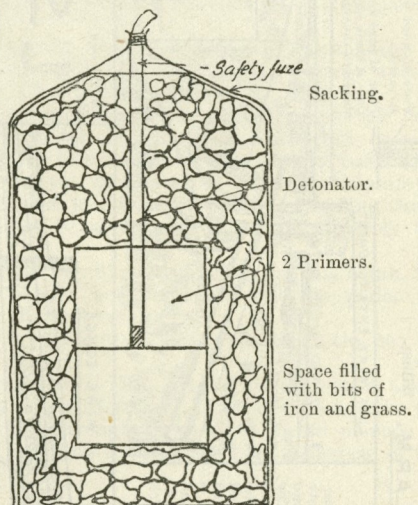


Fig. 7.

Fig. 8.

JAM TIN BOMB.

With sacking envelope.



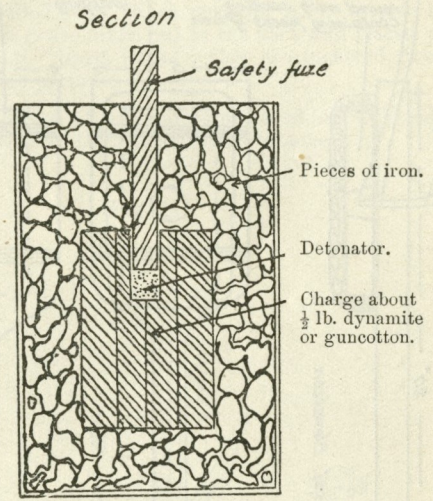
JAM TIN BOMB.

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

Fig. 9.

HAND GRENADE

Made of one jam tin with a tin envelope.



HALF TOP PLAN.

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

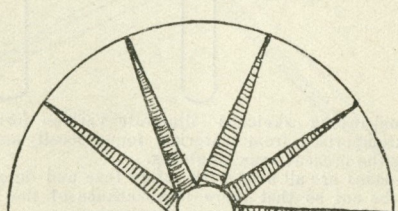
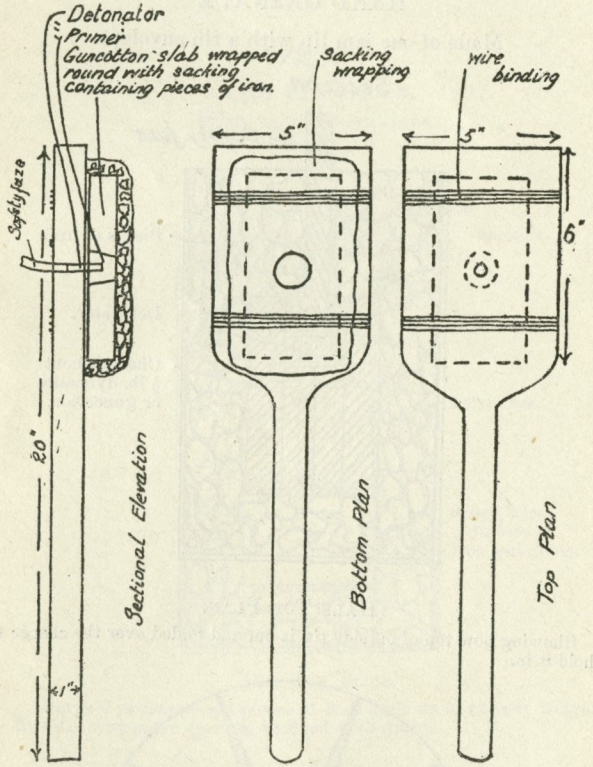


Fig. 10.
HAIR BRUSH BOMB.



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.

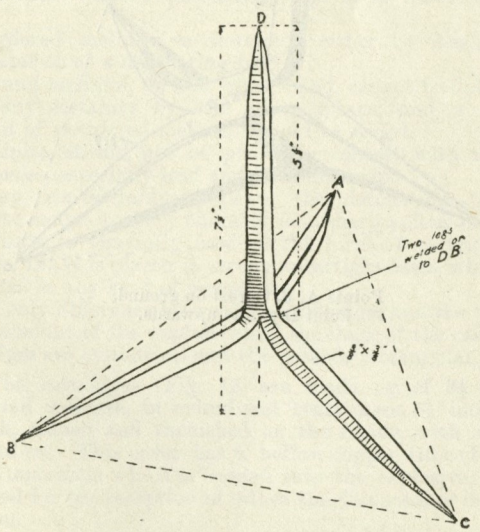
The size and weight of the bomb should be limited to what a man can throw easily.

V.—OBSTACLES.

i. Wire entanglement may be made of pyramids of wood, 3 feet 6 inches high, with six strands of barbed wire fixed to every two, in such a way that the wire will be up, however the pyramid is rolled over. Each pyramid can be carried by one man. The bays are taken out in the dark and placed on the ground so as to "break joint"; they are picketed down later on if occasion permits.

ii. Crows feet (Figs. 11, 12) and planks studded with nails add to the efficiency of the barbed wire obstacle.

Fig. 11.

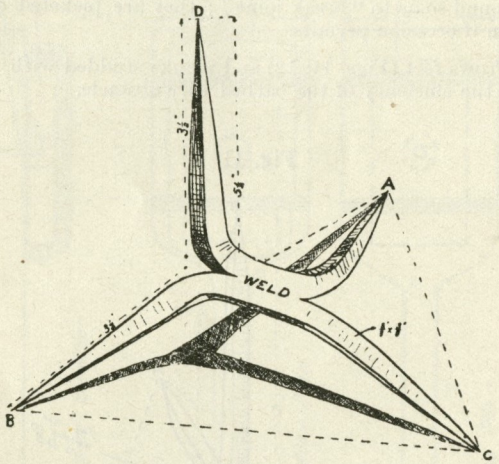


Points A, B, C, rest on ground.
Point D points upwards.

Crows feet are easily made by any smith out of $\frac{3}{4}$ inch by $\frac{1}{4}$ inch or $\frac{3}{8}$ inch flat bars. These should be cut into 7 inch lengths, split for 3 inches from each end, and the "fingers" then tapered to points on the anvil.

Shoeing-smiths, farriers, and artificers should be shown how to make them.

Fig. 12.



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

VI.—NOTES ON FRENCH MILITARY EXPLOSIVES.

Figs. 13 to 33.

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 $2\frac{1}{2}$ 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 fuse.

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.

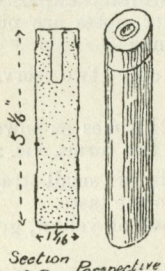
The only difference between the cartridges and the petards is the amount of the explosive and the shape of the case ; the cartridges are cylindrical and the petards rectangular.

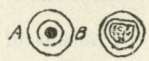
4. The cartridges (Fig. 13) are made up of $3\frac{1}{2}$ ozs. of powdered melinite, in cylindrical brass cases, $5\frac{1}{6}$ inches by $1\frac{1}{6}$ inch, tinned and varnished on the inside, with a cover soldered on. This cover has a hollow copper tube (Fig. 14) on the underside which is bedded into the explosive, and is intended for the reception of either the detonator or detonating fuze.

The petards (Fig. 14) contain 5 ozs. of melinite in rectangular cases 6 inches by $1\frac{1}{8}$ inch by 1 inch.

Fig. 13.

CARTRIDGE 3½-OZ.



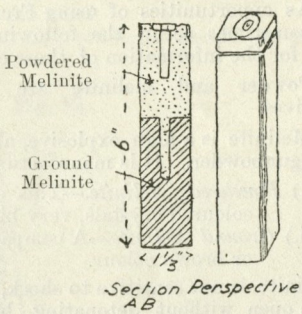


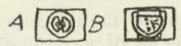
Top plan. Copper tube uncovered.

Top plan. Copper tube covered.

Fig. 14.

PETARD 5-OZ.





Top plan. Copper tube uncovered.

Top plan. Copper tube covered.

5. In addition to the above two forms of charges, there is smaller priming charge (Fig. 15) containing 2 ozs. of

PRIMING CHARGE 2-OZ.

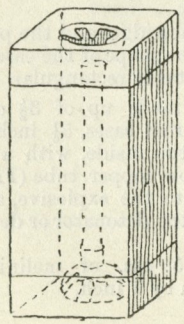


Fig. 15.

Copper tube

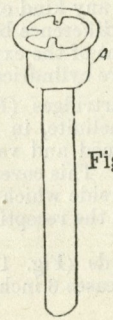


Fig. 16.

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. 18), or for igniting the detonating fuze at the firer's end.

6. For large mines charges of 44 lbs. (Fig. 17) and 22 lbs. are used. The larger charges are contained in cases 1 foot 7 inches by 7 inches by 7 inches, the cases of the smaller charges being half the length. The 22 lb. charges are not often met with.

Fig. 17.

44 lb. CHARGE.

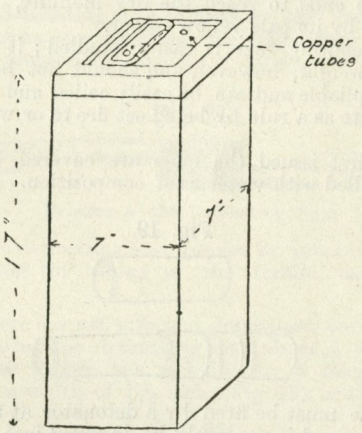
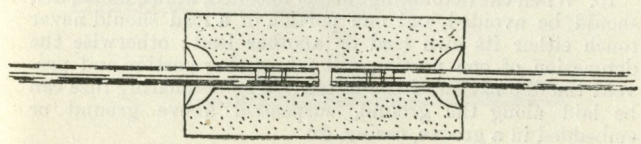


Fig. 18.



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 the surfaces.

9. The detonating fuze consists of a melinite core about $\frac{1}{8}$ inch to $\frac{3}{16}$ inch diameter enclosed in a tin tube about $\frac{1}{4}$ inch diameter. Rate of burning about 7,600 yards per second.

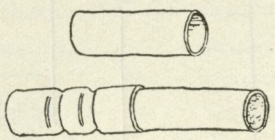
It is advisable to keep away from the fuze when it is fired, as pieces of the tin tubing are apt to fly.

The tin tube is watertight, and damp can only get at the uncovered ends. These should therefore have about 4 inches cut off the ends to reach the dry melinite, which can be recognized 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. 19) filled with waterproof composition.

Fig. 19.

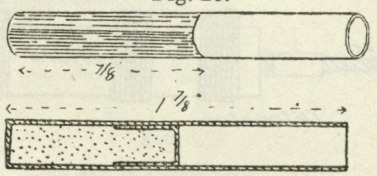


This fuze must be fired by a detonator at the firing end; at the other end it need only be inserted into the powder or melinite charge.

10. When the detonating fuze is uncoiled, kinks, knots, &c., 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, &c.

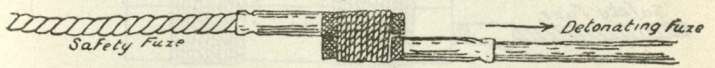
11. The detonator (Fig. 20) is a small copper tube, $\frac{1}{4}$ inch in diameter, and $1\frac{4}{5}$ inch long, containing 21 grains of fulminate of mercury. The portion containing the fulminate is painted black. Detonators should never be carried near melinite charges or detonating fuze. 30 detonators are packed in a cylinder.

Fig. 20.



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. 21).

Fig. 21.

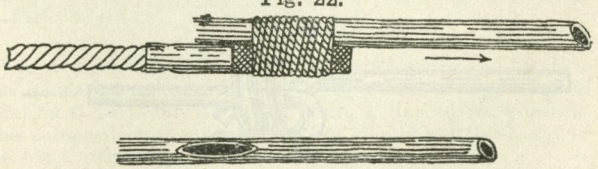


Priming of the Detonating Fuze.

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 $\frac{1}{2}$ inch from the end so as to expose the melinite for a length of about $\frac{3}{4}$ inch and a width of $1\frac{1}{16}$ inch (Fig. 22), or the detonating

Fig. 22.



fuze can be tied along the whole length of a petard fitted with a detonator (Fig. 23), or two petards can be joined together (Fig. 24).

Fig. 23.

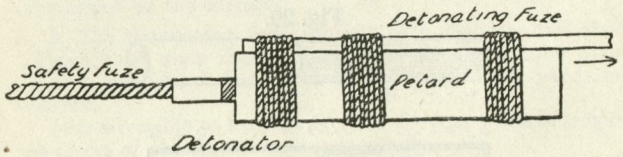


Fig. 24.

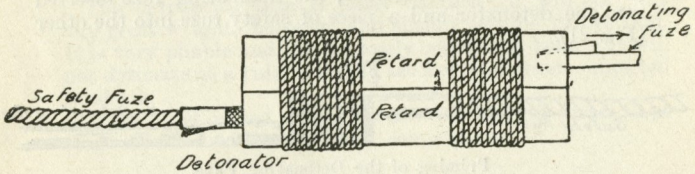


Fig. 25.

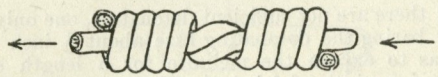


Fig. 26.

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. 25 and 26).

(ii.) A priming charge (Fig. 18).

(iii.) A cartridge or a petard (Fig. 27).

(iv.) Two petards (Fig. 28).

Fig. 27.

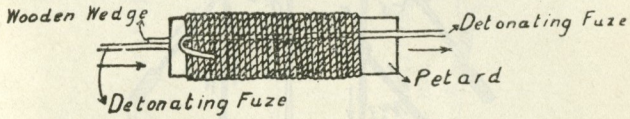
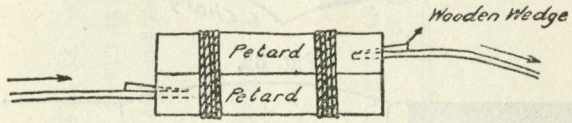


Fig. 28.



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. 29.

17. A watertight joint between the detonator and the fuze can be made as shown in Fig. 30 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.

Fig. 29.

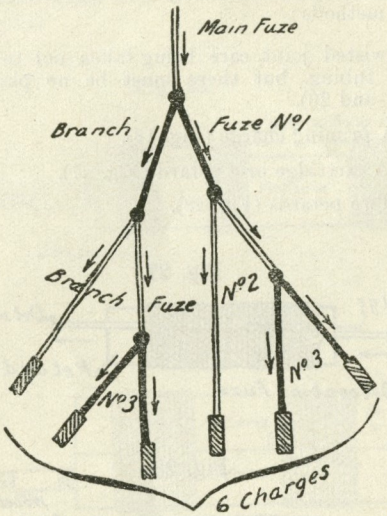
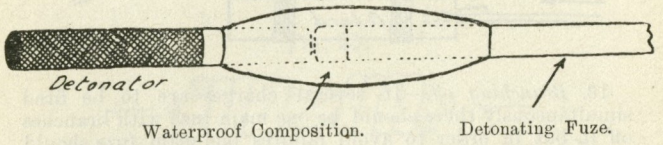


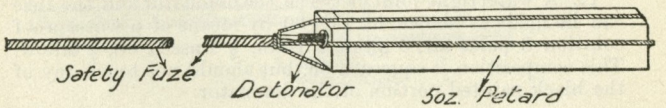
Fig. 30.



18. Figs. 31, 32 and 33 show various methods of fixing charges.

Fig. 31.

FIRING ARRANGEMENTS AT A PETARD.



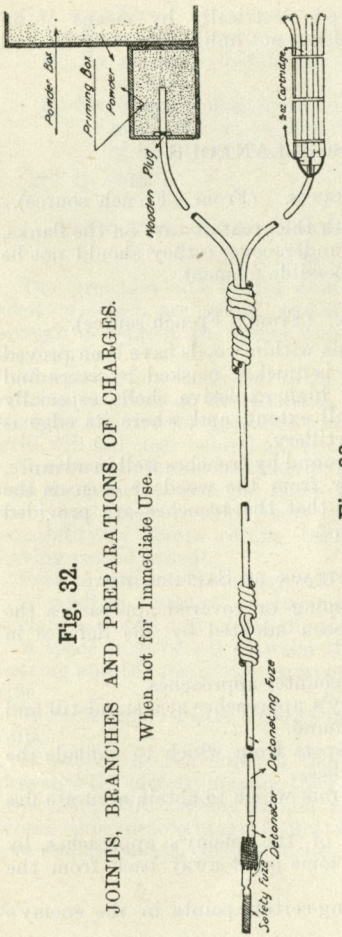


Fig. 32.

JOINTS, BRANCHES AND PREPARATIONS OF CHARGES.

When not for Immediate Use.

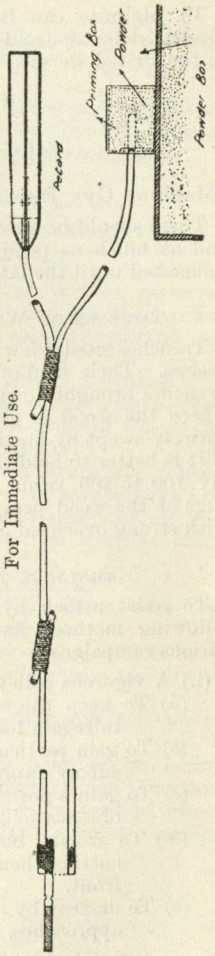


Fig. 33.

JOINTS, BRANCHES AND PREPARATION OF CHARGES.

For Immediate Use.

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

VII.—MISCELLANEOUS.

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.

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. 34).

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.

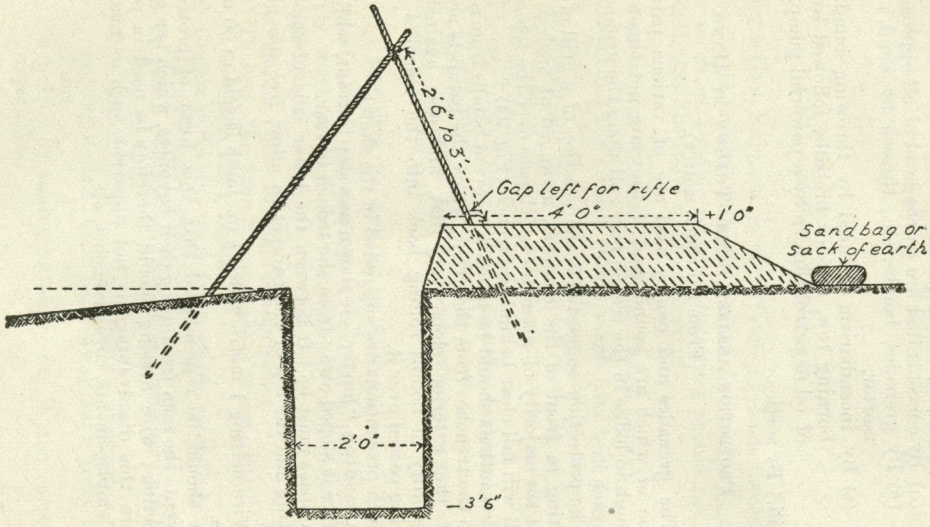
A sandbag "hurter" is shown as a stop in front, while the surface is sloped away from the trench in rear.

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.

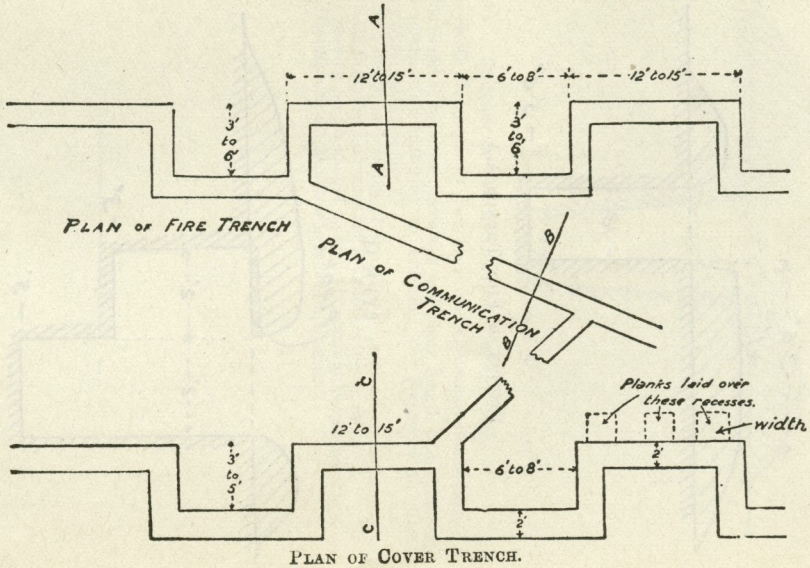
Wire netting 1 metre wide 1½ in. mesh is sold in 50 metre rolls.

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 emplacements, cover trenches, etc.

Fig. 34

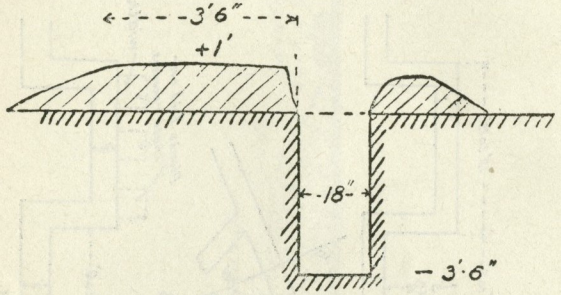


SKETCH OF TYPE TRENCHES.



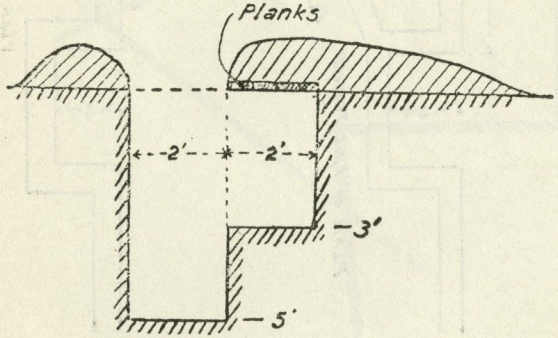
PLAN OF COVER TRENCH.

TYPE I



SECTION OF FIRE TRENCH A.A.

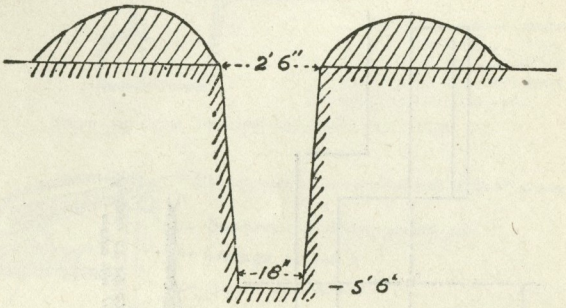
TYPE II.



SECTION OF COVER TRENCH C.C.

(This may be covered over in places if material is available.)

TYPE III.



SECTION OF COMMUNICATION TRENCH B.B.

Notes on the dimensions of Fire, Cover and Communication Trenches.

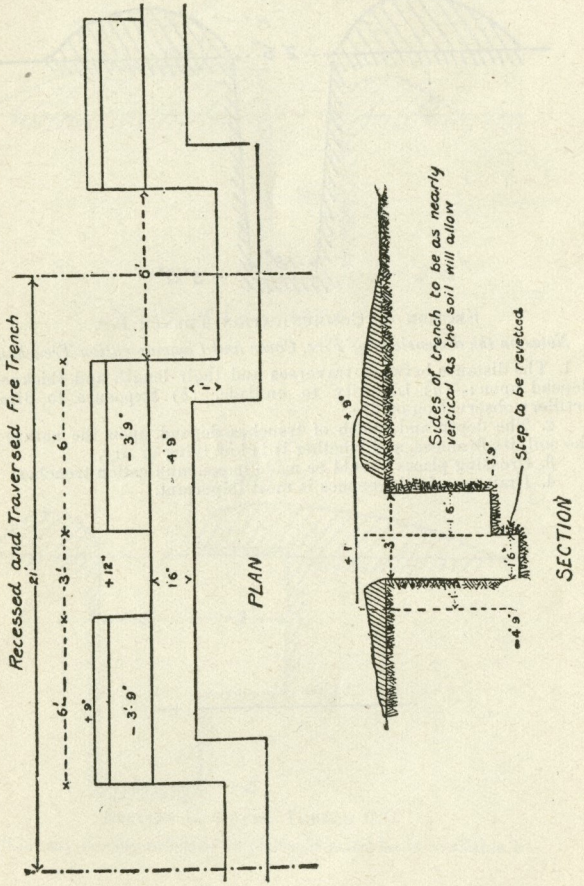
1. The distance between traverses and their length and thickness depend upon:—(*a*) Liability to enfilade. (*b*) Exposure to direct artillery observation or fire.

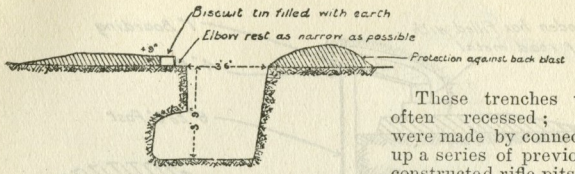
2. The depth and width of trenches depend upon the nature of the soil, its firmness, and whether it is low lying or dry.

3. Crossing places should be made in communication trenches.

4. Drainage of all trenches is most important.

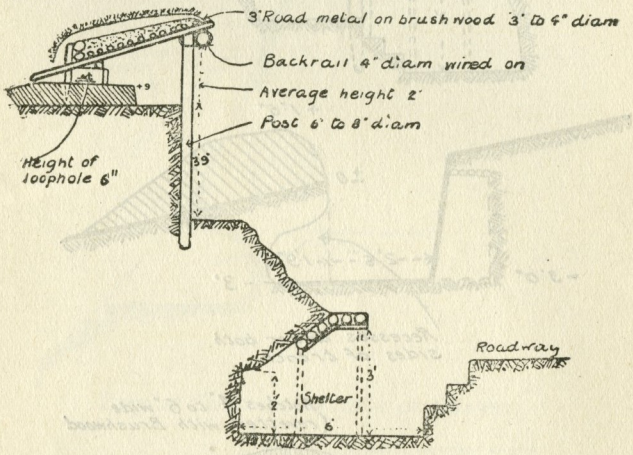
SECTIONS OF VARIOUS TRENCHES IN THE AISNE VALLEY POSITION.



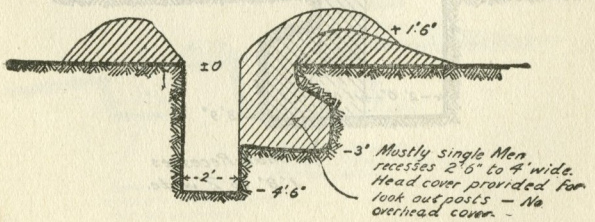


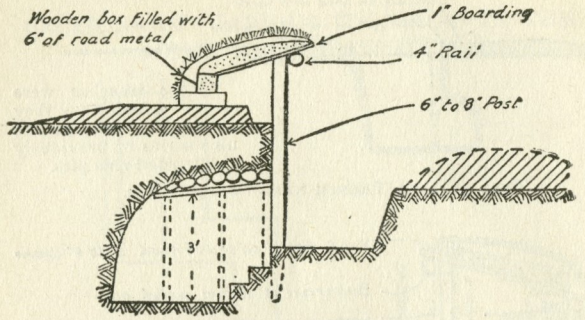
These trenches were often recessed; they were made by connecting up a series of previously constructed rifle pits.

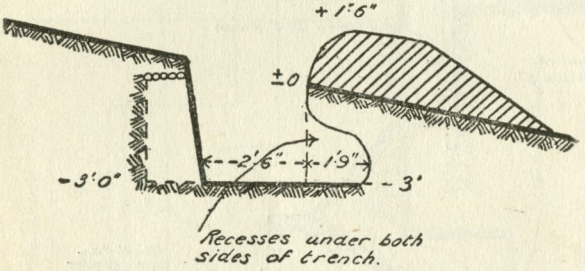
TYPE OF FIRE TRENCH NEAR SOUPIR FARM.

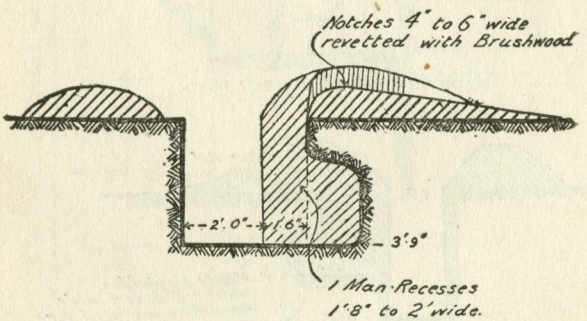


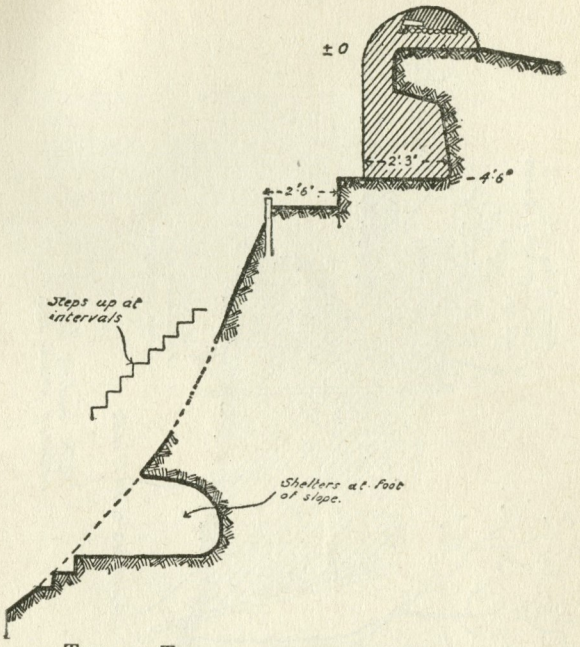
MADE ON BANK OF SUNKEN ROAD.



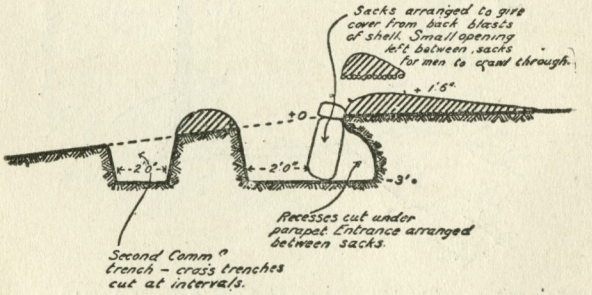


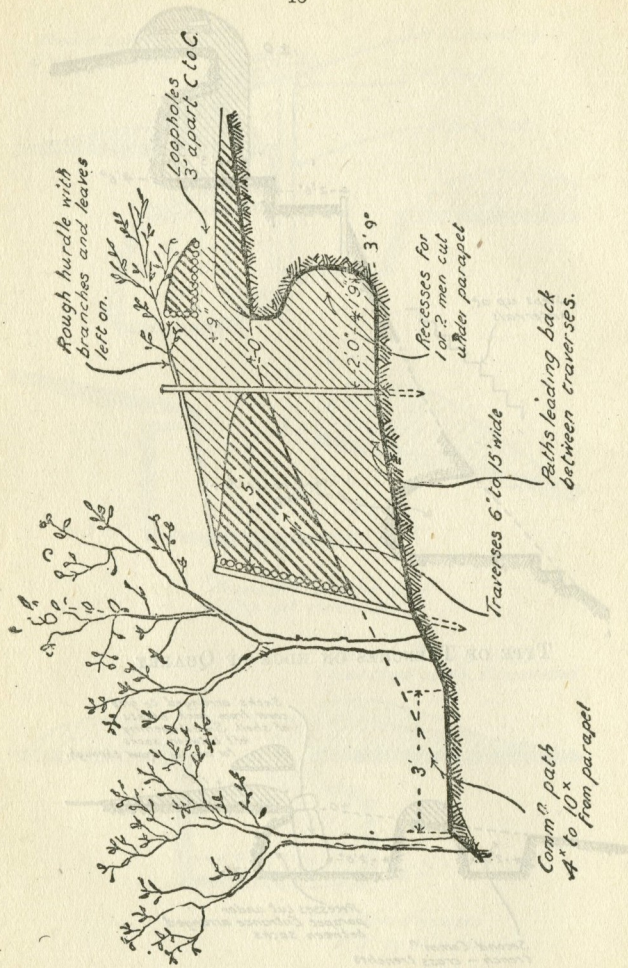






TYPE OF TRENCHES ON EDGE OF QUARRY.





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