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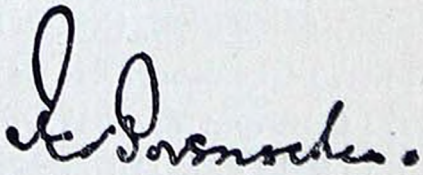
HANDBOOK OF ENEMY AMMUNITION

PAMPHLET No. 9

GERMAN TELLERMINES, DEMOLITION CHARGES, FUZES AND GUN AMMUNITION OF CZECH ORIGIN.

ITALIAN FUZE, PRIMERS AND SHELL.

By Command of the Army Council,



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HANDBOOK
OF
ENEMY AMMUNITION

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HANDBOOK
OF
ENEMY AMMUNITION

GERMAN TELLERMINE 42
(Fig. 1)

This model of the Tellermine, like the 35 model described in Pamphlet No. 8, is designed to function by pressure applied to a contact fuze or by detonators in the side and base which may be initiated by " booby trap " devices or by instantaneous detonating fuze connected to another mine. In this model the fuze is situated beneath the cover plate assembly.

The mine is 12·8 inches in diameter and has a convex head with a central recess, approximately 7 inches in diameter, from which the main cover plate and the fuze cover plate protrude. The main cover plate is corrugated radially and has a plain retaining ring surrounding its base. The fuze cover plate protrudes from the centre of the main cover plate and has six curved surfaces formed on its flange to facilitate turning by hand. The overall height of the mine with the cover plate assembly is 3·7 inches. The weight of the mine with its amatol bursting charge and P.E.T.N./wax exploders is 17 lb. 15 oz. The exterior is painted a dark grey but will probably also be found with camouflage painting.

The fuze is similar to that used in the British anti-tank mine R.E. No. 1 and is described in this pamphlet. A load of 570 lb. applied to the cover plate above the fuze will cause the fuze to function. The required load decreases towards the periphery of the main cover plate because of the lever effect and at the outer edge may be as low as one half of this amount.

Body

The body is pressed from sheet steel and consists of two main parts, the charge container and the base plate. The base plate is fitted to close the base of the container after filling and is turned in at its circumference to engage a flange at the base of the container wall. A brass detonator holder is screwed into a hole with a socket in the base about 2·2 inches from the centre. The holder is screwthreaded internally near the mouth to receive a pull igniter. The charge container has a similar detonator holder screwed in the side wall. The head of the container is convex and is shaped to form a concentric circular recess of 7 inches diameter with a fuze socket welded at its centre. A detonator holder of steel for the main detonator is fitted to the base of the fuze socket. A locating ring with a circular groove to receive the base end of the cover plate

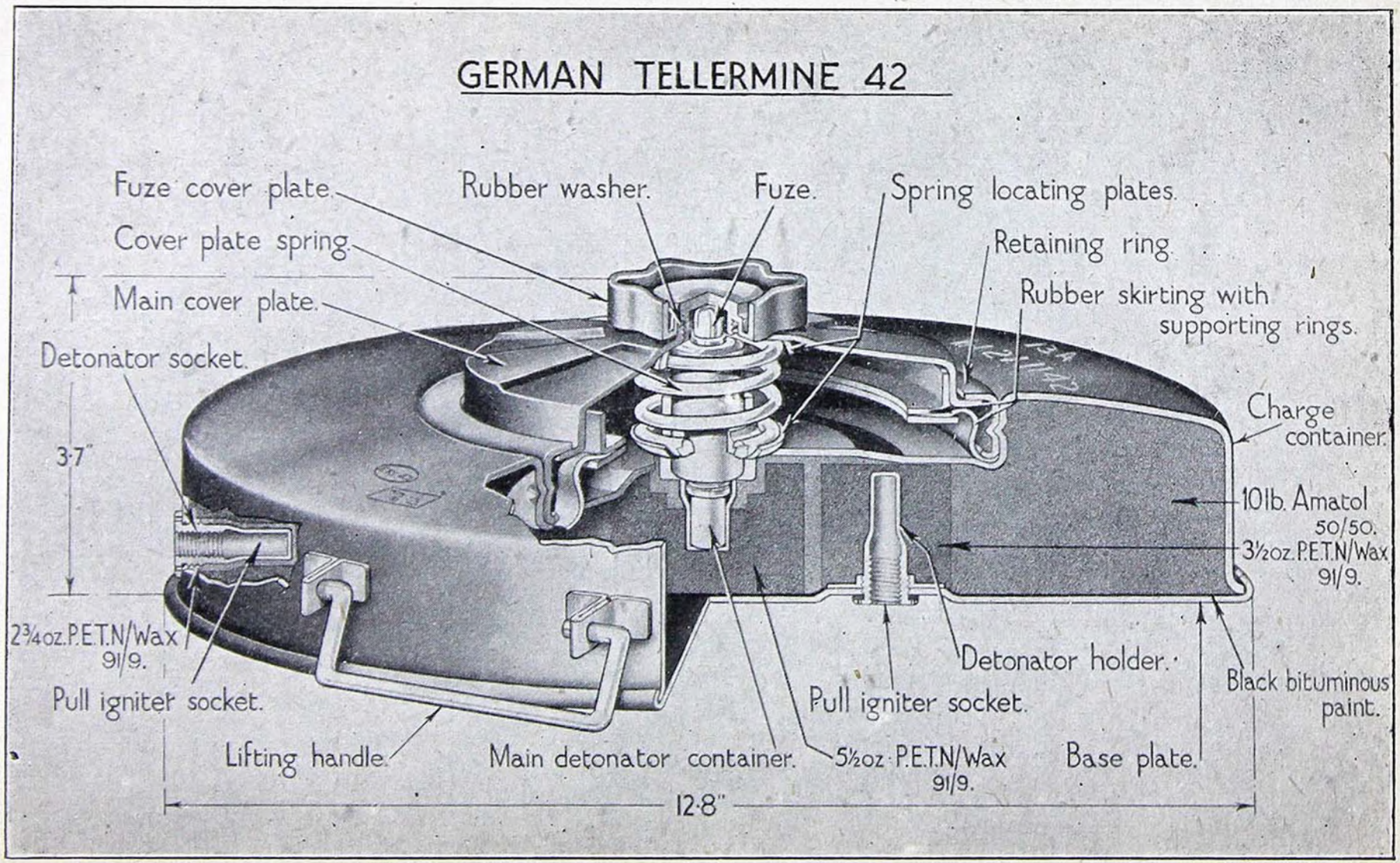

GERMAN TELLERMINE 42
Fuze cover plate.
Cover plate spring.
Main cover plate.
Detonator socket.
3·7"
2¾oz. P.E.T.N/Wax 91/9.
Pull igniter socket.
Lifting handle.
Rubber washer.
Fuze.
Spring locating plates.
Retaining ring.
Rubber skirting with supporting rings.
Charge container.
10lb. Amatol 50/50.
3½oz. P.E.T.N/Wax 91/9.
Detonator holder.
Pull igniter socket.
Black bituminous paint.
Main detonator container.
5½oz. P.E.T.N/Wax 91/9.
Base plate.
12·8"

FIG. 1

spring is fitted round the socket in the recess. A steel retaining ring fitting round the wall of the recess is secured by indentations at intervals in the wall and ring. The top of the ring is turned inwards to form a flange which retains the main cover plate by engaging with a flange at the base of the cover plate. The bottom of the ring is also curved inwards to present a suitable bearing surface for a skirting of red rubber the lower edge of which is held between the retaining ring and the wall of the recess.

Cover Plate Assembly

The main cover plate is approximately 5·8 inches in diameter with a ·5 inch cylindrical wall flanged at the base to engage with the retaining ring in the charge container. The top of the plate is corrugated radially and rises slightly towards the centre where a screwthreaded hole is formed to receive the fuze cover plate. A locating ring for the top of the spiral spring which supports the main cover plate is spot welded to its underside. Two supporting rings between which the upper edge of the rubber skirting is held are attached beneath the main cover plate. The uppermost ring is in the form of a hoop with an internal flange at the base. This ring fits into the underside of the main cover plate where it is secured by spot welding. The lower ring is in the form of a slightly dished washer with a larger external diameter than the upper ring. The two rings with the top of the rubber skirting held between them are held together by spot welding.

The fuze cover plate screws into the top of the main cover plate and is recessed at the underside to fit over the top of the striker protruding from the fuze. The plate is in the form of a plug with a flanged head which has six curved sides to provide a handgrip. A rubber sealing washer is held between the flange and the main cover plate.

Bursting Charge and Exploders

The bursting charge consists of 10 lb. of Amatol 50/50 which is filled from the base to a density of 1·59 and covered with a coating of black bituminous paint. An unwrapped exploder pellet of pressed P.E.T.N./wax 91/9 is inserted to form a surround for each of the detonator holders during the process of filling. The weights and densities of the pellets are :—

Exploder for main detonator 5½oz. density 1·57
Exploder for side detonator 3½ oz. density 1·58
Exploder for base detonator 2¾ oz. density 1·57

Main Detonator

The main detonator is attached to the fuze by means of an adapter and is described with the fuze in this pamphlet.

GERMAN FUZE AND MAIN DETONATOR FOR TELLERMINE 42

(Fig. 2)

The fuze has a cylindrical body, approximately 1·5 inches in length and ·87 inch in diameter, from the head of which the hemispherical end of the striker, with its supporting shearing pin, protrudes. At the base end, the main detonator for the mine is attached by means of a screwed adapter sleeve. The fuze is painted the normal dark olive green.

The body is of steel and is in the form of an inverted cup with a hole at the head through which the outer end of the striker protrudes. The base is closed by the cap holder, which is secured by the body being turned inwards under its flange.

The steel striker has a central striking projection at its inner end where it is flanged to engage one end of the steel spiral spring. A slot, for the escape of air during the functioning of the striker, is cut through the flange. The spiral spring is held in compression between the flange and the upper end of the body by a mild steel shearing pin. The pin is fitted in a lateral channel in the striker from which the ends protrude and bear on the recessed top of the body. The diameter of the pin is ·079 inch and the V.D. Hardness figure is 232.

The cap holder contains a percussion cap and anvil assembly in a central channel and is screwthreaded externally to receive the adapter for the attachment of the main detonator.

The cap and anvil assembly is contained in a copper sheath. The cap is of copper and contains a ·77 grain filling consisting of 40·8 per cent. of lead styphnate, 40·7 per cent. of barium nitrate, 2·9 per cent. of antimony sulphide and 15·6 per cent. of calcium silicide. The filling is partly covered by a paper washer varnished on both sides, and is pressed to form a central cavity to fit over the anvil. The cavity is also varnished. The anvil consists of a brass strip shaped to fit into the mouth of the cap with clearance for the passage of the flash at each side of the strip. Projections at the base ends of the strip are bent to form a ring, under which the wall of the copper sheath is turned inwards.

The screwed adapter sleeve is of very light construction and has an internal flange at the base to engage a corresponding flange on the main detonator.

The light metal body of the main detonator is cylindrical with an external flange at its open upper end. The filling comprises 12 grains of P.E.T.N. with an initiator topping consisting of lead azide 58·9 per cent., lead styphnate 39·2 per cent., and graphite 1·9 per cent. The composition is contained in an inverted light metal capsule which is pressed down into the mouth of the body. A central flash hole in the capsule is closed at the underside by a disc of black gauze material.

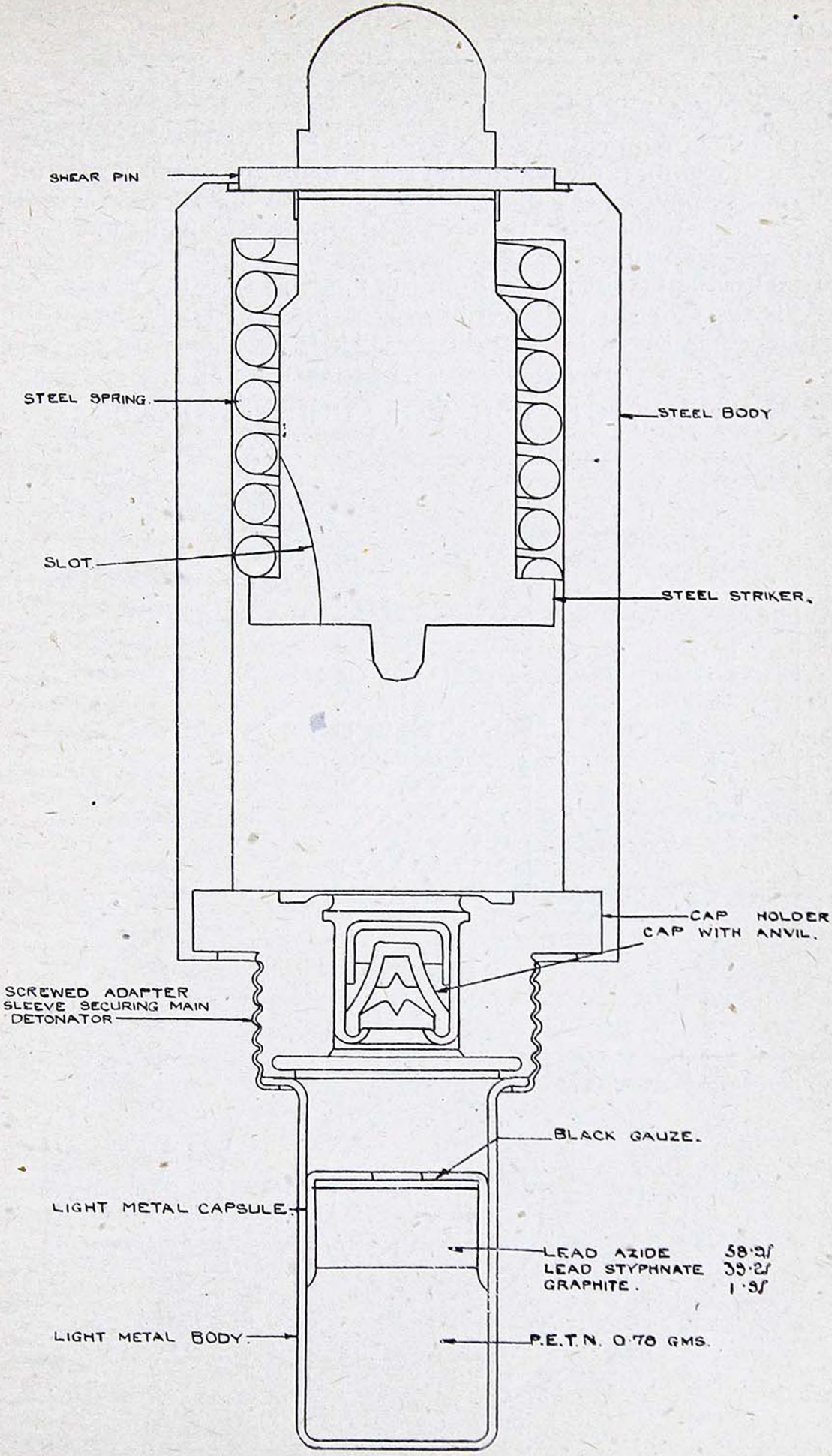

SHEAR PIN
STEEL SPRING.
STEEL BODY
SLOT.
STEEL STRIKER.
CAP HOLDER
CAP WITH ANVIL.
SCREWED ADAPTER
SLEEVE SECURING MAIN
DETONATOR
BLACK GAUZE.
LIGHT METAL CAPSULE.
LEAD AZIDE 58·2%
LEAD STYPHNATE 39·2%
GRAPHITE. 1·8%
LIGHT METAL BODY.
P.E.T.N. 0·78 GMS.

FIG. 2

Functioning Load

The load required to actuate the fuze in the mine varies between 570 and 580 lb. if applied to the cover plate above the fuze. With the load applied near the outer edge of the main cover plate the lever effect reduces the required load which may be as low as one half of this amount.

With the fuze removed from the mine, so that the resistance of of the spring under the cover plate is excluded and only the shearing pin has to be severed, the load required is 495 lb.

GERMAN TELLERMINE 35

MAIN DETONATOR AND FUNCTIONING LOAD

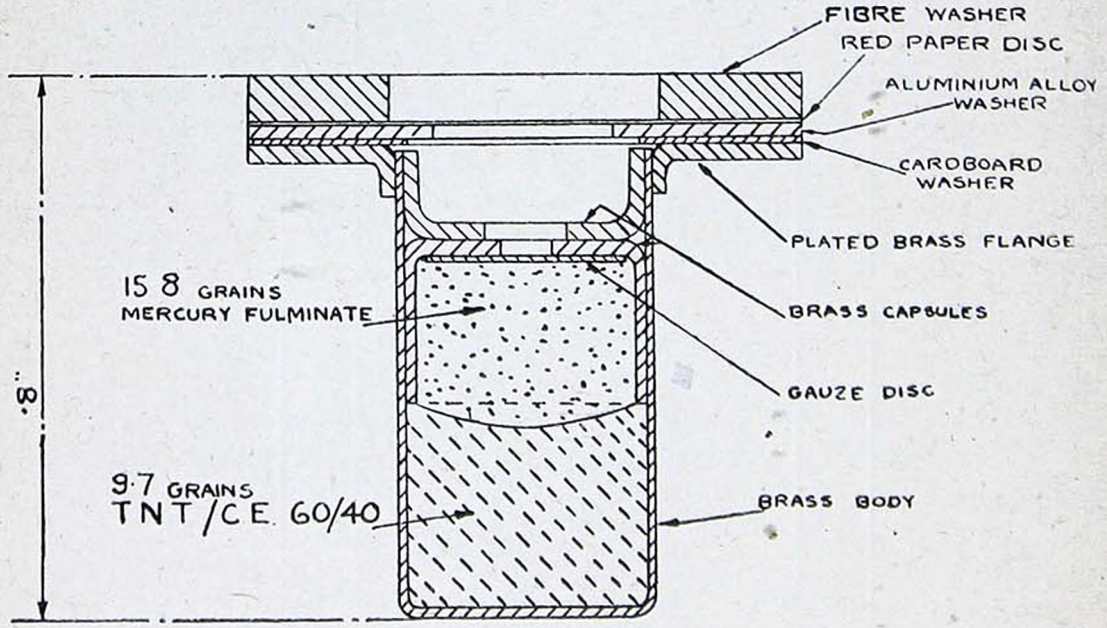


FIG. 3

Descriptions of the 1935 model of the Tellermine and its fuze are given in Pamphlet No. 8. Since this pamphlet was published, further details of the main detonator have become available and, as the result of further trials, the functioning load has been found to be subject to variation.

Main Detonator (Fig. 3)

The brass body of the detonator, in the form of a cylindrical cup, is plated internally and has a plated brass flange soldered externally at the mouth. A cardboard washer carrying a washer of aluminium alloy, a closing disc of red paper and a fibre washer, all secured by a colourless adhesive, is fixed to the top of the flange.

The filling consists of 9·7 grains of T.N.T./C.E. 60/40 over which a brass inverted capsule is inserted with a 15·8 grain filling of mercury fulminate. A central hole in the capsule is closed on the inside by a disc of black gauze material. The body is closed at the mouth by another brass capsule, inserted base downwards. This capsule has a central hole and is lacquered.

Functioning Load

The following loads, lower than those given in Pamphlet No. 8, have been arrived at :—

(*a*) Load required to actuate fuze in the mine varied from 305 to 310 lb. The load required is appreciably affected by the degree of airtightness of the fuze fitting and the amount of " slack " in the rubber skirting. The depression required was 4 mm.

(*b*) Load required to actuate the fuze alone varied from 210 to 215 lb., with the three fuzes used in the test.

GERMAN 13.5 Kg. HOLLOW DEMOLITION CHARGE (Fig. 4)

The demolition charge is approximately hemispherical in shape with three hinged telescopic legs fitted to the hollowed base and a cylindrical projection, closed by a perforated coned cap, at the top. A fabric lifting handle is attached to the side. The exterior is painted the normal deep olive green. The complete charge weighs 30·5 lb., and has a diameter at the base of 13·5 inches.

Charge Container

The charge container consists of the cavity liner, the base ring (carrying the telescopic legs), the cover and the cap.

The cavity liner is hemispherical with an internal radius of 4·92 inches and consists of 4 superimposed close-fitting domes. The domes are spun to shape from ·04 inch sheet steel and are drilled at the vertex for attachment by a deposit of weld metal. They are also attached by spot welding at two points, diametrically opposite,

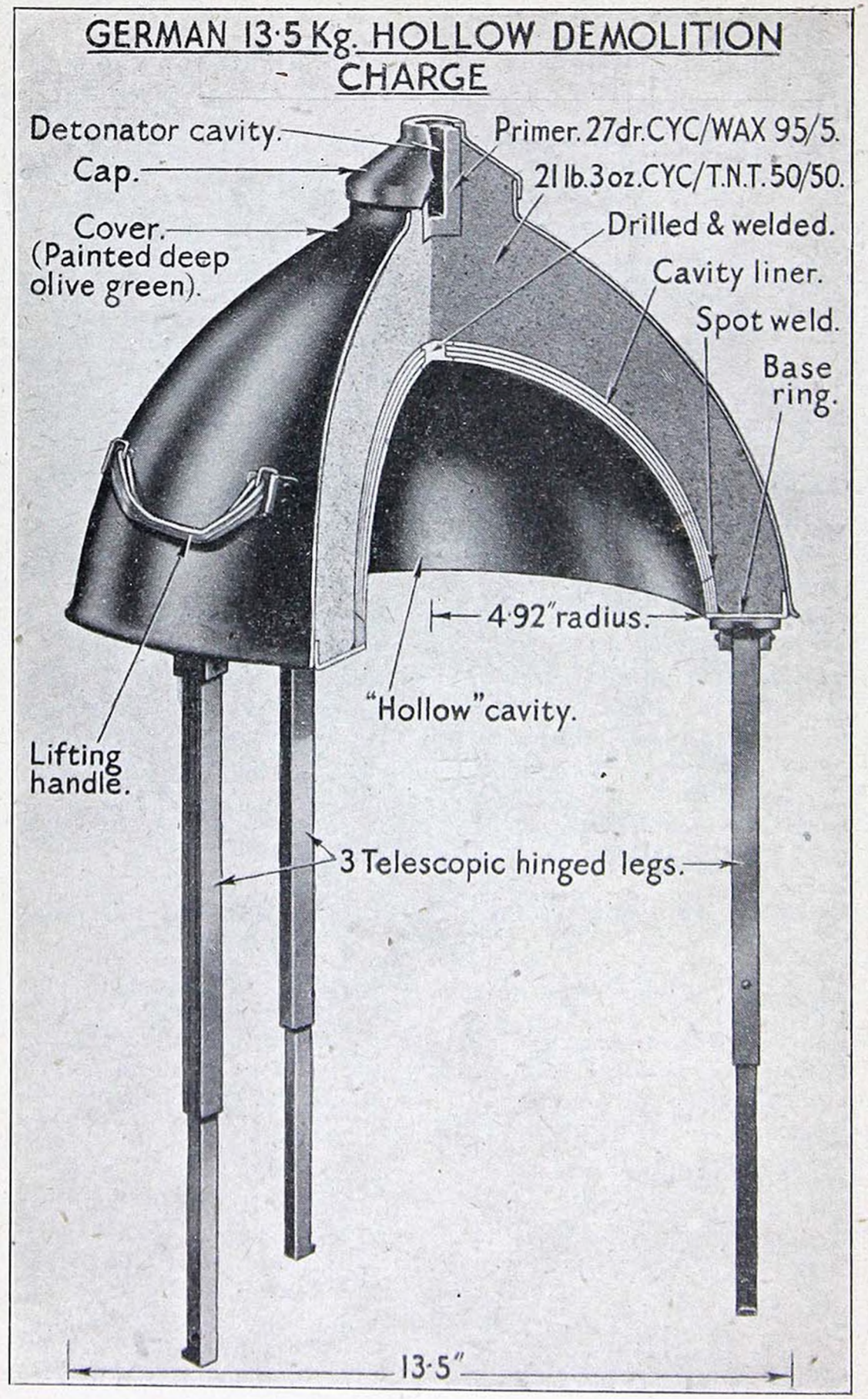

GERMAN 13·5 Kg. HOLLOW DEMOLITION CHARGE
Detonator cavity.
Cap.
Cover. (Painted deep olive green).
Primer. 27dr. CYC/WAX 95/5.
21 lb. 3 oz. CYC/T.N.T. 50/50.
Drilled & welded.
Cavity liner.
Spot weld.
Base ring.
4·92" radius.
"Hollow" cavity.
Lifting handle.
3 Telescopic hinged legs.
13·5"

FIG. 4

near the base. This 4-ply construction of the liner has advantages over one of single sheet construction both for production and for the perforation performance of the charge. Failure of the domes to fit closely together may, however, affect the direction of the pressure and result in a perforation of an irregular shape.

The base ring is of ·02 inch sheet steel and is soldered to the base of the cavity liner in the form of a flange. Three telescopic legs of strip steel are attached to the underside of the ring at equally spaced positions. The lengths of these legs are adjusted to position the charge, relative to the surface to be perforated, so that the maximum effect is obtained. The legs can be extended to 13·2 inches from the base ring.

The cover is almost hemispherical in shape and has a hole with a short cylindrical rim at the top. The sheet steel from which it is spun is ·02 inch thick.

The cap is spun from ·02 inch sheet aluminium and fits over the rim on the top of the cover. A central perforation is formed in the top of the cap for the insertion of a detonator.

The weight of the empty container is 9·05 lb.

Method of Filling

The main filling consists of 21 lb. 3 oz. of cyclonite/T.N.T., 50/50, filled to a density of 1·66 by the " biscuit " filling process (i.e. cast, including broken slab). A cavity formed in the top of the main filling contains a perforated 27 dr. primer pellet of cyclonite/wax 95/5. The density of the pellet is 1·63.

Perforation of Armour

With the legs fully extended and the charge fired at the normal to a 9 inch face-hardened plate the main dimensions of the perforation obtained were as follows :—

Aperture at surface of the plate $1{\cdot}5 \times 3{\cdot}15$ inches.

Aperture at back of the plate $3{\cdot}5 \times 2{\cdot}75$ inches.

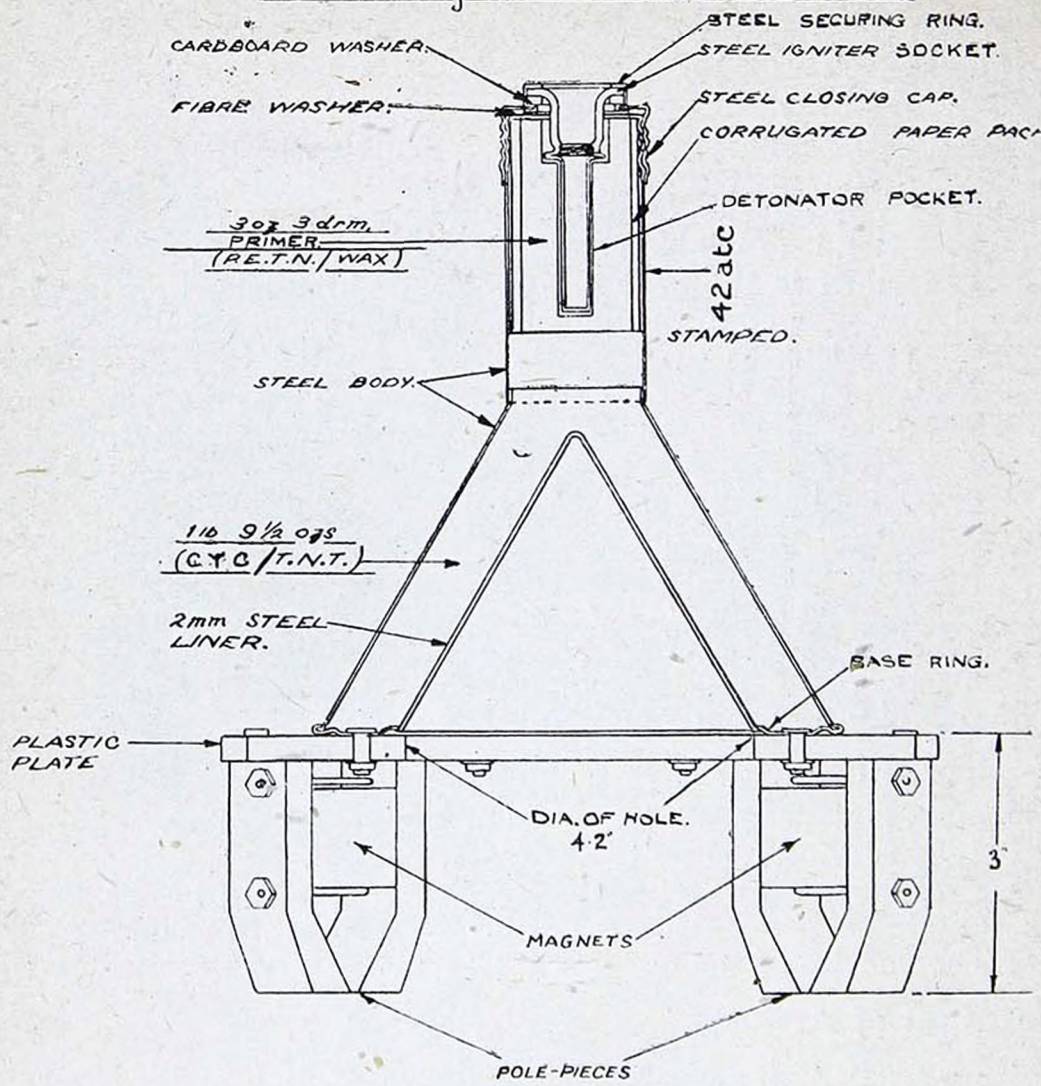
Disintegrated area surrounding aperture in back of plate $15 \times 15\frac{1}{2}$ inches.

GERMAN 3 Kg. MAGNETIC HOLLOW CHARGE (Haft-H 3)

(Fig. 5)

The charge container is in the form of an inverted funnel (i.e., a cone with a cylindrical stem) which is painted the usual deep olive green and is mounted on a hexagonal plate of plastic. The plate has a large central hole, corresponding with the liner of the " hollow " in the filling, and has three magnets fitted in equally spaced positions on the underside. The stem portion, at the top, is designed for the insertion of a detonator and the fitting of an igniter. The overall

GERMAN 3 Kg. MAGNETIC HOLLOW CHARGE.



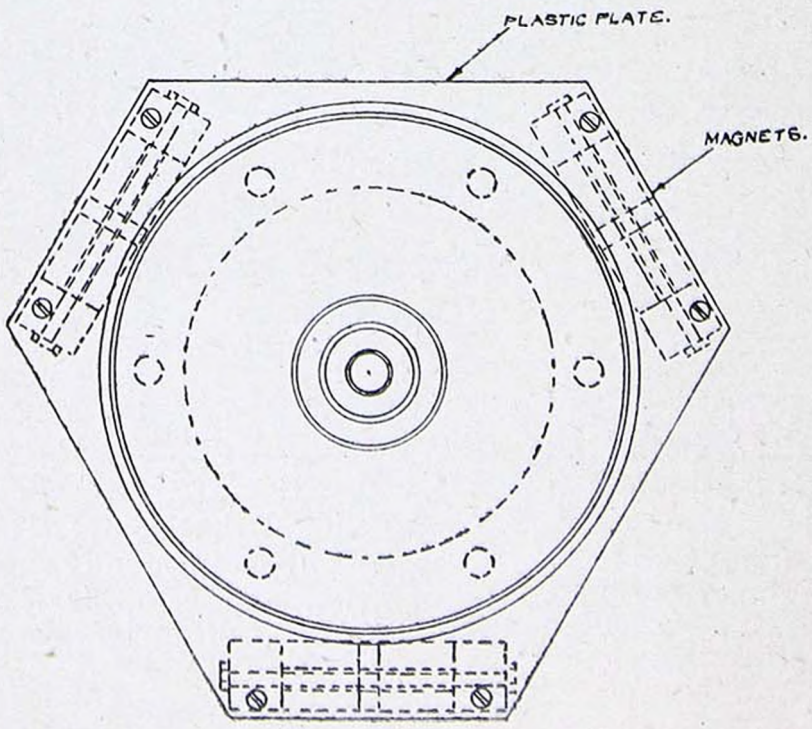


FIG. 5

eight without igniter is 10·7 inches and the weight, 7 lb. 11 oz. The total weight of explosive is 1 lb. 12 oz. 11 dr.

Charge Container

The container is of light steel construction and is in the form of a cone fitted with a cylinder at the top. The base of the container is flanged to engage with the overlapping base ring bolted to the plastic plate. The base ring also engages the steel cavity liner which forms the inner wall of the charge container. The liner is a simple 60 degree cone and is of mild steel with a thickness of ·079 inch.

The cylindrical portion has a screwthread formed near the top end to receive a steel closing cap which has an igniter socket held in a central hole by a steel securing ring. The socket has a short internal screwthread for the reception of the igniter and has a detonator pocket secured to a flange at its base. According to reports, the igniter B.Z.24 and the No. 8 detonator are used. Details of the B.Z.24 are included in the description of the stick hand grenade in Pamphlet No. 5. Types of No. 8 detonators are shown in Pamphlet No. 6 (Fig. 2). The igniter B.Z.39 described in Pamphlet No. 6 is also reported to be used.

The three magnets fitted to the plastic plate each consists of two pole pieces connected near the top by a rectangular permanent magnet and bent at the base ends to leave only a small gap between the poles. Each of the pole pieces is secured to the plastic plate by a screw. The permanent magnet is held in position by two brass bolts. Keepers for the preservation of the magnets, by connecting the lower ends of the poles are reported to be in use but these are not yet available. The magnetic assemblies are each capable of lifting about 14 lb.

Method of Filling

The main filling, contained between the cavity liner and the conical part of the container and also in the lower part of the cylindrical portion, consists of 1 lb. 9½ oz. of cyclonite/wax 50/50 cast to a density of 1·67. The primer, contained in the cylindrical portion, consists of a 3 oz. 3 dr. pellet of P.E.T.N./wax 90/10 pressed to a density of 1·58. The pellet is pink in colour and has a cavity for the igniter socket and the detonator pocket. A packing of corrugated paper is inserted between the pellet and its container.

Perforation of Armour Plate

The charge is held in position on the armour plate by the magnets and may be thrown from a short distance. Trials at a distance of 16 feet have proved the magnets to be unreliable in holding the charge on a tank suspension. Using the friction igniter B.Z.24 as the initiator, the delay between the pulling of the igniter twine and the detonation of the charge would be 4½ seconds.

It is estimated that the charge will perforate a 110 mm. homogeneous plate and retain enough energy to have good effect behind the plate. The cavity liner of 2 mm. mild steel will give some fragments behind the perforation.

GERMAN BASE FUZE WITH OPTIONAL AND VARIABLE DELAY FOR 15 CM. ANTI-CONCRETE SHELL (Bd. Z.f. 15 cm. Gr. 19 Be.)

(Fig. 6)

The fuze is of the igniferous type and is used with a gaine in the anti-concrete shell (Gr. 19 Be) for the 15 cm. medium howitzer (s.F.H.18). The shell is described in Pamphlet No. 8. The designation of the fuze, " Bd. Z.f. 15 cm. Gr. 19 Be.", is stamped in the base which carries a flat ring graduated to indicate the setting positions for non delay (OV), short delay (KV), and long delay (GV). The setting plug, in the centre of the ring, has a slot for the setting key and a setting index in the form of a line at right angles to the slot.

The graze mechanism is assembled in a cylindrical container, capable of rotation within the fuze body, and consists of a fixed needle and an inertia pellet carrying an igniferous detonator. The pellet is held away from the needle by five pivoted centrifugal segments mounted on a ring shaped holder and encircled by an expanding spring ring. There is no creep spring.

The cylindrical container of the mechanism is retained in the body by a screwed securing ring engaging a shoulder near the base and has a diametrical projection at the base to engage a corresponding slot in the front face of the setting plug. The top of the container is closed by the needle holder which is secured by four screws and has an inclined flash channel.

The setting plug, slotted to engage the container, is coned to correspond with a coned seating in the body and is secured by a screwed ring. A sealing washer of lead is held between circular grooves in the plug and the ring. The key slot in the base of the plug is at right angles to the container slot but for clarity is shown parallel in the drawing.

A diaphragm formed in the body of the fuze separates the large recess for the mechanism container from the small recess at the head for the delay unit and the magazine. The diaphragm has three equally spaced flash holes, with any one of which the inclined flash channel in the needle holder can be aligned by rotating the setting plug to the appropriate graduation on the setting ring. Felt discs and an aluminium disc with perforations corresponding with the flash holes are inserted between the needle holder and the underside of the diaphragm. A recess for the locating pin of the delay unit is formed in the top of the diaphragm which is covered by similar felt discs.

The delay unit is held fixed in its recess by a locating pin in its base and consists of a cylindrical aluminium pellet with three equally

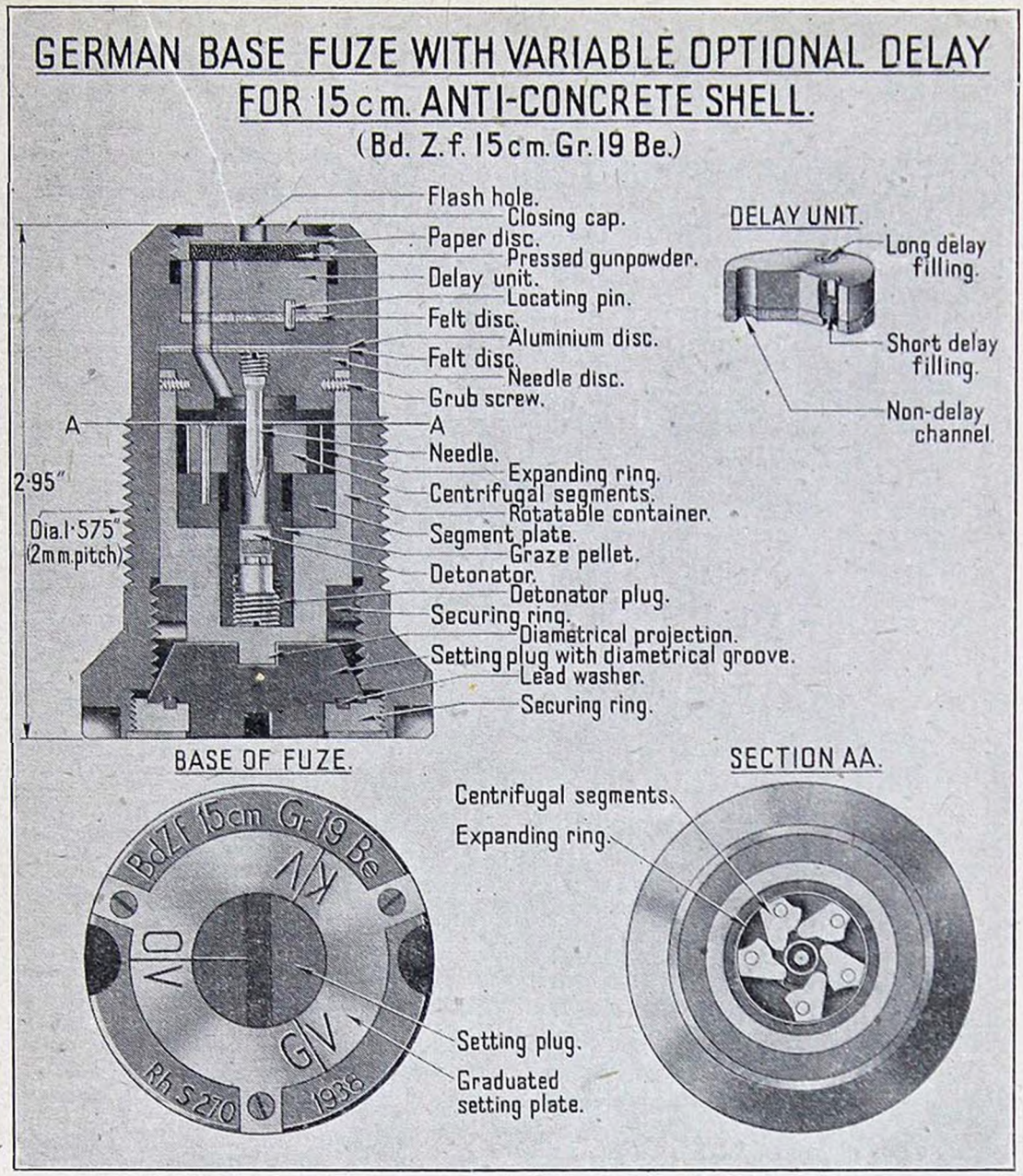


FIG. 6

spaced longitudinal channels of about ·1 inch diameter which coincide with the flash holes in the diaphragm. One of these channels contains no filling and provides a direct flash channel leading to the magazine when the inclined channel in the needle holder is aligned with it by rotating the setting plug to the " OV " graduation. The two other channels contain a pressed filling of delay composition with a central cavity of about ·04 inch diameter formed from the top. The cavity assists in the ignition of the gunpowder in the magazine, the depth being designed to give the required effective thickness in the delay composition (i.e., about ·2 inch in the long delay channel and about ·15 inch in the short).

The magazine consists of a screwed plug recessed at the underside to contain the gunpowder filling. A flash hole formed in the centre is closed on the inside by a paper disc.

Action

Before loading, the fuze is set for non-delay, short delay or long delay by turning the setting plug so that the index line on the plug coincides with the " OV ", " KV ", or " GV " graduations respectively. The turning movement of the plug is imparted to the mechanism container thus bringing the inclined channel in the needle holder into alignment with the appropriate hole in the diaphragm and channel in the delay unit.

During the travel of the shell up the bore, the pressure of the propellant gases presses the coned setting plug into its coned seating and compresses the lead washer between the plug and its securing ring. The gases are thus prevented from entering the fuze.

During flight, the coil of the expanding spring ring is enlarged and the segments swung clear of the path of the graze pellet by centrifrugal force. Independent rotation of the mechanism container is prevented by the setting plug forced tightly into its seating.

On graze, the pellet moves forward and the detonator is pierced by the needle. The flash from the detonator passes through the inclined channel in the needle holder and enters the hole in the diaphragm with which this channel has been aligned by the setting. With the fuze set for non-delay, the inclined channel is aligned with the hole corresponding with the empty channel in the delay unit, so the flash passes direct to the powder in the magazine. When set for short or long delay, the inclined channel coincides with the holes in the diaphragm corresponding with the appropriate channel in the delay unit. The flash then ignites the delay composition in the channel which burns through to the magazine.

With the setting plug at any position other than those indicated on the graduated ring, the inclined channel in the needle holder is masked by the washers and the solid parts of diaphragm. This would most probably prevent the ignition of the magazine and result in a " blind ".

GERMAN BASE FUZE WITH OPTIONAL DELAY FOR 21 CM. ANTI-CONCRETE SHELL

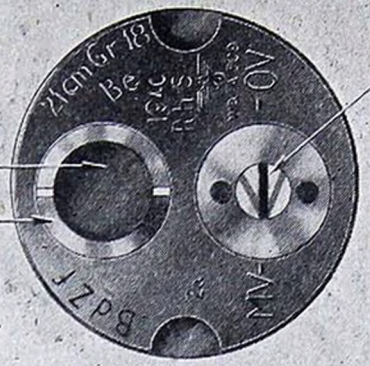
(Bd. Z.f. 21 cm. Gr. 18 Be.)

(Fig. 7)

The fuze is of the igniferous type and is used with a gaine in the anti-concrete shell (Gr. 18 Be) for the 21 cm. heavy howitzer (Mrs 18). The shell is described in Pamphlet No. 8. The designation of the fuze, " Bd. Z.f. 21 cm. Gr. 18 Be. ", is stamped in the base of the fuze where there is also a setting device for optional delay. The setting index is in the form of an arrow head which is set to a graduation

GERMAN BASE FUZE WITH OPTIONAL DELAY FOR 21cm. ANTI-CONCRETE SHELL.

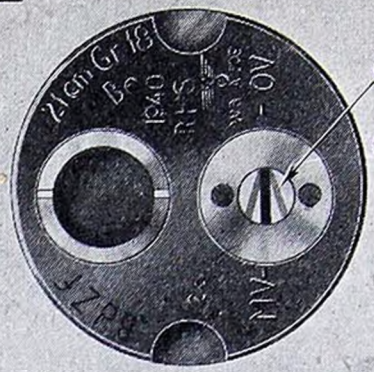
(Bd. Z. f. 21cm. Gr. 18.)



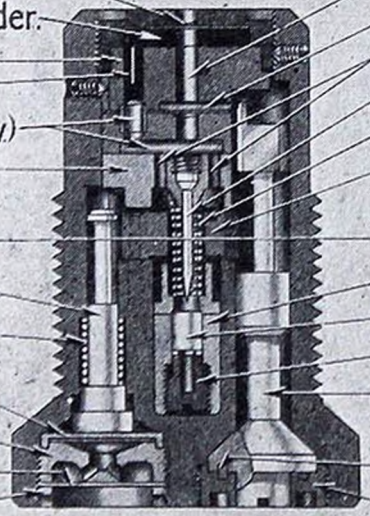
Closing disc.

Screwed collar.

Optional delay setting spindle. (set for delay.)



Optional delay setting spindle. (set for non-delay.)



Lightly closed flash hole.
Magazine filled powder.
Delay holder.
Delay pellet.
Flash channel. (delay)
Needle plate.

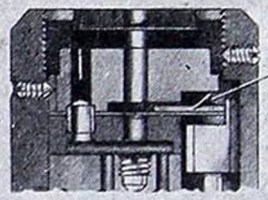
Flash channel. (non-delay)
Shutter closed for delay.
Flash holes.
Needle.
Creep spring.
Centrifugal segments.

C

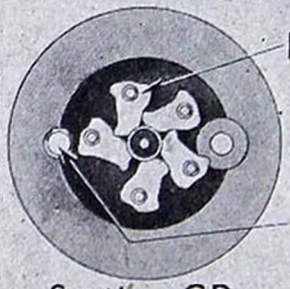
D

Locking spindle.
Spring.
Sealing disc.
Perforated screwed plug.
Closing disc.
Screwed collar.

Graze pellet.
Detonator.
Detonator plug.
Optional delay setting spindle.
Sealing ring.
Screwed collar.



Shutter open for non-delay.



Pivoted centrifugal segments.

Head of locking spindle.

Section CD.

Fig. 7
15

marked " MV " for delay or to a graduation mark " OV " for non-delay.

The graze mechanism consists of a fixed needle and an inertia pellet carrying the detonator with a creep spring inserted between the needle holder and the pellet. The needle holder is in the form of a disc with flash channels, the needle being secured by a screwed plug.

A safety device consisting of five pivoted centrifugally operated segments is fitted at the top of the pellet recess. The segments are shaped to interlock and, instead of being retained in the safe position by the usual expanding spring ring, the releasing segment is held by a locking spindle. The spindle is contained in a longitudinal recess displaced from the centre of the fuze and has a head formed on its inner end to engage the segment. The spindle is retained in this position by a spiral spring. The base of the spindle is of larger diameter for operation by the pressure of gases from the propellant charge and is covered by a copper sealing disc to prevent the gases entering the fuze. The copper sealing disc is secured by a perforated screwed plug and the recess is closed at the base by a foil disc secured by a screwed ring.

The optional delay device consists of a centrifugally operated shutter which is prevented from moving clear of the open flash channel in the delay unit by the setting spindle when set for delay. The shutter is carried on a platform fitted above the needle holder and is of the sliding type. The platform is recessed on the underside to form a cavity with two flash channels ; one leading to the open channel in the delay unit and the other, fitted with a sealing tube, to the delay channel. The setting spindle is contained in a second longitudinal recess, diametrically opposite to that containing the locking spindle, and has a portion of the head cut away to provide clearance for the sliding shutter when the spindle is set to the " OV " (non-delay) graduation on the base of the fuze. The spindle is coned near the base to correspond with a coned seating in the body so as to provide a seal against gas pressure and has a slot in the base for the setting key. A screwed collar in the base of the fuze retains the spindle in its recess. A sealing washer of lead is held in circular grooves between the collar and the spindle.

The delay unit is shaped at the base to fit over the shutter and has two longitudinal channels. One channel is central, contains no filling, and leads direct to the magazine. The other channel is displaced from the centre and contains a pressed filling of delay composition. This channel leads to the outer edge of the magazine.

The magazine contains pressed gunpowder and is closed by a screwed plug with a central flash hole. The hole is closed on the inside by a paper disc.

Action

Before loading, the fuze is set for delay or non-delay by rotating

the setting spindle so that the arrow head at its base is aligned with the " MV " or " OV " graduation respectively.

During the travel up the bore the propellant gases destroy the foil disc and, passing through the perforated plug, press the copper sealing disc and the locking spindle forward. The head of the locking spindle is thus moved clear of the segment which is free to move. The entry of the gases into the fuze is prevented by the copper sealing disc, the coned portion of the setting spindle and the lead washer being pressed into their seatings

During flight, the tendency of the graze or inertia pellet to move forward as the result of deceleration is prevented by the creep spring. Also, the centrifugal segments are rotated, in succession, clear of the path of the pellet by centrifugal force. With the setting spindle set to " OV " (non-delay) the shutter is also thrown outwards, leaving the direct flash channel to the magazine open.

On graze, the momentum of the pellet overcomes the creep spring and the detonator is impinged on the needle. The flash passes through the channels in the needle holder and enters the magazine via the central channels in the platform and the delay unit.

With the setting spindle set to " MV " (with delay) the head of the spindle prevents the shutter from moving clear of the central direct flash channel. The flash can then reach the magazine only by the channel containing the delay composition.

GERMAN s.10 cm. K.18 (10.5 cm. calibre) Q.F. CARTRIDGE

The cartridge is of the separate loading Q.F. type and is used in the 10·5 cm. gun " s.10 cm. K.18 ". The case, 17·5 inches in length, is fitted with a C/12nA percussion primer and normally contains sections No. 1 and No. 2 of the propellant charge, the mouth being closed for packing and transport by a grey steel cap. A super charge, numbered " 3 DR ", is packed separately in a container marked " Sonder kart. 3 s.10 cm. K.18 " and is used in the case in place of sections 1 and 2 when required. The model number of the case, " 6349," and the abbreviated designation of the equipment, " s.10 cm. K.18 ", are stamped in the base of the case. The marking " P.T.+25°C.", indicating the standard charge temperature on which the weight of the charge is based, is stencilled in red on the base of the case.

Propellant Charge

Sections 1 and 2 of the propellant are each contained in a bag of artificial silk. The two bags, arranged side by side, protrude from the mouth of the case and are choked at the neck. The bag containing No. 1 section has a comparatively large igniter sewn lightly to the base. The numerals of the sections are marked prominently in black near the top of each of the bags. The bag of No. 1 section, which is the larger of the two, bears the following markings in black:—

" s.10 cm. K.18 2,375 Kg. Digl.R.P.-GO,5-(450-3,1/1,5) " and, in red, " P.T.+25°C." The markings on the bag of No. 2 section differs only in the weight of the section which is " 910 g " instead of " 2,375 Kg.".

The propellant, as indicated by the markings, is of double base composition (nitrocellulose and diethylene-glycoldinitrate) in tubular form. The dimensions of the tubes being length 17·7 inches, external diameter ·122 and internal ·059 inches. The charge weights being, section No. 1, 5 lb. 3 oz. 11 dr. and section No. 2, 2 lb. 0 oz. 1½ dr.

The igniter, attached to the base of No. 1 section by a few stitches, is sufficiently large in diameter and is attached in such a way that it also fits under the base end of No. 2 section. The following marking appears on the igniter :—" s.10 cm. K.18, 40g Nz.Man.N.P. (1,5-1,5), 35 g. Ngl. Bl.P.--12.5-(40.40.0,2) ". These markings indicate a filling consisting of 1 oz. 6½ dr. of nitrocellulose powder (including potassium nitrate) and 1 oz. 3¾ dr. of double base (nitroglycerine and nitrocellulose) propellant. The N.C. powder is in the form of granular cylindrical pellets ·06 inch long and ·06 inch in diameter. The double base propellant is in the form of square flake, the dimensions being 1·6 × 1·6 × ·08 inches. The two fillings are separated by a disc of artificial silk sewn between the upper and lower discs of the igniter, the N.C. powder being nearest the primer. In some instances the igniter contains only the 1 oz. 6½ dr. filling of N.C. powder and the marking relating to the double base composition does not appear on the base.

The transit cap fitted over the protruding charge sections and the mouth of the case has two paper labels at the top. One is worded to the effect that the igniter with an additional filling is sewn to No. 1 section of the charge. The other gives the weight, nature and size of the propellant charge and the igniter filling. Stencilling in white on the side of the cap is to the effect that the cap is not for firing, and in some instances, that the cap is only for brass cases. The standard charge temperature is also stencilled in red on the side of the cap.

Super Charge (Sonderkart 3)

This charge is packed in a cylindrical container made of rolled paper and is inserted in the case in place of sections No. 1 and No. 2 when required. The white artificial silk bag containing the charge is approximately 30 inches long and 4 inches in diameter with an igniter at the base. The bag is choked at the top and is marked prominently in black " 3DR (gr.Ldg.) ". The following markings relating to the propellant charge are also black but in smaller lettering :—" s.10 cm. K.18 5,800 Kg, Digl. R.P.-G2-(750-5,9/3)." The marking " P.T. + 25°C." is also on the side of the bag in red.

The 12 lb. 12 oz. 8 dr. propellant charge, as indicated by the markings, is a double base composition consisting of diethylene glycoldinitrate and nitrocellulose and is in tubular form. The dimen-

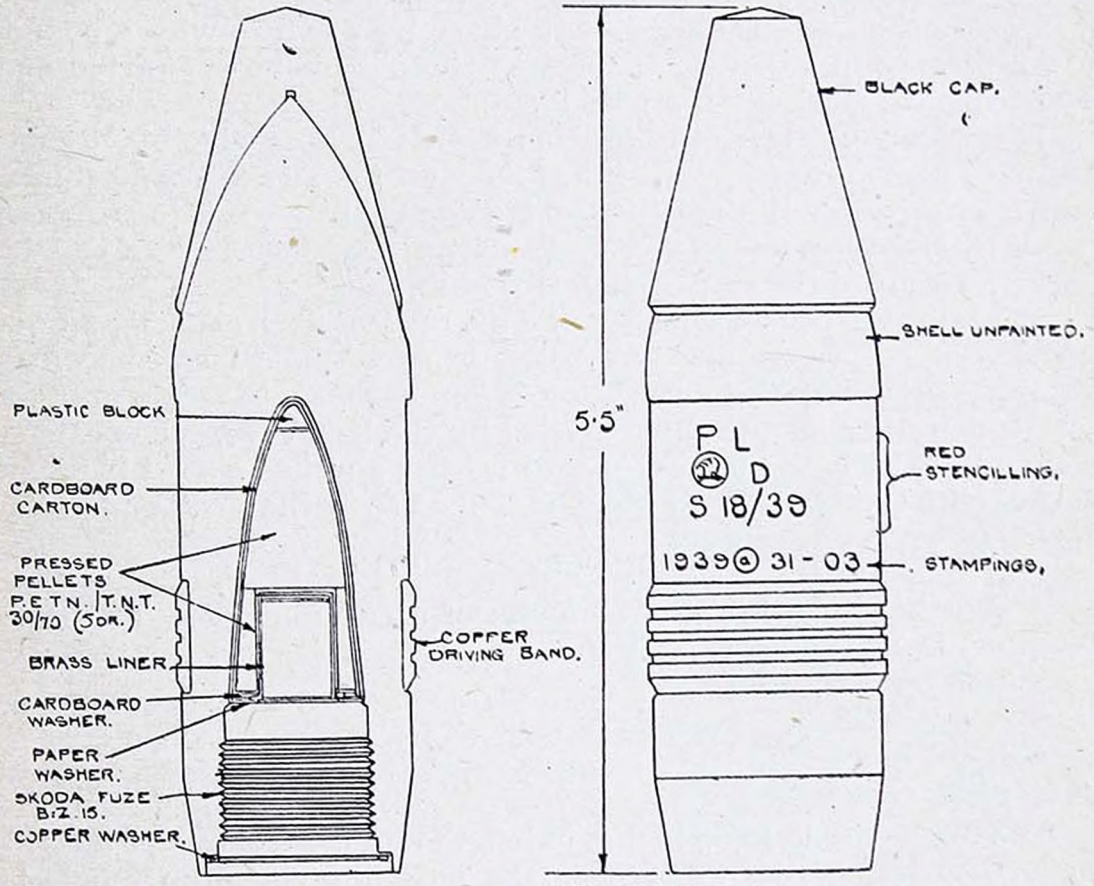
sions of the tubular cords are :— length 29·53 inches, external diameter ·232 inch, internal diameter ·118 inch.

The flat circular igniter stitched to the base of the bag is marked " s.10 cm. K.18 u. lg. 10 cm. K.T., 35 g. Ngl. Bl.P.-12,5(40 × 40 × 0,2)" indicating a filling of the same weight and composition as that of the square flake in the igniter attached to No. 1 section.

GERMAN 3.7 CM. CARTRIDGE, Q.F., A.P.C. OF CZECH ORIGIN

(Fig. 8)

The fixed Q.F. round is a Skoda production and is 14·85 inches long. The weight of the complete round is 3 lb. 2 oz. 12 dr. The cap of the shell is black but the body is unpainted and is stencilled



Filled weight 1 lb. 13 oz. 13 dr.

FIG. 8

in red. The stencilling includes the letters " PL " to indicate the bursting charge of P.E.T.N./T.N.T., the Skoda symbol followed by the letter " D " to indicate the filler and place of filling and a letter and numerals indicating the serial and number of the filled lot. The copper driving band has three cannelures. The brass case is 10·55 inches in length and has stamped in the base the designation " 3·7 cm. VZ 34 ". The stencilling, " P.P. Vz 36S ", relating to the propellant is found in black on the base of the case.

The complete round consists of the following components :—

(*a*) Armour piercing shell fitted with a penetrative cap and filled P.E.T.N./T.N.T. 30/70.

(*b*) Skoda base fuze B.Z.15.

(*c*) Brass case, 3·7 cm. Vz. 34.

(*d*) Propellant charge of double base composition in strip form with a decoppering agent.

(*e*) Medium percussion primer, Vz 33 s.v.

Shell

The steel body is machined from rolled bar and has a hardened head. The V.D. Hardness figure for the head averages about 800. The cavity for the bursting charge is of the small size characteristic of piercing shell and is closed at the base by the fuze with a copper washer. A copper driving band with three cannelures is fitted and the body, near the base, is streamlined.

The steel penetrative cap tapers towards its nose which is circular and rises slightly to form a point at its centre. The cap is machined from bar, hardened throughout and is attached by a soldering process. The V.D. Hardness figure averages about 675.

The weight of the empty shell is 1·76 lb.

The bursting charge consists of 5 dr. of P.E.T.N./T.N.T., 30/70, in the form of two compressed pellets in a cardboard carton. The upper pellet is solid, the lower being in annular form to receive a brass liner which fits over the gaine carried by the base fuze. The carton is closed at the base by a cardboard washer and has a solid block of the bakelite type at the top which is shaped to fit the small end of the shell cavity.

The weight of the shell filled and fuzed is 1 lb. 13 oz. 13 dr.

A similar shell with the remnants of a cap and filled T.N.T. is described in Pamphlet No. 2.

Fuze

The Skoda base fuze B.Z.15 is described in Pamphlet No. 2.

Cartridge Case

The brass case is 10·55 inches in length and has a shoulder formed by an increase in the taper near the mouth. The primer hole is screwthreaded to a diameter of ·66 inch.

Propellant Charge

The charge is in the form of long thin flexible strips with a smooth surface and has a paper label attached which reads " 152g. 06/6/210 P.P. Vz. 36S. 5C/37 ". This indicates the charge weight in grams (5 oz. 5½ dr.), the dimensions of the strip in millimetres (thickness ·024 inch, breadth ·236 inch, length 8·28 inches), the shape (P.P. denotes strip), the nature (V.Z. 36S) and the lot. The propellant consists of 63·96 per cent. of nitrocellulose, (Nitrogen content

12·3 per cent.), 30·06 per cent. of nitroglycerine and 5·98 per cent. of centralite.

The decoppering agent, included with the charge, is a 3·9 inch metal strip, ·24 inch wide and ·13 inch thick. The strip weighs 26 grains and consists of 60·4 per cent. of tin, 37·8 per cent. of lead and 1·8 per cent. of bismuth. There is also a trace of antimony.

Primer

The percussion primer Vz. 33 sv. is the medium size of the Vz. 33 type and differs from the Vz. 33 dv. described in this Pamphlet, in the length of the magazine which is 1·35 inches instead of 1·97 inches. The designation of the primer is stamped in the base.

GERMAN PRIMER, PERCUSSION, Q.F. CARTRIDGE, Vz. 33 OF CZECH ORIGIN

(Fig. 9)

The Vz. 33 percussion primer is a Skoda design of which there are three sizes, i.e. Vz. 33 dv. (long), Vz. 33 Sv. (medium) and Vz. 33 Kv. (short). These sizes can be identified by the designations stamped in the base of the primers. The long primer differs from the medium in the length of the magazine which is 1·97 inches instead of 1·35 inches. Details of the short primer are not yet available.

The primer shown in the drawing is the Vz. 33 dv. with the long magazine. The cap and the percussion arrangement, located inside the brass body, are of an unusual design. The copper cap is enlarged in diameter near the mouth to accommodate the brass anvil and contains the initiating composition in the smaller portion at the base. The composition consists of mercury fulminate 29·9 per cent., potassium chlorate 23·5 per cent., antimony sulphide 35·7 per cent. and 10·9 per cent. of ground glass. The ·5 grain pressing of the composition is shaped on the surface to conform with the anvil and is covered by a tinfoil disc without varnish. The anvil consists of a brass circular disc with a central protuberance underneath and a recess in the top. Four radial slots for the passage of the flash are formed around the protuberance. The cap is held between a brass closing plug, with a central flash hole, and the percussion arrangement.

The percussion arrangement consists of a steel ball supported in a brass holder by a plated steel disc. The holder is cylindrical with a recess at the top to receive the cap and another at the base into which the disc is sprung. The ball is located in a channel between the two recesses where it is held between the base of the cap and the spring disc.

Action

When the diaphragm at the base of the primer is forced in by the striker of the firing mechanism, the ball is driven against the base of the cap and crushes the initiating composition on the anvil. The

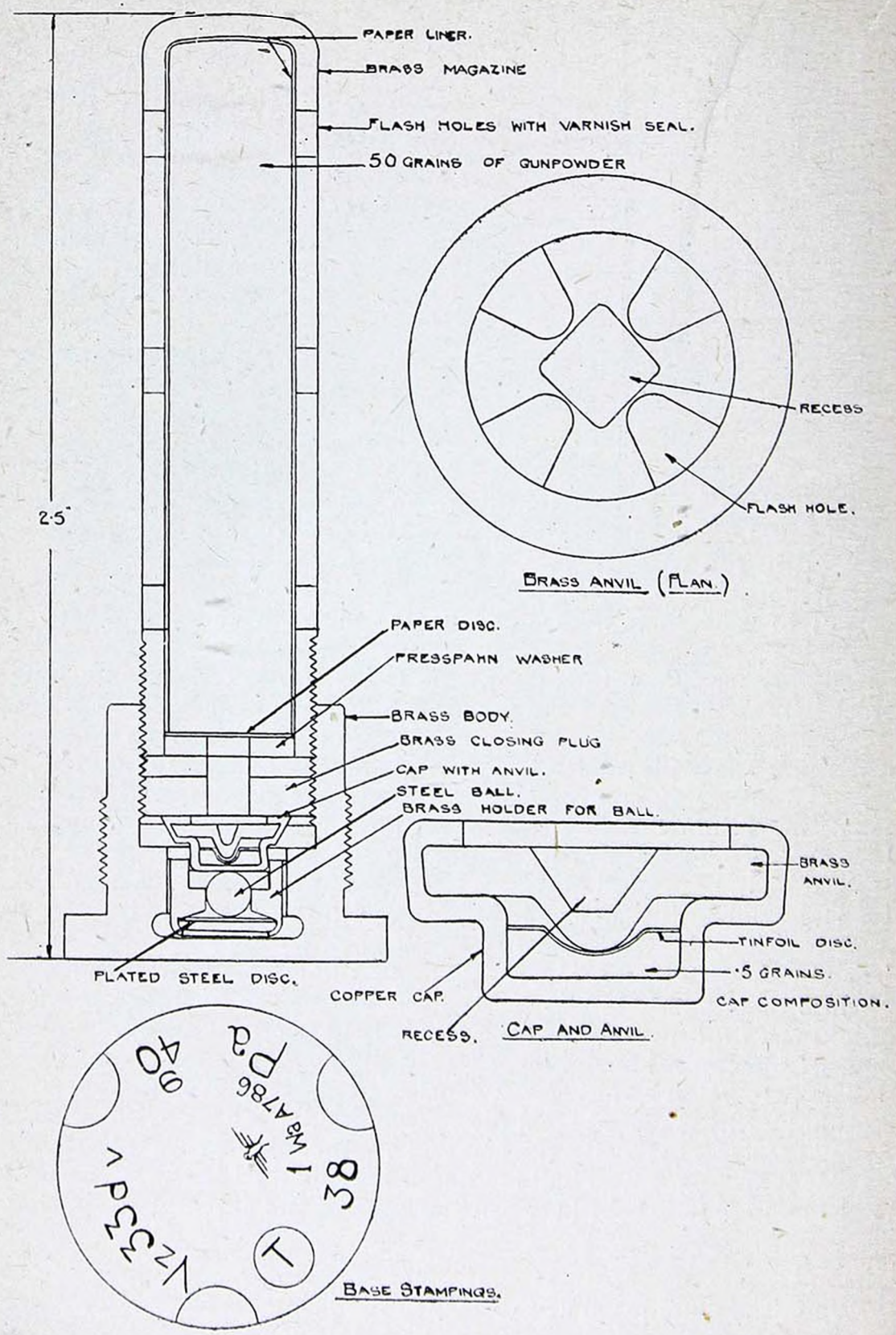

PAPER LINER.
BRASS MAGAZINE
FLASH HOLES WITH VARNISH SEAL.
50 GRAINS OF GUNPOWDER
2·5"
RECESS
FLASH HOLE.
BRASS ANVIL (PLAN.)
PAPER DISC.
PRESSPAHN WASHER
BRASS BODY.
BRASS CLOSING PLUG
CAP WITH ANVIL.
STEEL BALL.
BRASS HOLDER FOR BALL.
BRASS ANVIL.
TINFOIL DISC.
·5 GRAINS.
CAP COMPOSITION.
PLATED STEEL DISC.
COPPER CAP.
RECESS.
CAP AND ANVIL.
BASE STAMPINGS.

FIG. 9

flash passes through the slots in the anvil and through the hole in the closing plug to the powder in the magazine. The use of the ball for transmitting the striker blow to the cap ensures a central blow on the cap even if the striker of the firing mechanism is not concentric.

ITALIAN TIME FUZE GRADUATED TO 59

(Fig. 10)

The fuze has been found in the following shell :—

75/27 C.K. & A.V. anti-aircraft fragmentation shell.
75/27 Gun-how. shrapnel shell.
75/27 Gun-how. and 75/13 how. shrapnel shell.
77/28 How. shrapnel shell.

Somewhat similar in appearance to British fuzes of the No. 80 type, the fuze protrudes about 2 inches from the nose of the shell and is of the combustion type with two time rings and a tensioning cap. The upper ring is fixed and the lower setting ring is graduated to 59 and numbered to 58. The cap is of aluminium and is marked " T " in red. The rings and body are of aluminium alloy, but in some instances the periphery of the platform, bearing the setting index, is of brass. A brass fuze cover may be fitted and secured by a tear-off strip with a finger ring. The cover is also marked with the red " T " and an arrow with the word " TIRARE " indicating the direction in which the ring should be pulled for the removal of the cover. The screwthreaded portion of the fuze for insertion in the shell is 1·96 inches in diameter and has eight threads to the inch.

A fuze set to 58 gave a time of burning of 22·7 seconds at rest.

The body of the fuze has the normal type of platform formed around it with an inclined channel leading to the magazine. A felt washer on the platform is perforated to coincide with the channel which contains two perforated pellets of gunpowder. The magazine contains 44 grains of gunpowder and is closed at the base by a screwed plug with a lightly closed hole in its centre. Near its upper end the cylindrical part of the body has two semi-circular recesses for the locking pins of the upper time ring and is screwthreaded to receive the screwed retaining collar and the tensioning cap. A cylindrical recess is formed in the upper part of the body to accommodate the detonator assembly. The recess has a steel needle fitted in the centre of its base and a flash channel, leading to the upper time ring, in the wall. Two inclined surfaces to receive the arms of the stirrup spring are formed at the mouth of the recess. The lower part of the body, between the magazine and the recess, is solid.

The detonator assembly consists of a cylindrical brass pellet carrying an igniferous detonator in its base and supported by a brass stirrup spring. The upper end of the pellet is recessed to seat the larger end of a helical locating spring held between the pellet and a recess in the base of the cap.

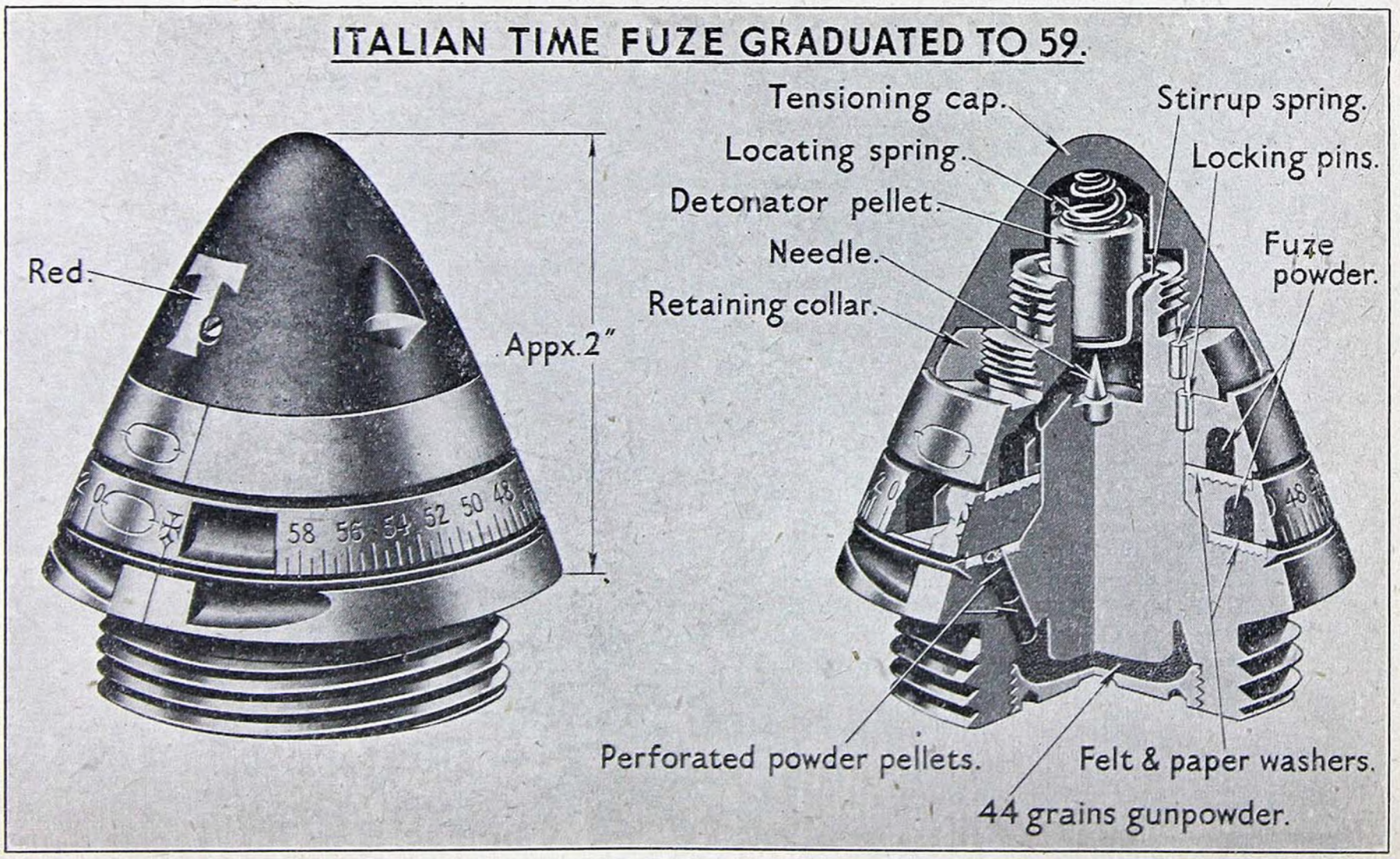

ITALIAN TIME FUZE GRADUATED TO 59.
Red.
Appx. 2"
58 56 54 52 50 48
Tensioning cap.
Locating spring.
Detonator pellet.
Needle.
Retaining collar.
Stirrup spring.
Locking pins.
Fuze powder.
Perforated powder pellets.
Felt & paper washers.
44 grains gunpowder.

FIG. 10

The time rings are of normal design each having the usual lightly closed vent containing a perforated pellet of powder at the commencement of the train of fuze powder. The upper ring has two semi-circular recesses in its inner face to coincide with those in the body for the reception of the two locking pins. The flash channel leading into the fuze powder filling in the ring contains no powder. The lower ring is rotated relative to the index on the platform in setting and is graduated from 0 to 59 in a clockwise direction. The graduations are sub-divided to indicate half divisions and every alternate main graduation (even numbers) from zero to 58 is numbered. The safety setting is indicated by a cross. The assembled rings are secured by the retaining collar screwed to the body above the upper ring and secured by a locking pin. The tensioning of the setting ring is adjusted at assembly by the screwed cap, which is then secured by a fixing screw. Coinciding lines scribed on the cap and the upper ring indicate the position to which the cap was turned to obtain the desired tensioning.

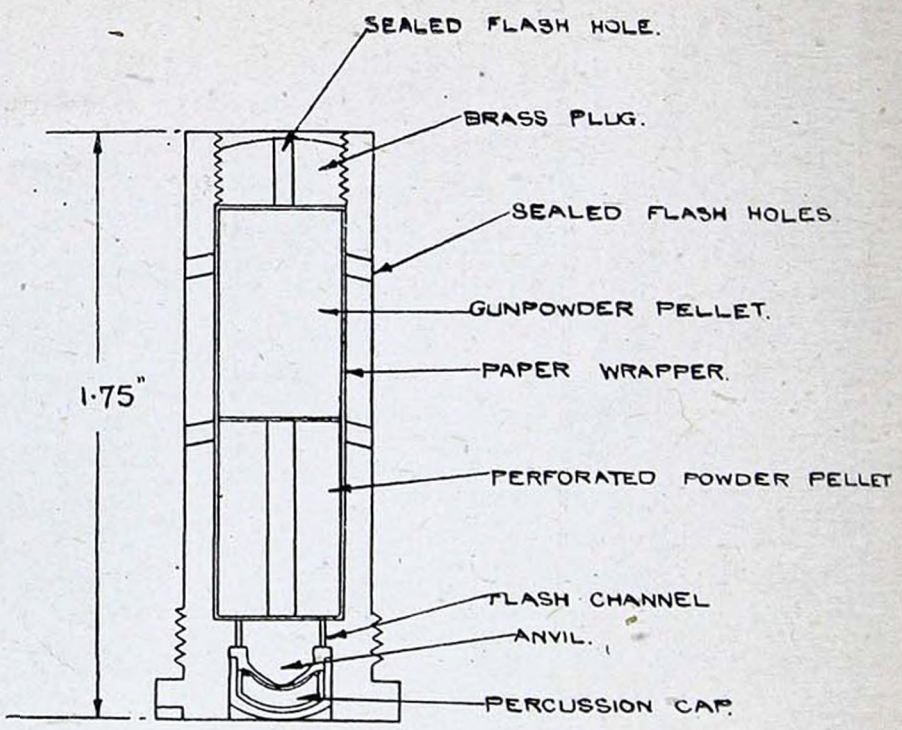
ITALIAN PRIMER PERCUSSION Q.F. CARTRIDGE MODEL 908

(Fig. 11)

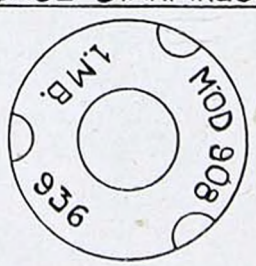
The base of the primer is stamped " MOD 908 " and has a cap chamber in which the brass cap holder is visible. The brass body is flanged at the base and has a short screwthreaded portion for assembly in the cartridge case. The plain portion of the body has two rows of flash holes which are inclined at ten degrees towards the base and are closed by a sealing composition. The cap chamber at the base has an anvil formed in it and two flash channels leading into the magazine. The interior of the body is shaped to form a cylindrical magazine and is screwthreaded at the top to receive the brass closing plug. The plug has a central flash hole which is also closed with a sealing composition.

The magazine contains two pellets of gunpowder in a paper wrapper. The lower pellet has a central perforation, the upper being solid. The powder consists of potassium nitrate 74·4 per cent., charcoal 16·5 per cent. and sulphur 9·1 per cent.

The copper cap is contained in a brass cap holder pushed into the cap chamber from the base and has a 1·8 grain initiator filling consisting of mercury fulminate 18·6 per cent., potassium chlorate 42·3 per cent. and 39·1 per cent. of antimony sulphide. The filling is pressed to form a cavity corresponding to the shape of the anvil and is covered by a disc of tinfoil without varnish.



BASE STAMPINGS.



CAP.

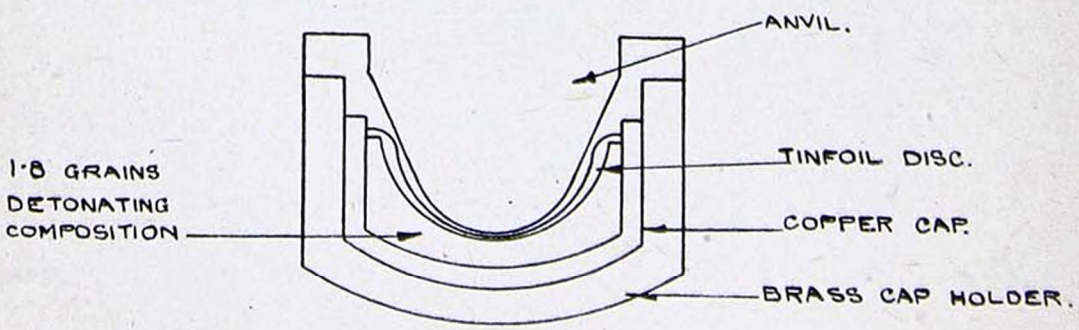
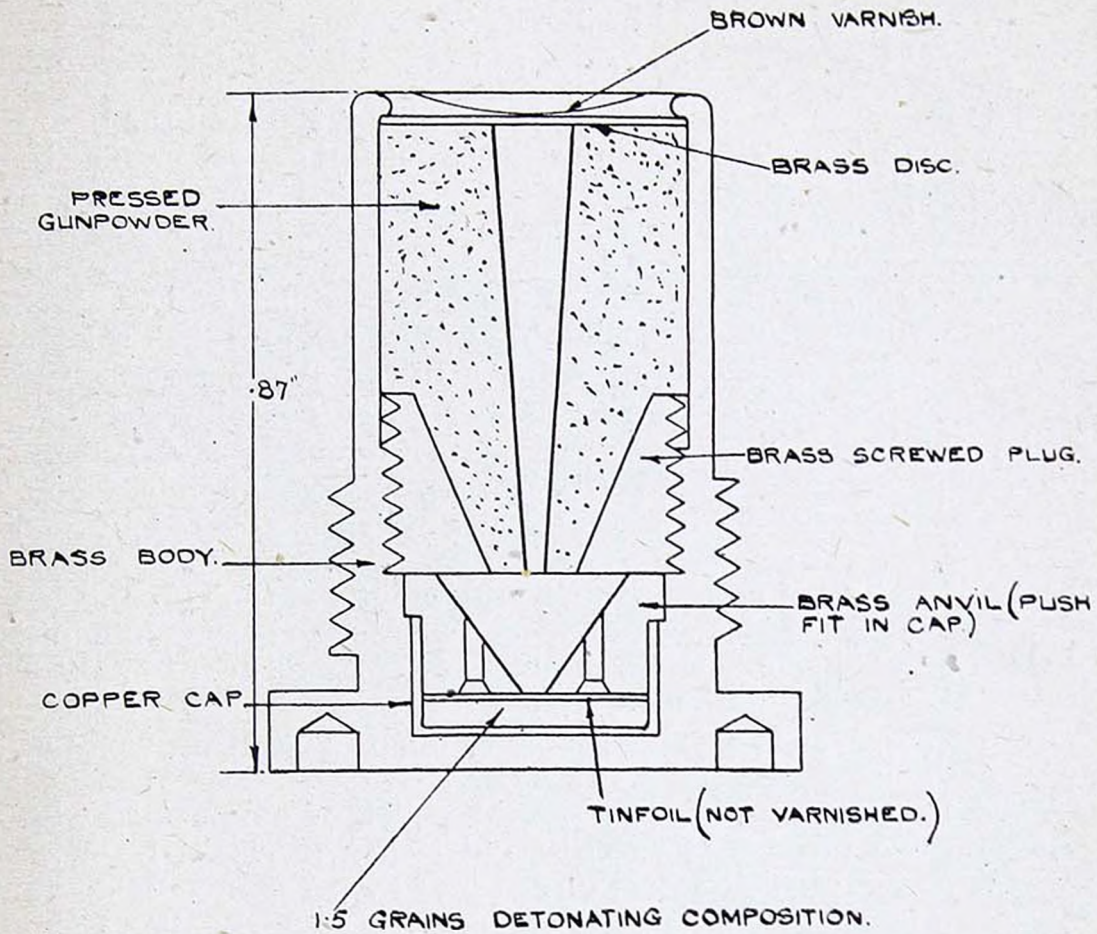


FIG. 11



BASE STAMPING.

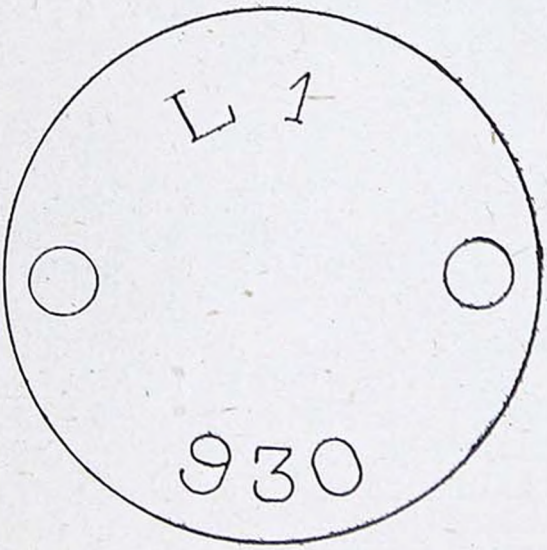


FIG. 12

ITALIAN PRIMER PERCUSSION Q.F. CARTRIDGE MODEL 930

(Fig. 12.)

The primer is identified by the stamping " 930 " on the base and is of the type in which the percussion cap is not exposed. The brass body is flanged at the base and is screwthreaded over the lower part for insertion in the cartridge case. The interior is shaped to form a cap chamber and magazine and is partly screwthreaded to receive a screwed plug which supports the magazine filling and retains the anvil in position. The cap chamber has a base ·045 inch thick and has a shoulder near the top to support the anvil.

The copper cap is large in diameter and contains a 1·5 grain initiator filling consisting of mercury fulminate 28·4 per cent., potassium chlorate 34·4 per cent., antimony sulphide 35·6 per cent. and 1·6 per cent. of glass. The filling is covered by a disc of tinfoil without varnish.

The brass anvil is a push fit in the mouth of the cap and has a hole through the centre which tapers towards the base. In addition there are two smaller flash holes which are enlarged at the base. The base of the anvil is of unusual shape.

The screwed plug also has a hole through the centre which tapers towards the base.

The magazine contains a pressed pellet of gunpowder with a tapering hole through the centre and is lightly closed by a brass disc. The top of the body is turned inwards to secure the disc and a waterproofing seal of varnish applied to cover the disc and the junction.

ITALIAN 75/27 CK. & 75/27 A.V. :—CARTRIDGE, Q.F., H.E., FRAGMENTATION

(Fig. 13)

The shell, fitted with a 10·9 inch brass cartridge case carrying a Model 35 percussion primer and a double base propellant charge, forms a fixed Q.F. round for the 75 mm. 27 calibre C.K. and A.V. anti-aircraft guns. The shell is fuzed with a time fuze and, excepting a rust-proofed band near the shoulder, has either a pale blue or blue body with a ·6 inch darker blue band painted ·8 of an inch above the driving band. Blue shell of this type without a band marking have also been met with. The fuze-hole adapter, forming the head of the shell, has a marked reduction in diameter forming a cylindrical neck immediately below the fuze. The head of the shell (i.e. the adapter and the forward end of the body) is painted an orange red. The following details are stencilled on the body in black :—" Kg.6.3, TRITOLO " (enclosed in rectangle), " 75/27 C.K., 75/27 A.V.". The time fuze is marked with a red " T " on the cap and may be

fitted with a brass cover secured by a tear-off strip with finger ring. The cover also bears the red " T " and an arrow with the marking " TIRARE ". The length of the complete round is 20·5 inches.

The fuzed shell is 11·2 inches in length and when filled and fuzed weighs approximately 14 lb.

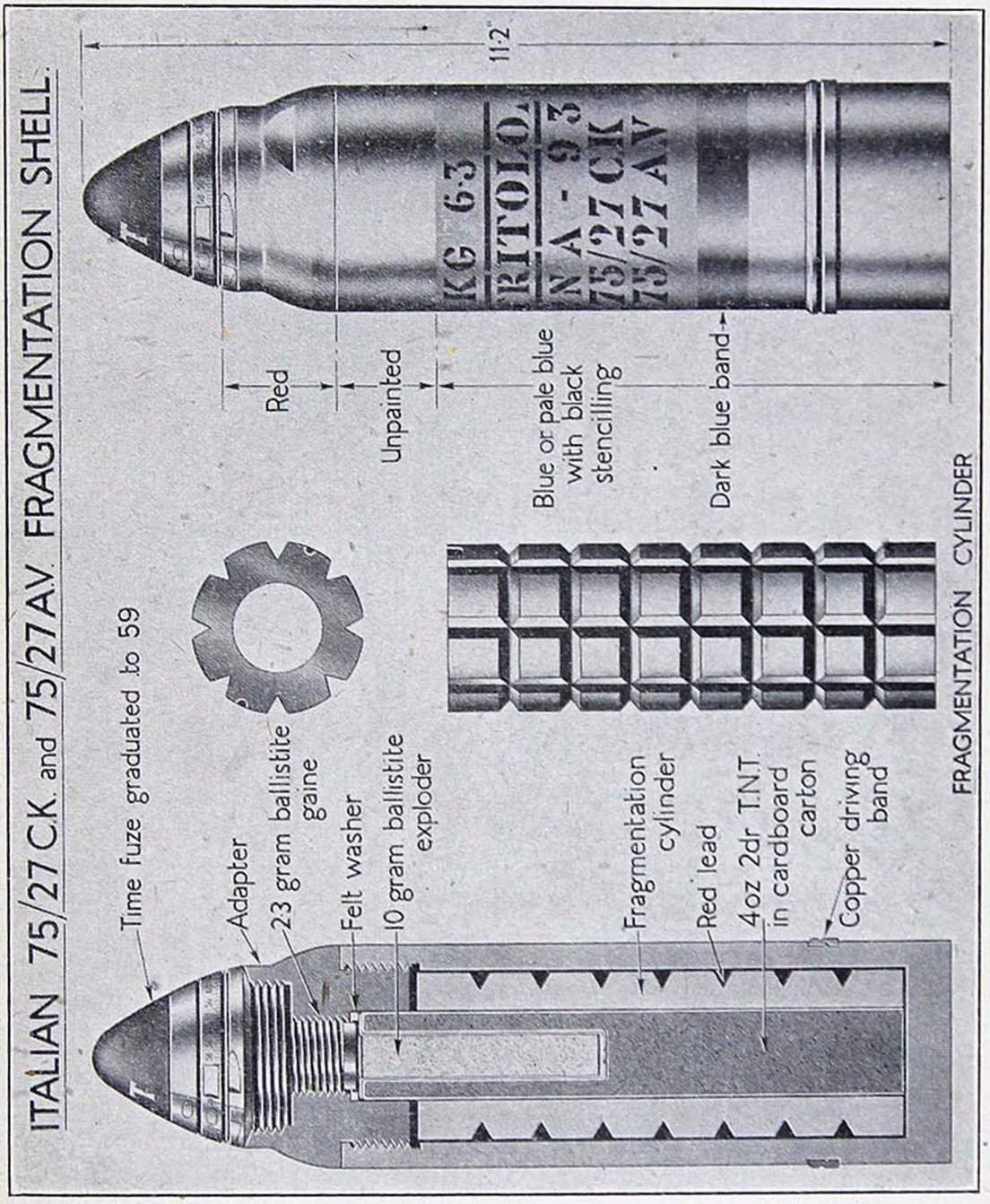


FIG. 13

Shell

The cylindrical shell body is of forged steel with a comparatively thin wall and is fitted with a copper driving band. The forward end

is screwthreaded internally to receive the adapter. The body contains a fragmentation cylinder machined from grey cast iron which is grooved along its length and circumferentially on the exterior to assist fragmentation. A channel is formed through the centre of the cylinder to accommodate the bursting charge. Red lead is inserted between the exterior of the cylinder and the wall of the shell and in the fragmentation grooves. The fuze-hole adapter is machined from grey cast iron and is screwthreaded internally to two diameters to receive the gaine and fuze respectively. The exposed portion of the adapter forms the head of the shell and is shaped to form a sloping shoulder with a cylindrical neck. The base of the adapter is recessed to fit over the forward end of the bursting charge.

The weights of the shell components are as follows :—

Body	6·98 lb.
Fragmentation cylinder	3·85 lb.
Adapter	1·87 lb.
Total	12·7 lb.

Bursting Charge

The bursting charge consists of approximately 4 oz. 2 dr. of cast T.N.T. in a cardboard carton. A cavity formed in the head of the charge to accommodate the exploder is lined with a cardboard tube. A felt washer is inserted between the top of the filling and the base of the adapter and gaine and a felt disc is inserted in the bottom of the exploder cavity.

Exploder

The exploder consists of 5·5 drams of ballistite flake in a cylindrical brass body. The body is approximately 3·1 inches in length with a small central hole at each end, closed on the inside by a fabric disc.

Gaine

The 2·3 gram ballistite gaine used below the time fuze is described in Pamphlet No. 7.

Fuze

The combustion type of time fuze, graduated to 59, is described in this pamphlet.

Propellant Charge

The propellant charge is contained in a bag with a red igniter bag of gunpowder approximating to G.20 tied at the base. Charges of two types are used, both being of double base propellant. One consists of 1 lb. 3 oz. 5 dr. of a ballistite in strip form, the dimension of the strips being $8{\cdot}3 \times {\cdot}4 \times {\cdot}038$ inches. The composition of the propellant, as found by analysis is :—nitrocellulose (including inorganic matter) 60·29 per cent., nitroglycerine 25·54 per cent. and dinitrotoluene 14·17 per cent. The bag containing the charge is marked " Ballistite Attentuata In Piastrine $1 \times 10 \times 210$ ". The

igniter bag contains about 160 grains of gunpowder and is marked " 10 Gr.". The other type of charge consists of 1 lb. 3 oz. 11¾ dr. of a cordite in tubular form, the external and internal diameters of the 8·05 inch tubes being ·131 and ·042 inches respectively. The composition of the propellant, as found by analysis is :—nitrocellulose (including inorganic matter) 71·53 per cent., nitroglycerine 23·73 per cent. and mineral jelly 4·74 per cent. The bag containing the charge is marked " P.O.508,008 DNC 1933 " (these markings are very indistinct). The igniter bag contains about 160 grains of gunpowder.

Primer

A description of the percussion primer, model 35, is given in Pamphlet No. 7.

Fragmentation

As the result of trials it has been found that the break up of the fragmentation cylinder generally follows the lines of weakness as designed by the grooving but the segments also undergo considerable fragmentation. The dispersion of the fragments is mainly lateral.

ITALIAN 149/13 LIGHT CASE H.E. SHELL

(Fig. 14)

The shell is fired from the 149 mm. 13 calibre field howitzer with a separate loading Q.F. cartridge and, without the fuze, is 25·96 inches (approx. 4·5 calibres) long. From the nose to the shoulder the shell is painted red or orange and from the shoulder to a 1·6 inch green band above the copper driving band the body is sherardised and is pale blue. Behind the driving band the shell is painted white and has two black strips painted at right angles across the base and continued up the wall to the driving band, thus producing four black longitudinal strips behind the band. The weight marking " Kg. 42 " and the letters " M.B.T." enclosed in a rectangle which indicate the bursting charge to be shellite are stencilled on the ogive. The calibre in millimetres and the length of the howitzer in calibres are stencilled at about the centre of the body in the form " 149/13 ". A small aluminium transit plug with knurling near the head protrudes from the Inneschi fuze in the fuze hole at the nose. The weight of the shell, filled and fuzed, is approximately 93 lb. 8 oz. The weight of the bursting charge is 16 lb. 7½ oz.

Shell

The shell, weighing 85·74 lb., consists of three main parts, the body, the diaphragm and the head.

The body is of forged steel with a comparatively thin wall and a correspondingly high capacity. A narrow driving band, wholly of copper, with a single cannelure is fitted at one and a half inches from the base. There is no base plate. The forward end of the body is shaped to correspond with the contour of the ogival head and is

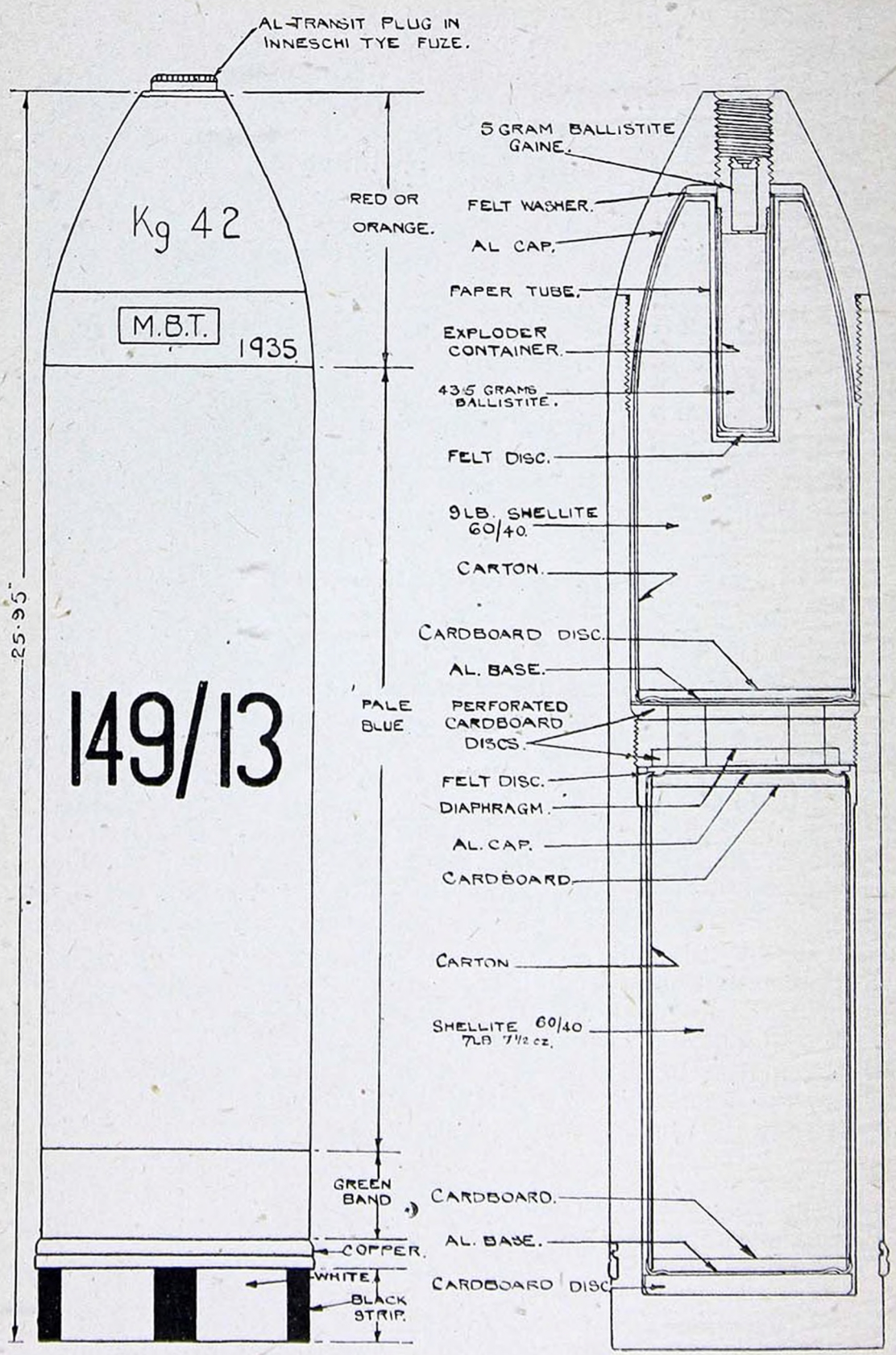

AL-TRANSIT PLUG IN INNESCHI TYE FUZE.
Kg 42
M.B.T.
1935
149/13
25·95"
RED OR ORANGE.
PALE BLUE
GREEN BAND
COPPER.
WHITE
BLACK STRIP.
5 GRAM BALLISTITE GAINE.
FELT WASHER.
AL CAP.
PAPER TUBE.
EXPLODER CONTAINER.
43·5 GRAMS BALLISTITE.
FELT DISC.
9 LB. SHELLITE 60/40.
CARTON.
CARDBOARD DISC.
AL. BASE.
PERFORATED CARDBOARD DISCS.
FELT DISC.
DIAPHRAGM.
AL. CAP.
CARDBOARD
CARTON
SHELLITE 60/40 7LB 7½ oz.
CARDBOARD.
AL. BASE.
CARDBOARD DISC.

FIG. 14

screwthreaded internally for its assembly. The cavity for the bursting charge is machined throughout and is screwthreaded at about the centre for the insertion of the diaphragm which thus strengthens the wall. The diameter of the cavity in front of the diaphragm is 4·88 inches. Behind the diaphragm the thickness of the wall is increased by the diameter being reduced to 4·46 inches at this part of the cavity. A chemical analysis of the steel shows the composition includes :—chromium ·69 per cent., manganese 1·26 per cent., silicon ·24 per cent., phosphorus ·02 per cent., sulphur ·052 per cent. and nickel ·26 per cent. The Vickers Diamond Hardness figures average 274.

The diaphragm is a circular plate of forged steel with an external screwthread for insertion in the cavity. Four equally spaced holes of ·79 inch diameter are drilled about midway from the centre. The underside is recessed.

The head is ogival with a fuze hole at the nose and is of forged steel machined internally and externally. The lower portion is screwthreaded externally for assembly with the body.

Bursting Charge

The 16 lb. 7½ oz. bursting charge of shellite 60/40 (trinitrophenol 60, dinitrophenol 40) is contained in two cartons, inserted with paraffin wax, one in each part of the cavity. The cartons are made of thick paper interleaved with aluminium foil and are fitted with aluminium end pieces. The carton in the lower part of the cavity is cylindrical and contains a 7 lb. 7½ oz. block of shellite. A cardboard disc is inserted in the base of the cavity below the carton and a felt disc is placed over the head. The recess in the underside of the diaphragm contains a cardboard disc with perforations corresponding with those in the diaphragm. A similar disc covered by a disc of thin cardboard covers the front face of the diaphragm.

The carton in the upper part of the cavity is shaped to suit the ogival head of the shell and includes a paper tube closed at the base to line the exploder cavity and contains a steel exploder container. The exploder container is screwed to the gaine and has a felt disc at the base. The carton contains a 9 lb. block of shellite and has a felt washer placed over the head.

Exploder

The exploder container, screwed to the gaine, contains 43·5 grams of graphited ballistite in the form of ·022 inch cubes. The ballistite consists of nitrocellulose 50·47 per cent. (Nitrogen content 12·25 per cent.), nitroglycerine 48·96 per cent. and ·57 per cent. of graphite.

Fuze and Gaine

The fuze is of the Inneschi type described in Pamphlet No. 7 but has a larger body. The gaine contains a 5 gram filling of ballistite and differs from the 2·3 gram type shown in Pamphlet No. 7 (Fig. 8C) in being longer. The lower portion of the body is reduced in diameter and screwthreaded for insertion in the top of the exploder container. The ballistite consists of 57·82 per cent. of nitrocellulose (Nitrogen content 12·12 per cent.) and 42·18 per cent of nitroglycerine.

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