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AMMUNITION BULLETIN N°31

FOR INSPECTING ORDNANCE OFFICERS

AND

A.A. AMMUNITION OFFICERS.

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CHIEF INSPECTOR OF ARMAMENTS,

AMMUNITION BULLETIN NO. 31

for

INSPECTING ORDNANCE OFFICERS

and

A.A. AMMUNITION OFFICERS.

ISSUED BY -

CHIEF INSPECTOR OF ARMAMENTS,
WOOLWICH.CONTENTS

ITEMS 597 - 634.

- 630 Amendments.
- 623 Approved Metallic Packages.
- 629 Bangalore Torpedo 2 inch Mk. I. Alteration to markings.
- 614 Cartridge Q.F. super velocity 2 pdr. Marking of cartridges and packages.
- 612 Cartridge Q.F. 17 pdr. Batch labels giving adjusted charge weights.
- 597 Cartridges Q.F. 25 pdr. Markings on cartridge cases and packages containing composite charge N.H./F.N.H. Powder.
- 620 Cartridge S.A. blank .303 inch L Mk. V.
- 621 Chemical Training mixtures.
- 602 Fuze, point detonating, M.53 (Fig. 249).
- 609 Fuze, point detonating, M.57 (American). Nomenclature.
- 599 Grenade, A.T. M.9A1 (Fig. 247)
- 600 Grenade A.T. Practice, M.11A1.
- 604 Grenade, hand, fragmentation, Mk. II (American) (Fig. 251).
- 605 Grenade, hand, offensive, Mk. III A.1. (American) (Fig. 252).
- 619 Grenade No. 68 A.T.
- 603 Gun, 76 m.m. M.1. Complete round with shell, H.E. M.42A1 (American) (Fig. 250).
- 606 How. 75 m.m. M.1 and M.1A1 (American). Complete round with shell H.E. A.T. M.66. (Fig. 253).
- 616 Life of N.C.T.
- 617 Loading of Railway Vehicles.
- 625 Marking Detonators.
- 627 Marking of Small Arm Cartridges.
- 615 Marking on Small Arm Cases.

- 608 Mine Anti-Tank M.l. (American). Replacement of Fuzes M.l by Fuze M.l.A1. and Boosters M.l.A1. (Fig. 255).
- 609 Mine, Anti-Tank, Dutch. (Fig. 248).
- 624 Packing of Small Arm Ammunition and Signals.
- 607 Primers percussion Q.F. cartridge. Marking of Boxes Ammunition containing "Q" primers.
- 611 Propellants. Code letter for F.N.H./D.B.
- 610 Propellants. Stability of M.4.X.
- 613 Propellants. Service life of N.C.T. of 1914-1918. Manufacture extended.
- 598 Rocket U. 5 inch. Marking of Tails propelling and packages containing light-weight propellant charges.
- 626 Small Arm Cartridges for Aircraft.
- 622 Smoke Weapons.
- 628 Station Monograms.
- 618 Tracers.

ENEMY AMMUNITION

- 634 German Ammunition markings and nomenclature.
- 633 German Cartridge Q.F. 3.7 c.m. H.E/Tracer (3.7 c.m. Sprenggranat-Patrone). (Fig. 258).
- 631 German H.E. Anti-Tank, Hollow charge Rifle grenade. (Fig. 256).
- 632 German H.E. Rifle and Hand, self-destroying grenade. (Fig. 257).

597. CARTRIDGE, Q.F., 25 PDR. MARKINGS ON CARTRIDGE CASES AND PACKAGES CONTAINING COMPOSITE CHARGE N.H./F.N.H. POWDER.

A composite charge, consisting of N.H. powder for Charge 1 and F.N.H. powder for Charges 2 and 3, has been introduced for this cartridge.

Cartridge cases and packages containing this composite charge will bear the propellant code letter "L".

598. ROCKET U, 5 inch. MARKING OF TAILS PROPELLING AND PACKAGES CONTAINING LIGHT-WEIGHT PROPELLANT CHARGES.

Certain lots of propellant charges for Tails Propelling, Rocket U, 5 inch, have been found to be approx. 4 ozs. light and to range approximately 200 yards shorter than those with the normal charge. To facilitate recognition all tails filled with such charges are now marked with the legend "L.W.T." in one inch red letters below the date of filling the igniter.

Boxes packing tails containing light weight charges are marked with these letters in one inch red lettering on both sides and both ends. The contents of such boxes, issued in the past, will be found to be without the special marking.

599. GRENADE, A.T. M. 9A1 (Fig. 247)

1. This American hollow filled steel grenade is fired from a rifle fitted with a grenade firing attachment. It consists of the following components:-

- Body in two parts - Head and Base (with cone).
- Body union.
- Fuze body.
- Stabilizer with fins and wood plug.

2. The head is flanged at its open end and clinched to a flange formed on the lip of a cup shaped base, the cone being seated on the flange of the base.

3. The lower end of the base is turned into the body union which is screw threaded internally and screwed on to the front end of the fuze body. The rear end of the fuze body has 4 screw holes around its exterior.

4. A tubular steel stabilizer is secured to the rear end of the fuze body by 4 screws and spot welds. It contains the S.A. cartridge and 3 fins are fitted to its rear end which is closed by a wood plug for transit purposes.

5. A bursting charge of cast 50/50 and 10/90 Pentolite is contained in the base portion of the body to form a hollow charge.

6. The fuze body accommodates the firing pin and spring, the detonator holder and booster cup. The firing pin is held clear of the detonator when in the safe position by a safety pin, one end of which passes through a hole in the fuze body and engages in a groove formed around the exterior of the firing pin. A spring is interposed between the head of the firing pin and the detonator holder.

An aluminium detonator cup seated on a cork washer in the detonator holder contains .98 grains primer mixture, 2.95 grains lead azide and a 1.26 grain C.E. pellet. It is closed at each end with an aluminium disc. A retaining disc of aluminium is placed over the top of the detonator. A brass cup containing a C.E. booster pellet,

covered with an onion skin paper disc is screwed in to the fuze body.

7. S.A. Cartridge.

A brass Cartridge, Rifle Grenade, .30M2 or .30M3 in a moisture proof wrapper, is issued with the grenade and carried in the stabilizer tube.

8. Colour and Markings.

The grenade is painted yellow and bears the following markings in black on the body:-

Grenade, A.T. M9A1
Lot No., Manufacturers initials. Month and year
of manufacture.

9. Dimensions and Weight.

Overall length of grenade without wood plug - 11.24 inches.
" " " " with " " - 12.115 "
Weight, with cartridge 1.31 lbs.

10. Action.

The wood plug and S.A. cartridge are removed. The cartridge is inserted in the rifle and the grenade is placed on the firing attachment and the safety pin withdrawn.

During flight the firing pin is held apart from the detonator by its spring. On impact the firing pin travels forward against its spring and initiates the detonator.

The head of the grenade acts as a ballistic cap in flight and as a distance piece on impact to ensure maximum effect from the hollow charge.

11. Packing.

Packing details are not yet available.

600. GRENADE, A.T. PRACTICE, M.11A1.

1. This steel practice grenade is slightly shorter than Grenade, A.T. M.9A1, being 11.18 inches in length without the wood plug. Weight of grenade with cartridge is 1.315 lbs., the weight being adjusted by a steel rod screwed into the fuze body.

Alternatively, the base portion of the body may be of cast iron, the weight of grenade being adjusted by the thickness of the walls.

2. Colour and Markings.

The grenade is painted black and bears the following markings in white on the body:-

Grenade, A.T. Practice, M.11A1.
Lot No., Manufacturers initials. Month and Year.

3. Packing.

Packing details are not yet available.

601. MINE, ANTI-TANK, DUTCH (Fig. 248)

1. The mine, of American manufacture, consists principally of a hood, body and fuze. Both the hood and body are of sheet steel.
2. The hood is fitted with a steel lifting handle and is bored centrally to receive a knurled plug. An 'outer' ring of steel is soldered to the underside of the hood and a steel coil spring is positioned between the body and the hood. 4 slots are cut in the hood to allow movement of the hood over 4 steel bolts secured to the body.
3. The body is bored centrally with an 'inner' ring of steel soldered to its underside and carries the fuze assembly and bursting charge. A steel bottom plate is crimped to the body through 360°, the joint being sealed with a moisture proof compound. 4 steel bolts, which pass through 4 slots cut in the hood, are secured by nuts to the body.
4. The fuze assembly comprises a body, firing pin assembly, detonator holder, pellet tube, shear pin and safety pin. During transit and storage a cork plug is inserted in the mine in place of the fuze assembly.

Body.

The brass body is bored at one end to take the firing pin assembly and threaded internally at the other end to receive the detonator holder. At the firing pin assembly end is a flange through which a hole is drilled to receive the safety pin, the flange is knurled on its external radius. Immediately below the flange is an undercut through which a hole is drilled to take the shear pin and external threads are formed to screw the fuze body into the body of the mine.

Firing pin assembly.

Consists of a brass sleeve, flanged at one end, over which fits a cadmium plated arming spring. A small hole is bored centrally through the flange to receive the steel firing pin which is crimped over to secure it. In the body of the sleeve are two holes, one to take the shear pin, the other, nearer the end remote from the firing pin, to take the safety pin.

Detonator holder.

The brass holder is threaded externally and bored out to receive the detonator, a diaphragm being left at one end. After the detonator has been inserted in the holder an upstanding lip on the holder is rolled over to keep the detonator in place. At the diaphragm end of the holder a seating is formed to take the pellet tube. The outstanding edge of this seating is rolled over a lip on the pellet tube.

Pellet tube.

The brass tube is closed at one end. At the other end a lip is formed to facilitate attachment of the tube to the detonator holder. 3 C.E. pellets of approximate weight 14 grains each, are seated on a felt washer in the pellet tube.

Shear pin.

The pin is of soft copper with a shearing load of 180-240 lbs.

Safety pin.

The pin is of brass with an eye formed at one end to which is attached a short length of cable cord.

5. Filling.

The mine is filled with approximately 6 lbs. T.N.T. C.E. booster pellets, seated on a felt washer, are located on the bottom plate of the body concentric with the axis of the mine. One of the booster pellets is a ring pellet into which is inserted a cadmium plated steel pellet tube cup which accommodates the brass pellet tube. A protecting washer of cadmium plated steel is seated on the ring pellet.

6. Preparation.

To prepare the mine for firing the knurled plug in the hood is unscrewed and the cork plug removed from the fuze cavity. (Care should be taken to see that the coil spring is in position.) A fuze is then screwed in and, the safety pin being removed, the knurled plug is screwed fully home.

7. Action.

Pressure applied to the hood of the mine is transmitted by the plug on to the firing pin sleeve in the fuze assembly. Continued pressure on the sleeve causes the shearing wire to break and the arming spring to force the firing pin down on to the detonator, so initiating the detonation of the filling through the C.E. booster pellets.

8. Painting and Marking.

The mine is painted an Olive drab, dull finish, and the hood bears the marking, "AM - 41" in red.

9. Dimensions and Packing.

Overall diameter of mine approx. $8\frac{1}{2}$ inches.
Height, assembled, approx. $3\frac{1}{2}$ inches.

Five mines and, separately, five fuze assemblies each in a metal container provided with a tear strip for opening, are packed in a wooden service box fitted at its centre with a steel strap. The box is painted Olive drab and its dimensions are 25 $13/16$ inches long, 10 inches wide and 10 $13/16$ inches high.

No details of box markings are yet available.

602. FUZE, POINT DETONATING, M. 53. (Fig. 249)

1. This D.A. type American fuze, details of which are shown in Fig. 249 is of aluminium-alloy. The striker comprises an aluminium alloy head with a steel firing pin, riveted together. A brass shearing wire passes through the firing pin and the fuze body.

A delay element is interposed between the upper detonator and the detonator carried in the slider.

2. The brass slider is mounted transversely in the body of the fuze and is held in the safe position with its spring under compression by a brass safety pin. The safety pin passes through a fork formed in the slider and is retained, with its spring under compression, by a steel set-back pin (detent) engaging in a hole formed near its inner end. The set-back pin is supported by a spring and a safety wire which is fitted round the body of the fuze.

A brass lock pin, supported by a spring, engages in a groove cut in the slider and prevents it from turning. When the fuze is armed the lock pin secures the slider by engaging a recess cut in the groove.

3. The C.E. booster lead is contained in a gilding metal cup. The C.E. booster, in an aluminium-alloy cup with felt disc, is screwed into the fuze body.

4. Action.

The safety wire is removed before firing.

On acceleration, set back causes the set-back pin to be disengaged from the hole in the safety pin of the slider and the safety pin is ejected by its spring, leaving the slider free to move. The slider is moved across the body of the fuze by its spring and the lock pin engages in the recess cut in the groove in the slider and locks it in the armed position. On impact the striker head and firing needle are driven in, breaking the shearing wire. The firing needle pierces the upper detonator, the flash passing through the delay element which in turn initiates the slider detonator, booster lead and booster.

5. Dimensions and Weight.

Overall length of fuze is 3.47 inches.
Length protruding from shell 2.36 inches.
Approx. weight .52 lb.

6. Packing.

Details of box packing are not yet available.

603 GUN. 76 M.M. M.1. COMPLETE ROUND WITH SHELL, H.E. M.42A1 (AMERICAN). (Fig.250)

1. The complete round, fixed Q.F. type, consists of the following components:-

Primer, percussion, M 28A2
Case, cartridge, M.26
Shell, 3 inch, H.E., M.42A1
Fuze, P.D.M.48 with Booster, M.20A1

2. Primer, percussion, M.28A2.

This primer differs from the M.28A1 (see Bulletin No.24, Item 394) in length, being 10.26 inches long.

3. Case, cartridge, M.26

The case is of brass or, alternatively, copper-silicon-alloy. It is tapered and the mouth is attached to the shell by 8 crimps arranged in two rings of 4, and sealed with N.R.C. Compound. Propellant charge consists of approx. 3.75 lbs. F.N.H. powder.

4. Shell, H.E. M.42A1.

The shell body is a steel forging and is fitted with a bakelite fuze well cup. The head of the shell is struck with a radius of approx. 7 C.R.H. and the rear portion is fitted with a gilding metal driving band. Two grooves are cut around the shell body in rear of the driving band for the attachment of the cartridge. A base cover plate is spot welded to the base.

The following bursting charges are used:-

T.N.T. Grade 1 (.86 lb.)
Amatol 50/50 with T.N.T. booster surround (.77 lb.)
Trimonite (.88 lb.)

The body of the shell is painted yellow and is marked to indicate the calibre of gun, nature of filling and nomenclature of shell.

5. Fuze, P.D.M.48

For details of this fuze see Item 393, Bull. No.24.

6. Booster M.20A1

This Booster differs from Booster M.20 (see Bulletin No.24, Item 392, Fig.140) in that the external screw threads near the top of the body are reduced in number to leave a plain ring of metal at the top of the body into which are cut the two slots for screwing the Booster into the fuze hole of the shell.

7. Dimensions.

The overall length of the fuzed round is approx. 32.29 inches.

8. Packing.

Each complete round is packed in Container, Fibre, M.92. The container is cylindrical with terre plate end pieces and is painted black. The terre plate end piece in the lid is marked to indicate the nomenclature of the gun and container. Length of container is 34½ inches and diameter 3 9/10 inches.

Details of bundle packing are not yet available.

604. GRENADE, HAND, FRAGMENTATION, MK. II. (AMERICAN) (Fig. 251)

1. The grenade consists essentially of a body and a fuze. The body is made of cast iron and is screwthreaded internally at the top to receive the fuze. The outside surface is serrated horizontally and vertically to assist in forming uniform fragments when the grenade explodes. The bursting charge consists of .74 ounces E.C. powder giving a normal radius of burst of 30 yards, although fragments may fly over 200 yards.

2. The Fuze, Igniting, M10A2 gives a delay of approx. 5 seconds. The fuze body, of zinc alloy, is suitably shaped and prepared at the top to receive the safety lever, striker with spring and hinge pin and the safety pin. It is bored longitudinally to accommodate the primer, a delay charge of approx. 10 grains Gun Powder, and the upper part of a length of safety fuze. A copper tube, closed at one end, which contains a charge of approx. 8 grains of Gun Powder and accommodates the lower part of the safety fuze, is inserted into the lower end of the fuze body. External screw threads are formed near the lower end of the fuze body for the insertion of the fuze, over a fibre washer, into the grenade.

The steel safety lever is shaped to the contour of the grenade with a lip which fits over a projection formed at the top of the fuze body. A hole is bored through the lever near the top to take the safety pin. The safety pin, with a ring, passes through the safety lever and fuze body and retains the striker, with its spring under compression, in the safe position.

3. Action

The safety pin is withdrawn immediately before throwing, care being taken that the grenade is held with the safety lever firmly pressed by the palm until the grenade is thrown. When the safety pin has been removed the striker is retained in the safe position by the safety lever. On throwing the grenade the safety lever is forced clear of the grenade by the striker which is rotated by its spring on the hinge pin and strikes the primer, the resultant flash initiating the grenade filling through the delay charge, safety fuze and powder charge in the fuze.

4. Painting and Marking.

The body of the grenade is painted yellow and has the manufacturer's initials or symbol cast in the body.

5. Dimensions and Packing.

Overall length of grenade, fuze, is approx. 4.5 inches. Maximum diameter of body, approx. 2.25 inches. Details of packing are not yet available.

605. GRENADE, HAND, OFFENSIVE, MK. III.A.1. (AMERICAN) (Fig. 252)

1. The grenade, filled H.E., is used for demolition purposes and may be used in the open more safely than the Fragmentation Grenade (see ~~Fig.~~ 251) because there is no marked fragmentation. Fig.

2. It consists principally of a body and a fuze. The cylindrical body is of laminated cartridge paper closed at each end by a steel cover plate secured to the body by crimping. The top plate has a hole in the centre over which is fitted an adapter, screwthreaded internally to take the fuze. The body is filled with pressed T.N.T. on a felt disc or, alternatively, not more than 4 T.N.T. pellets. The fuze cavity is lined with Kraft paper.

3. The Fuze, Detonating, Hand Grenade, M6A2 is screwed into the grenade body over a fibre washer and gives a delay of from 4.3 to 5.5 seconds. It differs from the M10A2 (see ~~Fig.~~ 251) in that below the safety fuze is a 7 grain detonator and a charge of approx. 13 grains C.E., both contained in a gilding metal tube inserted into the lower end of the fuze body.

4. Painting and Marking.

The grenade body is painted black. A yellow label bears the following particulars:- Nomenclature of grenade, filler's lot number and year of filling.

5. Dimensions and Packing.

Overall length of grenade fuze is approx. 5.35 inches and maximum diameter approx. 2.1 inches.

Packing details are not yet available.

606. HOWITZER, 75 M.M. M.1 AND M.1A1. (AMERICAN). COMPLETE ROUND WITH SHELL, H.E.A.T. M.66. (Fig. 253)

1. Components.

The complete round, fixed Q.F. type, consists of the following components:-

Primer, percussion, M1B1A2.
Case, cartridge, M.5A1 or M.5A1B1.
Propellant, F.N.H. Powder.
Shell, H.E.A.T. M.66.
Fuze, Base Detonating, M.62.

2. Primer, percussion, M1B1A2.

This 'push in' type primer is of brass and the body contains 100 grains Gunpowder in a paper wrapping. Overall length of primer is approx. 3.7 inches.

3. Case, cartridge, M.5A1.

The brass case has a stepped flange and the base is bored and prepared to seat the primer, the metal around the primer seating being hardened. The case is necked at the mouth and is attached to the shell by crimping.

Two types of this case are made, Type II being used with Shell, H.E.A.T. M.66. The type is stamped on the base of the case.

As an alternative to brass, the case may be made of copper-silicon alloy.

Case, Cartridge, M.5A1B1.

This is a steel case and is the substitute standard for Case, Cartridge, M.5A1.

4. Propellant.

The propellant is F.N.H.

5. Shell, H.E.A.T. M.66.

The shell body is of forged steel with streamlined base and tapered walls. The base is bored and threaded to receive the fuze and is undercut to accommodate the gas check ring. A gilding metal driving band is fitted and a groove is cut around the body in rear of the driving band for the attachment of the cartridge case by crimping. Two set screw holes are bored through the front end of the body which is prepared internally to form a seating for the steel cone and threaded to receive the head.

A thin steel ballistic cap is welded to the head of the shell, the cap also acting as a distance piece on impact to ensure the best effect from the hollow charge. The head is screwed into the body and secured by two set screws.

The interior surface of the shell is coated with acid proof paint and the body is filled through the base with 50/50 Pentolite topped with 10/90 Pentolite, to form a hollow charge. The fuze cavity is formed in the 10/90 Pentolite.

The shell is painted yellow and bears the following markings:-

safely destroyed. Fuzes should not be allowed to accumulate unnecessarily at point of destruction.

(d) Remove mines from packing box and insert Booster, M.1.A1, which is shipped separately from fuze in the cavity so that expanding side strips catch under crimp at top of the socket.

(e) Place mines with boosters assembled on correct compartments in packing box.

(f) Place tray of Fuzes M.1.A1 in compartment from which tray of Fuzes M.1 was removed and close box.

(g) Add A.1 to the nomenclature to the fuzes in the marking on the box so that the correct nomenclature of Fuzes M.1.A1 is shown. Also obliterate lot number of old fuzes M.1 and show lot number of new Fuzes, M.1.A1."

609. FUZE POINT DETONATING M.57 (AMERICAN). NOMENCLATURE.

Reference Bulletin No. 29, Item 525 and Fig. 207.

The P.D. fuze T.18E2 has been designated, "Fuze P.D.M57" and now has the body tube integral with the body.

610. PROPELLANTS. STABILITY OF M.X.

Reference Bulletin No. 21, Item 311 and Bulletin No. 23, Item 366.

Climatic trials of this propellant have established that it has a safe life of at least 5 years at 90°F.

611. PROPELLANTS. CODE LETTER FOR F.N.H./D.B.

Reference Bulletin No. 30, Item 559 and Bulletin No. 24, Item 397.

The code letter K is used to indicate the propellant F.N.H./D.B.

612. CARTRIDGE Q.F. 17 PR. BATCH LABELS GIVING ADJUSTED CHARGE WEIGHTS.

Reference Bulletin No. 30, Item 589.

Labels on packages containing rounds in batches E.1, E.2 and E.3 (A.P. shot) and E.4 (A.P.C. shot) have been incorrectly completed to indicate the adjusted charge weight instead of the nominal weight.

With subsequent batches, commencing with E.5A, the labels are correctly completed to indicate the nominal charge weight.

613. PROPELLANTS. SERVICE LIFE OF N.C.T. OF 1914-1918 MANUFACTURE EXTENDED.

Reference Bulletin No. 15, Item 161.

A number of the sub batches of Q.F. 4.5 inch gun cartridges containing propellant charges of N.C.T. (1914-18) have reached, or are approaching, the end of the "Service Life" as indicated by the stencilling on the rounds. The life of these cartridges has been extended to December 1944.

immediately above the flange. These markings are in black (Silver nitrate process).

The container and the box C.207 are marked with khaki-brown patches in positions corresponding to the blue patches used on the packages containing M.V. rounds (See Bulletin No. 24, Item 398) and the letters "S.V." are stencilled in black on the patches.

615. MARKING ON SMALL ARM CASES.

The base of small arm cartridges of less than 20 m.m. calibre are marked by a code letter or letters and coloured annulus, with certain exceptions, to facilitate identification.

The complete arrangement is as follows:-

<u>Serial No.</u>	<u>Store.</u>	<u>Code Letter</u>	<u>Colour of Annulus</u>	<u>Meaning</u>
1.	Ball	Hil	Purple	Parent store irrespective of the core being soft or steel
2.	Practice	P.	"	Practice, i.e. having a modified bullet for practice, or reduced ballistics.
3.	A.P.	W.	Green	Special A.P. steel bullet or steel core.
4.	Semi-A.P.	F.	"	Has a special core for a definite penetration, less than 3 - its steel being particularised.
5.	Tracer	G.	Red	Tracer with little incendiary effect.
6.	Incendiary	B.	Blue	Incendiary without explosive effect.
7.	Proof	Q.	Yellow	High pressure.
8.	Blank	L.	Colourless	Blank with or without mock bullets.
9.	Drill	D.	Nil	Drill purpose only.
10.	Dummy	U.	"	For armourers use.
11.	Observing	O.	Black	Giving visual observation on strike, for training purposes.
12.	Explosive	R.	"	Explosive effect on strike.
13.	Grenade discharger	H.	Colourless	Blank for discharging grenades.
14.	Smoke generator discharger	E.	"	Blank for initiating grenades.

616. LIFE OF N.C.T.

Approval has been given for the official life of all N.C.T. of 1914-18 manufacture, which has been blended, either in bulk or cartridges, and restricted for use in Great Britain, to be extended for two years from December 1942, i.e. until December 1944. (See also Item 613).

617. LOADING OF RAILWAY VEHICLES.

War conditions increases the demand for railway vehicles. In addition, recent events have made it necessary to transfer a great deal of road traffic to the railways. The consequence is a very heavy demand for these vehicles. On this account it is imperative, in the national interest, that railway vehicles should be loaded to their full capacity.

A recent census taken by the companies has shown that in regard to explosives, small quantities of 2 to 3 cwt. are frequently being sent in a vehicle for several hundred miles. This is extremely uneconomical.

The Regulations for the Conveyance of Explosives by the Railway Companies impose certain restrictions on the traffic, but within these limits every effort should be made to load the vehicles to the limits laid down by the Regulations. These limits briefly are - up to 16,000-lb. nett explosives may be loaded into a covered vehicle and up to 4,000-lb. nett explosives into an open vehicle. For small quantities, up to approximately 2 cwt., the Railway Companies will accept consignments if packed in approved metallic packages for conveyance with ordinary merchandise. From the wagon point of view this is the most economical method of sending small consignments and should be adopted whenever possible. All approved metallic packages must be painted red.

When a small mixed consignment of explosives from Groups I to XI has to be sent from any depot or unit, they may all be loaded into the same vehicle provided the nett explosives limit does not exceed 2,000 lb.

All consignors of government explosives should ensure that railway vehicles are in future loaded to their full approved capacity. For the same reason every effort should be made to avoid holding wagons in and around service depots unnecessarily.

618. TRACERS.

The following new tracers have been recently developed and the particulars below are published for information.

No. 13. For use with 6 Pdr. 10 cwt. gun ammunition.
External. It is similar to Tracer, Shell No. 1, and is closed by a brass cap into which is sweated a thin brass disc. It is filled with Tracer Composition S.R.372, with a priming of S.R.399 and is ignited by the propellant charge. It traces for 6.5 seconds.

No. 14. For use with 40 m.m. ammunition.
Partly internal, partly external. It is a modified No. 11 of larger capacity, to give a longer time of trace. It ignites a self-destructing pellet as well as traces. The filling is Tracer Composition S.R.372, with a priming of S.R.399 and an igniting charge of S.R.227A.
The tracer is closed by a celluloid cup pressed into the base and held by a suitable cement.
It is ignited by the propellant charge and traces up to 12 seconds.

No. 15. For use with the 2 Pdr. super-velocity projectile.
External. It is filled with Tracer Composition S.R.372, with a priming of S.R.372P or S.R.399. It is closed with a celluloid disc, held by a suitable cement, and is ignited by the propellant charge. The period of trace is 2 seconds.

It is to be noted that, where the tracer is closed by a celluloid disc the latter must be covered by a disc of bakelised paper when inserted in the cartridge case. This is to prevent softening of the celluloid by contact with cordite.

The trace given is red.

619. * GRENADE NO. 68 A.T.

Provisional approval has been given for 30/70 C.E./T.N.T. to be used for filling this grenade when Iyddite or Pentolite are not available.

620. CARTRIDGE S.A. BLANK .303 inch L. M.K.V.

Cordite Mark I sliced and graphited is approved for loading this cartridge. H.C. powder is an alternative loading.

621. CHEMICAL TRAINING MIXTURES.

To avoid any confusion between chemicals and chemical training mixtures the nomenclature of the latter has now been revised as follows:-

<u>Old Code</u>	<u>New Name</u>	<u>New Code</u>
G.1	Ground Training Mixture No. 1	G.T.M.1
G.1D	No. 1D	G.T.M.1D.
G.2	No. 2	G.T.M.2
G.2D	No. 2D	G.T.M.2D.
G.3	No. 3	G.T.M.3
G.3D	No. 3D	G.T.M.3D.
S.1	Spray Training Mixture No. 1	S.T.M.1
S.1D	No. 1D	S.T.M.1D.
S.2	No. 2	S.T.M.2
S.2D	No. 2D	S.T.M.2D.
S.3	No. 3	S.T.M.3
S.3D	No. 3D	S.T.M.3D.

622. SMOKE WEAPONS.

Titanium tetra chloride and Chloro-Sulphonic acid are now being used for the filling of certain smoke weapons. These have corrosive properties and would normally be classified for Storage and Transport as Group XIII.

As this would have restrictive effects on Storage, it has been decided to classify weapons filled with these substances for Storage purposes only, as Group XI. Packages containing such weapons will have the Group XI label. They are only to be stored with other articles in Group XI and must not be placed in the same storage place as explosives from any other Group.

For transport by road, rail, or sea, the conditions laid down for Group XIII weapons will be observed.

623. APPROVED METALLIC PACKAGES.

The Railway Companies have agreed to carry small consignments of certain explosives with ordinary Merchandise by Freight train, provided the explosives, in their service packages, are placed in an approved Metallic Package, i.e. a package approved by the Companies for this traffic.

In peace time, the approved Metallic Packages are of a heavily constructed type as shown in items 1 to 5 on the following list.

		Length	Breadth	Depth	Nett Weight
1.	Cylinder, ammunition, $\frac{1}{2}$ barrel ..	-	14.55 in. dia.	17.9 in.	62 $\frac{1}{2}$ lb.
2.	" " " $\frac{1}{4}$ " ..	-	12.6 in. dia.	14.9 in.	46 $\frac{1}{2}$ "
3.	Case, transport, explosives	26 in.	21 in.	20 in.	137 "
4.	" " detonators, Mk. II.	24 in.	18 in.	14 in.	112 "
5.	" " " Mk. III.	24 in.	11.625 in.	7 in.	63 "
6.	" " ammunition, special..	23.55 in.	16.1 in.	9.45 in.	24 $\frac{1}{2}$ "
7.	Cylinder, cartridge, No. 36, in skeleton case.	-	10.2 in. dia.	34.8 in.	39 "
8.	Cylinder, cartridge, No. 56.. ..	-	13.75 in. dia.	22.1 in.	43 "
9.	Box, ammunition, C.190	20.7	14.2 in.	7.8 in.	43 "
10.	Box, ammunition, Q.F. 18-pr. C.238	26.1	10.1 in.	9.6 in.	24 "
11.	Box, Cartridge B.L. 5.5" C.239..	25.4	17.6 in.	10.3 in.	20 "
12.	Box, ammunition, Q.F. 4.5" How. ..	25.75	11.2 in.	6.4 in.	23 $\frac{1}{2}$ "
	C.244.				
13.	Box Cartridge, C.255.	25.1	16.35 in.	10.75 in.	26 "

The manufacture of these types of package cannot be accepted in War and to reduce the demand for railway vehicles, the Companies have agreed to accept certain standard service packages made of steel or other metals, provided they are adequately secured by bolts or straps. To date the packages numbered 6 to 13 above have been approved for this traffic.

All approved metallic packages are to be painted red.

There are a few explosives which the Companies will not accept for conveyance in such packages. They are indicated by "No" in column 5 of Table I in the Regulations for the conveyance of Government explosives by the Railway Companies.

This is the most economical way of forwarding small consignments in view of the prevailing wagon shortage.

The packages shown on the list will be accepted by the railways for the conveyance of certain explosives by Passenger Train without a conductor. Only one package will be accepted per train and the nett explosive limit per package is 50 lbs. of Propellant or 10 lbs. of certain other explosives. The detailed items which may be conveyed in this manner are shown in Schedule C. Appendix II of the Special Regulations for the conveyance of Government explosives during the present emergency.

624. PACKING OF SMALL ARM AMMUNITION AND SIGNALS.

The following types and quantities of Ammunition may be packed in :-

(a) Box Ammunition S.A. H.15 for Land and Air Services:-

<u>No. in package.</u>	<u>Calibre and type.</u>	<u>Method of packing.</u>
1248	.303 Ball, drill, dummy, Tracer, A.P., Incendiary, Proof Blank Mk. VII, Observing.	26 Cartons No. 1.
1400	.305" Drill or dummy	In bundles.

<u>No. in package</u>	<u>Calibre and type</u>	<u>Method of Packing.</u>
370	.5" Ball or A.P.	In 37 cartons, No.8.
420	.5" Drill or Dummy	In 42 bundles
990	7.92 m.m. Ball	In 33 Cartons, No.8.
1110	7.92 m.m. Proof.	In 37 Trade Cartons
150	.55" Ball, Practice, A.P., Tracer, Proof.	In 15 cartons
260	.55" Drill or Dummy	In 26 Bundles
3000	.380" Ball	250 Cartons, No.10
2160	.455" Ball	180 Cartons, No. 3
1600	.303" Blank	In bundles
114	1" Aiming rifle.	In bundles.
144	1" Aiming rifle, blank	In bundles.
900	.303" Rifle Grenade	In 45 tinned plate boxes.
1008	.303" Rifle grenade	In 72 tinned plate boxes.
72	1½" signal, with 4 in cases.	Wrapped singly.
32	1½" illuminating	Each in containers packing No.19
50	Cartridges, electric type A.Mt. IV.	Packed singly.
72	Cartridges, emergency, undercarriage Lowering Device M.L. for Beaufort A/C.	Wrapped singly.
1000	.30-in. Incendiary.	50 Cartons, No.21.

(b) Box Ammunition, S.A. or Port Fires friction, H.9.
Land, Naval and Air Services.

<u>No. in package</u>	<u>Calibre and type.</u>	<u>Method of packing.</u>
360 rounds.	.380 proof	In 30 cartons No.10
240 "	" Ball	In 20 cartons No.10
384 "	" "	In 32 bundles of 12.
240 "	.455 Proof	In 20 cartons No.3
276 "	" Ball	In 23 bundles of 12.
252 "	" P.S.L.	In 36 bundles of 7.
425 "	.32 Colt Auto Pistol.	In 17 trade cartons
350 "	" " " "	In 7 trade cartons.

625. MARKING DETONATORS.

A paper ring will be placed round the safety fuze of the Igniter sets for the Mk. V No. 36 H. Grenade for identification purposes in lieu of the rubber band.

626. SMALL ARM CARTRIDGES FOR AIRCRAFT.

The manufacture of Small Arm Cartridges of types which may at any time be fired from guns in aircraft has been standardised and, with effect from 1.1.1943 all packages containing such cartridges will carry an additional label, H.2272, bearing the following printed words in red:-

NOT TO BE FIRED FROM SYNCHRONISED GUNS AFTER -/-/-
the date shown being 2 years after manufacture.

The present "All Services" label, H.628, becomes obsolete.

627. MARKING OF SMALL ARM CARTRIDGES.

The base marking of S.A. Ammunition will show only the last two figures of the year of manufacture.

628. STATION MONOGRAMS.

The following Station Monograms have recently been approved:-

A.	GILGIL	G.G.
L.	OLDBURY (Messrs. Albright & Wilson Ltd.)	A.W.O.
L.	STOURBRIDGE (Messrs. Albright & Wilson Ltd.)	A.W.S.
L.	FLINT. (Messrs. Courtaulds Aber Works)	C.A.F.
L.	DALBEATTIE	D.B.
L.	POWFOOT	P.F.
L.	WIGTOWN	W.G.
N.	GASPAR	G.S.N.
N.	GHINDA	G.D.A.
N.	BRIDENLEY HILL (Nagersfield Brickworks)	B.H.

629. BANGALORE TORPEDO, 2 INCH MK. I. ALTERATION TO MARKINGS.

Reference Bull. No. 28, Item 511, For para. 2 substitute:-
Markings. The body is painted Service Green or Brown, No. 2, with a red band below which the following particulars are stencilled in yellow:-
"BANG. TORP. 2" I" followed by the monogram of filling firm or station, lot number and date of filling. Two $\frac{1}{4}$ inch buff bands enclose a 1 inch green band on which the letter 'A' is stencilled to denote the Ammonal filling.

630. AMENDMENTS.

- Bulletin No. 24. Item 395, page 11, para. headed "Weights & Dimensions of fuze.", line 2 :-
Delete "3.74" and substitute "4.55".
- Bulletin No. 28. Item 511. Bangalore Torpedo, 2 inch, Mk. I.
Para. 1, line 3. For "7 lbs." substitute "7 lbs. 12 ozs."
Para. 2. Delete heading and detail and substitute "See Bulletin No. 31, Item 629."
- Bulletin No. 29. Item 525. After last line, insert:-
"See Bulletin No. 31, Item 629."
Item 549, line 5:-
Delete "mark" and substitute "number"
- Bulletin No. 30. Item 579, page 9, para. headed Markings, sub para. (b), line 1:-
After "Two" insert "outer". Delete "midway". After "between" insert, "two inner green bands".

Fig. 227 (Small drawing showing bomb markings). Amend the lettering "Yellow bands" to read "Green bands". Add arrows indicating the narrow band above the upper green band and below the lower green band with the lettering "yellow bands".

ENEMY AMMUNITION.

631. GERMAN, H.E., ANTI-TANK, HOLLOW CHARGE, RIFLE GRENADE.

Fig. 256.

1. The grenade is fitted to a rifle, by means of an aluminium spigot device, which screws into the rifling at the muzzle, and fired with a 7.92 m.m. blank cartridge with wooden bullet.

The grenade consists of a streamlined bell shaped body, with a slightly convex closing disc of aluminium, a graze fuze, which screws into a projection on the base of the body and a vaned tail unit, which screws on the base of the fuze and is closed by a rubber plug. The whole of the grenade is painted olive green and a 5 m.m. blue band is painted round the projection at the base of the body. The overall length is approximately 9.5 inches and the maximum diameter 2.4 inches.

2. Body and bursting charge.

The body is made of thin steel and is streamlined with a cylindrical projection about .4 inches long welded at the base. The projection is screwthreaded internally for the insertion of the fuze. A hole in the base of the body is fitted with an aluminium cup to accommodate the protruding magazine of the fuze. The head of the body is closed by a concave disc of aluminium which is secured by the overturned rim of the body.

The bursting charge consists of cast R.D.X/wax, bluish white in colour, with a hemispherical cavity of .79 inch radius in the head. The cavity is fitted with an aluminium liner of corresponding shape with a flange which fits inside the body at the head. The length of the body is 3.15 inches.

3. Fuze.

The fuze body is cylindrical with an external screwthread at each end for assembly as the connecting piece between the tail unit and the body. A central recess contains the striker and creep spring and is closed at its enlarged front end by an aluminium magazine which is screwed in and contains a detonator and an intermediary explosive. A transverse channel near the base contains a spring loaded screwed shearing pin which engages in a recess in the stem of the striker. Another channel, containing a cutting pin with spring, is bored from the base of the body and communicates with the shearing pin channel at a point where the shearing pin is reduced in diameter. A circular plate, secured in a recess in the base of the body by two screws, retains the cutting pin in its channel. The base end of the cutting pin passes through a hole in the circular plate and is thus exposed to the pressure of the propellant gases.

Details of the magazine filling and the composition in the detonator are not available.

4. Tail Unit.

The tail unit screws on to the base of the fuze with a right hand thread and consists of a drawn steel tube with six vanes formed in pairs. The cartridge is placed inside the tube for transport and the tube is closed at the base by a rubber plug.

5. Cartridge.

The cartridge is of the 7.92 m.m. small arm type with an undyed hollow wooden bullet. The granular propellant consists of cylindrical grains .06 inches long and .02 inches in diameter with a basic composition of 54% of P.E.T.N. and 31.4% of nitrocellulose. Mineral Jelly and graphite are also included.

6. Action

The rubber plug is removed from the tail unit and with the cartridge loaded into the rifle in the normal way the tube of the tail unit is placed over the spigot device at the muzzle.

On firing the hollow wooden bullet is shattered by the propellant gases which project the grenade and, overcoming the spring of the cutting pin, drive the pin forward causing it to cut the shearing pin away from its screwed end. The shearing pin is then ejected by the spring held in compression under its head and thus leaves the striker held off the detonator only by the creep spring. On graze the momentum of the striker overcomes the creep spring and the detonator is pierced.

632. GERMAN, H.E., RIFLE & HAND, SELF DESTROYING, GRENADE.

Fig. 257.

1. The grenade is thrown by hand or fired from a rifled discharger device with a 7.92 m.m. S.A. cartridge. When used as a hand grenade it is initiated by a friction pull igniter which is operated immediately before throwing and gives a delay of 4.5 seconds. As a rifle grenade it is initiated by a percussion fuze or by a self destroying device which functions after a lapse of 11 seconds from the time of firing.

The grenade is cylindrical with an ogival head and a nose fuze. An engraved driving band is formed near the base. The overall length is 5.51 inches and the maximum diameter, over the driving band, is 1.22 inches. The diameter of the body is 1.18 inches. The weight of the complete grenade is 9 oz. Details of markings are not available.

The main components of the grenade comprise the following:-

Body with H.E. bursting charge and detonator.
Friction igniter with delay pellet.
Gascheck base with delay pellet.
Direct action fuze.

2. Body and Filling.

The body is in the form of a steel tube 3.15 inches long and 1.18 inches in diameter, the wall being .08 inch thick. A diaphragm formed near the base end is bored centrally and screwthreaded to receive the friction igniter which is inserted from the base. The body is screwthreaded internally at the front end to receive the fuze and at the rear to receive the gascheck base.

The bursting charge consists of 1.1 oz. of P.E.T.N./wax in a waxed cardboard carton with a central cavity to receive the detonator with its container at the front end and the igniter delay pellet at the base end. A sorbo washer, under another washer, is positioned between the base of the bursting charge and the diaphragm formed in the body.

The detonator is similar to the No. 8 type but is larger and is perforated at the base so that it can be initiated by flash from either end. The aluminium container carrying the detonator is crimped to retain the detonator and flanged for support by the bursting charge surrounding the cavity.

3. Friction igniter and delay pellet.

The friction igniter contains a pull-wire led through a perforated copper cap containing friction composition. The inner end of the wire is coiled to resist its passage through the composition, a loop being formed at its outer end for the attachment of the cord. The cord is passed through the loop and the ends are threaded through holes in a flat light alloy ring and tied. The ring is carried in a recess in the front face of the gascheck base where it is retained by a spring ring.

The delay pellet is screwed into the front end of the igniter and provides a delay of 4.5 seconds between the initiation of the igniter and the detonator.

4. Gascheck base with delay pellet.

The gascheck base is engraved to engage rifling and screwthreaded externally for insertion in the base of the grenade. An annular recess in the front face accommodates the ring of the friction igniter and its spring retaining ring. A central flash channel connects this recess with another below which contains the delay pellet. The base is recessed and screwthreaded to receive a screwed closing plug. The plug has a hole leading from its outer face to a cavity in its inner face below the delay pellet.

The delay pellet consists of a brass cup with a flash hole at its base and containing a composition which provides a delay of 6.5 seconds between its ignition by the propellant charge and the subsequent ignition of the friction composition in the igniter.

5. Fuze.

The fuze is of aluminium and has an ogival body with a hole at the nose through which the cylindrical striker protrudes. The body is screwthreaded for insertion in the grenade and has an internal circumferential recess below the striker to permit the expansion of the coiled spring in flight. The striker carries a needle surrounded by a spiral spring which is held between the underside of the striker and a cup shaped retainer. The retainer has a central hole for the needle and has a step formed near the front end around which a length of flat spring is coiled. The coiled spring is retained by a cylindrical arming ferrule with an internal groove near its base end. A stirrup spring is held between the retainer and the detonator holder. The detonator holder is screwed into the base of the fuze and carries an igniferous detonator in a perforated screwed plug. The holder is secured in the fuze body by a set screw.

6. Cartridge.

The steel cartridge is of the 7.92 mm. S.A.A. type, crimped at the neck, and containing a 139 grain propellant charge of nitrocellulose flake.

7. Action as a rifle grenade.

On acceleration the arming ferrule in the fuze sets back over the stirrup spring which engages in its groove and retains it clear of the coiled spring. During this period the coiled spring is held by the set back of the striker, and propellant gases, entering the flash hole in the screwed closing plug at the base, ignite the delay pellet.

During flight the coiled spring is expanded into the annular recess in the body by centrifugal force thus leaving the striker with its needle supported only by the striker spring.

On impact the striker is driven in and the needle pierces the igniferous detonator of the fuze. The flash from this detonator initiates the detonator in the grenade which in turn brings about the detonation of the bursting charge.

In the event of the fuze failing to function the flash from the delay fitment in the base, after a period of 6.5 seconds enters the perforations in the copper cap of the friction igniter and ignites the friction composition. This in turn ignites the attached delay pellet which, after a delay of 4.5 seconds, initiates the detonator in the grenade by a flash through its base and brings about the detonation of the bursting charge.

8. Action as hand grenade.

The gascheck base is removed by unscrewing so that the ring attached to the cord of the friction igniter is accessible.

Immediately before throwing the cord is tugged by means of the ring. This results in the pull wire being drawn through the friction composition and the production of a flash which ignites the filling of the delay pellet. After a delay of 4.5 seconds the flash from the delay pellet enters the base of the detonator and thus brings about the detonation of the bursting charge.

633. GERMAN CARTRIDGE Q.F. 3.7 cm. H.E./TRACER.
(3.7 cm. Sprenggranat-Patrone)

Fig. 258.

1. The fixed Q.F. round is used in the 3.7 cm. Pak (Anti tank gun) and has a shell painted aluminium colour with a yellow band midway between the fuze and driving band. There is only one driving band. The overall length of the round is 13.5 inches and the weight 2 lb. 11 oz. The number "6331" or "6331 st" is stamped in the base of the case in addition to "3.7 cm. Pak".

The round consists of the following components:-

Fuze A.Z. 39 or 3.7 cm. Kpf Z. Zerl P.
H.E. shell filled P.E.T.N./Wax with tracer.
Cartridge case No. 6331 (brass) or 6331 st (Steel).
Propellant charge of tubular double base type with an igniter of nitrocellulose powder and a decoppering agent of pure lead.
Percussion primer C/15 NA.

2. Fuzes.

Fuze A.Z. 39 is described in Bulletin No. 26, Item 460. The fuze "3.7 cm Kpf Z. Zerl P" is somewhat similar in appearance but has a red tip and is stamped with the designation of the fuze, the stamping being coloured red. The fuze is fitted with a centrifugal safety bolt which is retained in the safe position, obstructing the movement of the needle, by a powder pellet. A flash channel connects the powder pellet with a detonator which sets back on to a needle on acceleration and ignites the powder. The combustion of the powder leaves the bolt free to be displaced by centrifugal force. The needle with the hammer is then only held off the detonator by creep

3. Shell.

The interior of the shell is divided into two parts by a diaphragm formed in the shell. The forward compartment is screwthreaded to receive the fuze and the rear compartment to receive the tracer. The driving band is wholly of copper and is fitted approximately at the centre of the shell with a groove behind it to receive the mouth of the case.

The bursting charge, in the front compartment of the shell, consists of approximately 1 oz. of P.E.T.N./Wax 90/10 in a cup-shaped aluminium container. The container is closed at the mouth by a leather or composition washer over a paper washer.

The tracer consists of a steel cup containing tracing and priming compositions and has an external screwthread for assembly in the rear compartment of the shell.

4. Case.

The case is 9.8 inches in length and has a slight increase in taper near the mouth. The steel case, identified by the letters "St" following the number "6331" stamped in the base, is coated with brass.

5. Propellant charge and igniter.

The charge consists of tubular cords about 6.8 inches long with an external diameter of .098 inch and an internal diameter of .019 inch. The weight of the charge is approximately 5 oz. 11 dr. A small fabric

igniter is secured to the base of the charge by a silk strip which extends up the side of the charge. The igniter contains 34.2 grains of nitrocellulose powder in granular form.

The propellant is black in colour and consists basically of nitrocellulose and diethylene glycol dinitrate.

The silk strip securing the igniter is marked:-
"162g Digl R.P. -8.2- (175-2 2/085)".

6. Percussion primer.

The primer, Q/13, is of the normal German type with a diameter of .63 inches at the base and a length of .55 inches.

634. GERMAN AMMUNITION MARKINGS & NOMENCLATURE.

1. The following markings and designations have been reported or met with in the course of examining captured German Ammunition. Variations in the abbreviations and in the positions and dimensions of marking are not uncommon but the following appears to be the normal:-

2. General.

The following letters, commonly used in German nomenclature, have the following meanings:-

na - new pattern.
umg - modified
St. - steel.

In some instances the calibre given in the designation is not the actual calibre of the gun.

3. Fuzes

The designation is stamped above the flange on the nose fuzes and on the underside of base fuzes.

Nose fuzes, with the exception of one of the models used in 3.7 cm Pak (Anti-tank gun) Ammunition, are designated in a numbered series. In some instances, as for example the 23 fuze, there is more than one type of the model but these are all designated under the same model number.

The letter "S" with an oblique stroke immediately in front of the fuze number indicates a mechanical fuze.

The letter "C" with an oblique stroke immediately in front of the fuze number is found on fuzes from Naval Ammunition and older types of base fuzes of the igniferous type, (these are probably also of naval origin).

The following letters are included in the designation of nose fuzes and precede the model number (or letter and number).

<u>Stamping</u>	<u>Indication</u>
A.Z.	Percussion fuze.
E.L. Zdr	Sensitive type of percussion fuze.
K.Z.	Percussion fuze used under a ballistic cap.
Kl. A.Z.	Smaller size of a percussion fuze model.
G.I.gr.Z.	Fuze for infantry gun or howitzer shell.
Mgr. Z.	Fuze for mortar bomb.
Zt. Z.	Time fuze.

Fuzes for smoke shell have the letters "Nb" following the fuze number.

The excepted 3.7 cm fuze referred to is designated "3.7 cm Kpf.Z. Zerl P". The letters "Kpf. Z." indicate a nose fuze whilst "Zerl P" indicates the presence of a gunpowder pellet which is destroyed on firing to release a centrifugal safety device.

Base fuzes, except the older igniferous types, are designated to include the calibre of the equipment and the nature of projectile in which used. The following are typical examples:-

Bd. Z. f 7.5 cm Pzgr - indicating base fuze for 7.5 cm.
armour piercing projectile.

Bd. Z. f 15 cm Gr 19 Be - indicating base fuze for 15 cm anti
concrete shell model 19.

The following is an example of the older type of igniferous base fuze designated in a numbered series:-

Bd. Z. Q/38 - indicating base fuze Q/38.

Nose fuzes or base fuzes with a setting device for optional delay are stamped with the letters "M", "V" and "O" to indicate the positions to which the slot in the setting plug must be set to obtain either delay or non-delay action. With nose fuzes the "M" and the "V" are normally diametrically opposite and the plug is turned so that the slot in its head is aligned with them to obtain the "with delay" action. With base fuzes the "M" and "V" are stamped together as "MV" and the slot in the setting plug is aligned with this stamping to obtain delay action. The "O" stamping indicates the setting position for "without delay".

The stamped setting letters are coloured red. With these types of fuzes the letter "V", followed by numerals enclosed in brackets, is printed after the fuze number on package labels. The letter indicates delay and the figures, the period of delay.

The presence of a delay unit in the igniferous older type of base fuzes is not indicated by marking but some of the oldest which are neither numbered nor designated by calibre are stamped with the letters "m.V" on the underside. This marking indicates, "with delay" i.e. a delay fitment not of the optional setting type.

4. Gaines.

Gaines are designated in a numbered series, sometimes with a letter and an oblique stroke immediately in front of the number, e.g.

Black Marking.

Zldg A
Zldg B
Zldg Q/98
Gr. Zldg Q/98
Zldg Q/98 Np

Indication.

Gainc A
Gainc B
Gainc Q/98
Large gainc Q/98.
Gainc Q/98 filled P.E.T.N./Wax.

5. Exploders.

Where paper wrappers are used, the marking "Zldg" is also used as the designation for exploders and for the bursting charge similar to a long exploder which is used in smoke shell.

The R.D.X./Wax used in exploders is coloured blue or bluish-green.

The P.E.T.N./Wax used in exploders is coloured pink.

6. Smoke Boxes.

The designation "Raucherwickler" is marked on the side of smoke boxes for H.E. Shell.

7. Projectile nomenclature.

The name "granate", abbreviated to "Gr" or "gr" is used for all types of projectiles, (shot or shell), mortar bombs and rifle or hand grenades. The letter "W" precedes the abbreviation ("Wgr") in the designation of mortar bombs.

With gun or howitzer projectiles the nature of the projectile is indicated by a prefix to the word "granate" or to the abbreviation "gr" and with all types of projectiles etc. the model number is normally included in the designation as a suffix. The model number is an important part of the designation in the case of piercing projectiles as without this it is impossible, without examination, to differentiate between shot and shell or between capped and uncapped piercing shell. The model numbers are not common to the various calibres for other natures.

The following are typical designations from package labels, bursting charge containers etc. :-

<u>Designation</u>	<u>Indication</u>
Gr, Mod No., Be	Anti-concrete shell.
Gr, Mod No., (HL)	Hollow charge shell.
Nggr	Smoke Shell.
Pzgr	Armour piercing shell.
Pzgr 39	A.P.C.B.C. Shell.
Pzgr 40	A.P. shot with tungsten carbide core.
Pzgr 41	A.P. shot with T.C. core for coned bore guns.
Sprgr	H.E. shell.

The word "rot" included in the designation indicates the presence of a tracer in the shell.

8. Projectile Markings.

(a) The basic colours.

- (i) Piercing shot and shell are painted black. In some instances only the head or cap is painted.
- (ii) H.E. shell (excepting naval and anti-aircraft types), smoke shell, anti-concrete shell and hollow charge shell are painted a deep olive green. This is a darker shade than the British Service green.
- (iii) Naval and Anti-aircraft H.E. shell are painted yellow.
- (iv) 3.7 am shell with a two compartment cavity, one filled H.E. and the other filled tracing composition are painted aluminium colour with a yellow band midway between the driving band and fuze-hole.
- (v) Projectiles of the later types are sometimes painted white. This colour appears to be used for projectiles in the experimental stage supplied for trial by the Army in the field.
- (vi) H.E. and Smoke mortar bombs are painted dull red.

(b) Bands.

Band markings are not in common use except for a red band above the driving band which is found on some shell fitted with tracers and the yellow band on the 3.7 cm, aluminium coloured, H.E./tracer shell.

(c) Stencilling. (Fig. 259).

The following details of stencilling on projectiles are arranged in the sequence in which the markings are normally found commencing at the

head or ballistic cap of the projectile:-

- (i) The stencilling "Z. P. Hbgr." in black on the ballistic cap of an H.E.D.C. shell indicates the use of a nose fuze under the ballistic cap.
- (ii) The stencilling "R" followed by a number or, alternatively, the stencilling "MR" in black near the tip of the shell indicates the presence of a smoke box.
- (iii) The nature of filling of H.E. and hollow charge shell, other than naval types, is indicated by Arabic numerals stencilled in black on the head of the shell just below the fuze hole. The following markings are used:-

<u>Stencilling.</u>	<u>Indication.</u>
1	T.N.T. in cardboard carton packed with magnesium putty.
1 A	T.N.T. in cardboard carton packed with paper.
2	Picric acid in cardboard carton packed with magnesium putty or wax.
5	T.N.T./Wax 95/5 in paper or cardboard carton.
10	T.N.T./Wax 90/10 in paper or cardboard carton.
13	Anatol 40/60, cast.
14	T.N.T., cast.
32	P.E.T.N./Wax 90/10.
36/38	P.E.T.N./Wax 60/40 or 65/35.
91	R.D.X./Wax 95/5.
95	R.D.X./T.N.T.

- (iv) The place and date of the filling of the projectile, followed by a workmark, are indicated by stencilling in black at the shoulder of the projectile. The place is given in the form of an abbreviation somewhat similar to the British "Station monogram" e.g. "Lu 2.12.40 K1".
- (v) Roman numerals stencilled in black near the shoulder of the projectile indicate the classification of the projectile for weight. The system appears to be similar to the "Unit system" used for separate loading shell for field equipments in the British service. Projectiles marked "III" are apparently within the "dead weight limits", "II" and "I" indicate lighter and "IV" and "V" heavier projectiles. The stencilling is in 1.2 inch numerals for calibres up to 21 cm and in 2 inch numerals for larger calibres.
- (vi) In the following instances the type of shell, and to some extent the nature of filling, is indicated by 2.4 inch letters stencilled at two positions round the shell midway between the driving band and shoulder:-

<u>Stencilling</u>	<u>Indication</u>
A or IS (White)	Base ejection shell with flash producing charge.
Al (Black)	Filling includes aluminium powder to produce flash.
Bl (White)	Inert filling.
Bx (Red)	Drill projectile.
Nb (White)	Smoke shell.
Ub (White)	Practice projectile, filled gunpowder.
Ub. B (White)	Practice projectile, filled T.N.T.
Vp. (Black)	Dummy projectile.

Lightcase shell of pressed steel with a corresponding large bursting charge capacity are stencilled "Bo" in one inch lettering midway between the driving band and shoulder.

Cast steel shell are stencilled "Stg" in black 2.4 inch lettering at a short distance above the driving band.

- (vii) The letters "IPB", stencilled in white or red above the driving band indicate a driving band of the bi-metal type, iron covered with copper.

The place and date of assembly, followed by a work mark are stencilled

in 14 inch black or red lettering above the driving band, e.g. "Lr 4.6.4DL".

(c) Stampings

Fig. 260 gives the normal positions and significance of stampings on projectiles.

9. Marking of fixed Q.F. Cartridge cases and charges.

The abbreviation "Patr" is included in the designation of the complete round stencilled on packages or printed on package labels to indicate fixed Q.F. Ammunition. The following are typical examples:-

"7.5 cm Pzgr. Patr. Kwk. Bd. Z. f. 7.5 cm Pzgr."

i.e. 7.5 cm, anti-tank gun, A.P.C. cartridge with the appropriate base fuze.

"7.5 cm Nbgr. Patr. Kwk. m. Kl. A.Z. 23 Nb"

i.e. 7.5 cm, anti-tank gun, smoke cartridge with the small size of percussion fuze No. 23 for smoke shell.

In the designation of H.E. rounds the letters "Gr" without the prefix "Spr" are often used.

The markings on cases forming part of fixed rounds comprise stencillings round the side and base of the case and stampings in the base.

(a) Stencilling on side of case. (Fig. 261).

Stencilling on the side of cases is in black except the stencilling relating to propellant charges for use in hot climates which is in red.

The following details are arranged in the sequence in which the markings are normally found between the approximate centre of the case and the flange at the base:-

- (i) The calibre, types and model numbers of the equipments for which the round is suitable are stencilled in the form "7.5 cm Kwk 40" (i.e. 7.5 cm tank gun, model 40). Where a round is suitable for more than one equipment the designations of the equipments are stencilled in sequence with the letter "u", signifying "and", as a conjunction.

The following abbreviations, used to indicate types of fixed Q.F. equipment, have been met with:-

<u>Stencilling</u>	<u>Indication</u>
F.K.	Field gun.
Flak.	Anti-aircraft gun (may be dual purpose gun).
Kwk.	Tank gun.
Pak.	Anti-tank gun.
S.K.	Naval gun.
Stu.K. or	Assault gun.
Stu. G. (Calibre) K.	do.

The following markings are added to the designation, normally after the model number, to indicate equipments of foreign origin:-

(t) - Czech. (p) - Polish. (r) - Russian

- (ii) The weight of the propellant charge in grammes is stencilled in the form of numerals followed by the letter "g" below the details of the equipment, e.g. "164g".

(iii) The nature, shape and size of the propellant are stencilled below the marking indicating the charge weight.

The following markings are used to indicate the nature of propellant:-

<u>Stencilling</u>	<u>Indication</u>
Digl.	Double base propellant of diethylene glycoldinitrate and nitrocellulose.
Gu.	Double base propellant with the additions of nitroguanidine.
Mgl.	Double base propellant of nitroglycerine and nitrocellulose.
Nz.	Nitrocellulose powder.

These letters, in the case of double base propellants, are followed by figures or letters which also appear to relate to the composition.

The shape of propellant is indicated by the following letters added to those used to indicate the nature:-

Bl.P.	Flake
Rg.P.	Perforated disc (i.e. resembling a washer).
R.P.	Tubular.
Str.P.	Strip.

The size of the propellant is given by a statement of the dimensions in millimetres following the letters used to indicate the shape. The dimension figures are enclosed in a bracket and are arranged as follows with commas serving as decimal points:-

Flake (length, breadth, thickness) e.g. (3. 3. 0,8).

Perforated disc (thickness, external diameter/internal diameter)
- e.g. (1,9 x 15/4)

Tubular (length with minus tolerance, external diameter/internal diameter) - e.g. (175-2, 2/0,85). An "x" is sometimes used instead of the "-" between the length and the tolerance.

The following are typical examples of strip (length, breadth, thickness) - e.g. (125 x 5 x 0,5) the complete markings used to indicate the nature, shape and size:-

- " Digl. R.P. 8,2 (175-2, 2/0,85) "
- " Gu. Bl.P. 4,0 (4, 4, 0,6) "
- " Mgl Bl.P. 12,5 (40 x 40 x 0,2) "
- " Nz R.P. (135-5, 5/2) "
- " Digl. Str. P - 9,2 (125 x 5 x 0,5) "

(iv) The place and year of manufacture of the propellant, followed by a workmark, are stencilled below the marking relating to nature, shape and size. The following is a typical example:-

"abg 1942/3 "

(v) The place and date of the filling of the propellant charge, followed by a workmark, are stencilled below the marking relating to the manufacture of the propellant, e.g. "Oa 17.6.42 x U".

(vi) The red stencilling used to indicate propellant charges of a reduced weight for hot climates may be found near the base of the case, just above the flange, or higher up the side of the case, above the other stencilling. The marking used, "P.T. + 25°C", indicates that the normal or standard charge temperature on which the weight of the charge is based is 25° Centigrade (i.e. 77°F.). The German standard charge temperature for normal European temperatures is 10°C. (i.e. 50°F.).

(vii) In some instances cases are stencilled "Abgebr Idg" in red. This marking is found near the base (corresponding to the position of the "P.T. + 25°C" marking) and refers to the propellant charge. The marking probably indicates charges of low stability which are to be given priority in expenditure.

(b) Stencilling on the base of fixed Q.F. cases. (Fig. 261).

The positions of the following markings are as viewed with the case turned so that the stamped letters and numbers on the base are upright.

Distinctive markings in script lettering which indicate the nature, and in some instances the model number, of the projectile are stencilled in white or black paint to the left above the primer hole. The following markings are used:-

<u>Stencilling</u>	<u>Indication</u>
Gr (Model No.)	Hollow charge shell
Nbgr	Smoke Shell.
Pzgr	A.P. or A.P.C.B.C. shell.
Pzgr (Model No.)	A.P. shot with tungsten carbide core.
Sprgr	H.E. shell.

In some instances the Roman numerals indicating the weight classification of the projectile are stencilled in white to the right below the primer hole.

(c) Stampings on the base of fixed Q.F. cases.

Fig. 261 gives the normal positions and significance of base stampings. The model number, below the primer hole, is followed by the letters "St" when the case is of steel.

The abbreviations following the calibre of the equipment, stamped below the model number of the case, are the same as those given in the details of stencilling on the side of the case.

(d) Markings on cartridge bags in fixed Q.F. rounds.

The markings on the bags are the same as those stencilled on the side of the case except that the calibre, type and model number of the equipment are not included.

A typical example is given in Fig. 262.

10. Markings of separate loading Q.F. cartridges. (Figs. 263 & 264).

Where a cardboard or leatherboard cup is used to close the mouth of the case, labels on the cup give details corresponding to those stencilled on the side of cases forming part of a fixed Q.F. round. The label giving details of the equipment, charge weight, nature, shape and size of propellant, place and date of manufacture of propellant and place and date of filling is printed in black. The label indicating propellant charges for hot climates with a charge weight based on a normal charge temperature of 25°C is printed in red.

Cases with steel covers for packing and transport, which are removed before loading, have neither labels nor stencilling relating to the

propellant charge excepting the stencilling "P.T. + 25°C." in red on the base where applicable. Details of the propellant are available however from the stencilling on the charge bags.

The stampings on the base of the case are the same as those on the base of a fixed Q.F. round, except that the calibre of the equipment is sometimes omitted.

The following additional abbreviations used in the stamped designation of the equipments have been met with:-

<u>Stamping</u>	<u>Indication</u>
Geb (Model No.)	Mountain howitzer.
l.F.H.	Light, field, howitzer.
s.F.H.	Heavy, field, howitzer.
l.I.G.	Light, infantry, howitzer.
s.I.G.	Heavy, infantry, howitzer.
s. (Calibre) K.	Heavy gun.

The abbreviation used for howitzers are also used for gun-howitzers. The model number which follows the abbreviation differentiates between these types.

The silk cartridge bags in separate loading Q.F. cartridges are marked with details corresponding to those described for cartridge bags in fixed Q.F. rounds except that the designation of the equipment is included. In most instances this designation does not include the calibre. Typical markings are shown in Fig. 262.

When lead wire is included in the bag as a decoppering agent the bag is marked "Bleidraht im Beutel".

The number indicating the charge is marked prominently in black on the sections of howitzer and gun-howitzer cartridges. The letter "D" often follows this number and in some instances the marking is encircled by a red ring.

With certain equipments additional charge sections, to be used for long ranges in place of those in the cartridge case, are supplied in cylindrical cardboard packages. These sections are numbered in continuation of those supplied for use at normal ranges in the case. Cardboard packages containing these additional charge sections are marked "Sonderkart" followed by the numeral of the section.

11. Marking of primers for Q.F. Cartridges.

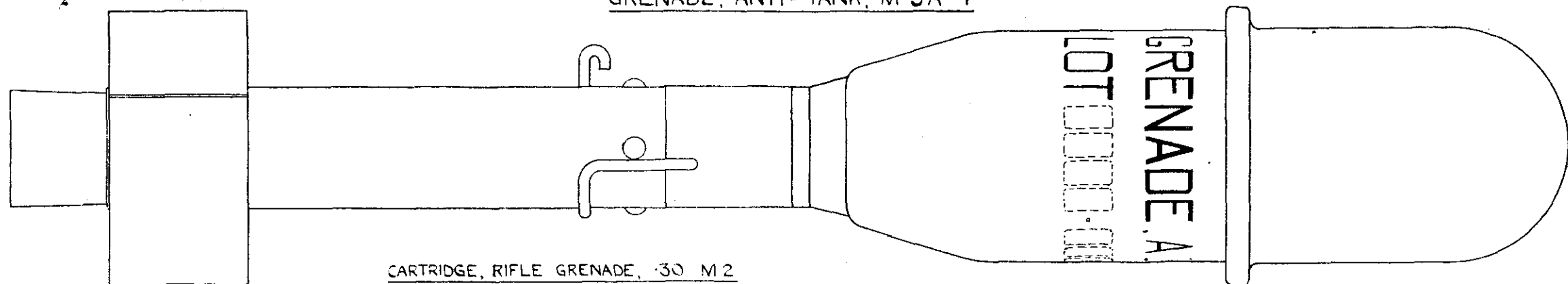
Primers are normally designated in a numbered series with the letter "C" and an oblique stroke immediately in front of the number. The "na" and "St" (indicating new pattern and steel) are included in the designation of those in common use.

Typical stampings are shown in Fig. 261.

12. Marking of flash reducing charges.

The flat circular silk bag is stencilled in black "Kart. Vorl." followed by the abbreviation indicating the equipment with which used and the weight of the charge in grammes.

FIG 247 (ITEM 599)
GRENADE, ANTI-TANK, M 9A 1



CARTRIDGE, RIFLE GRENADE, .30 M 2

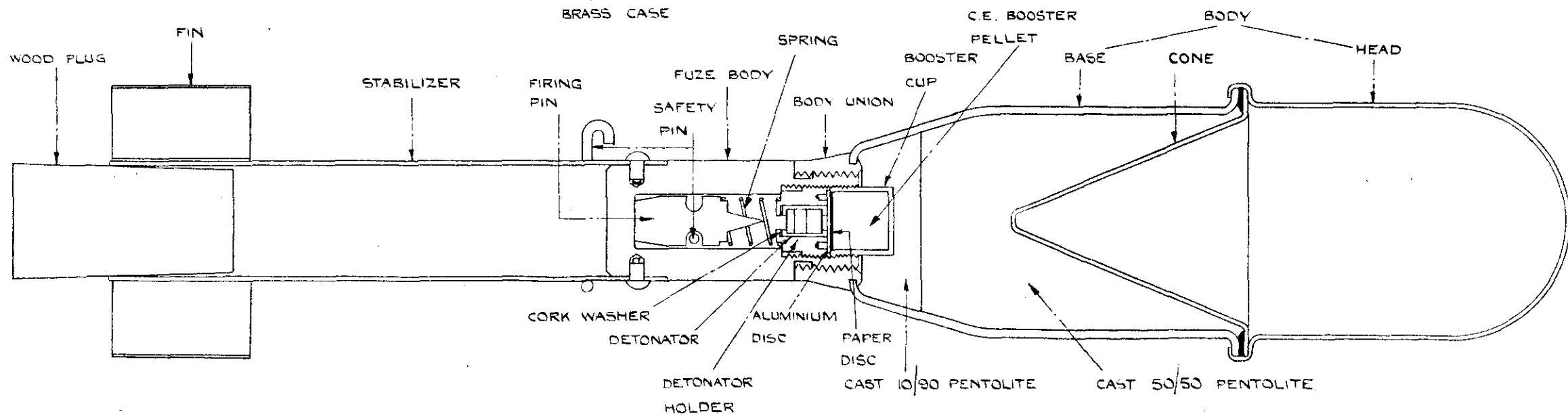
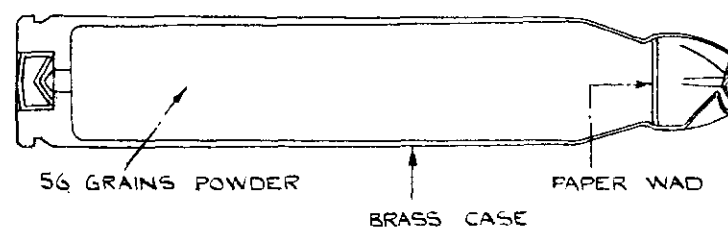
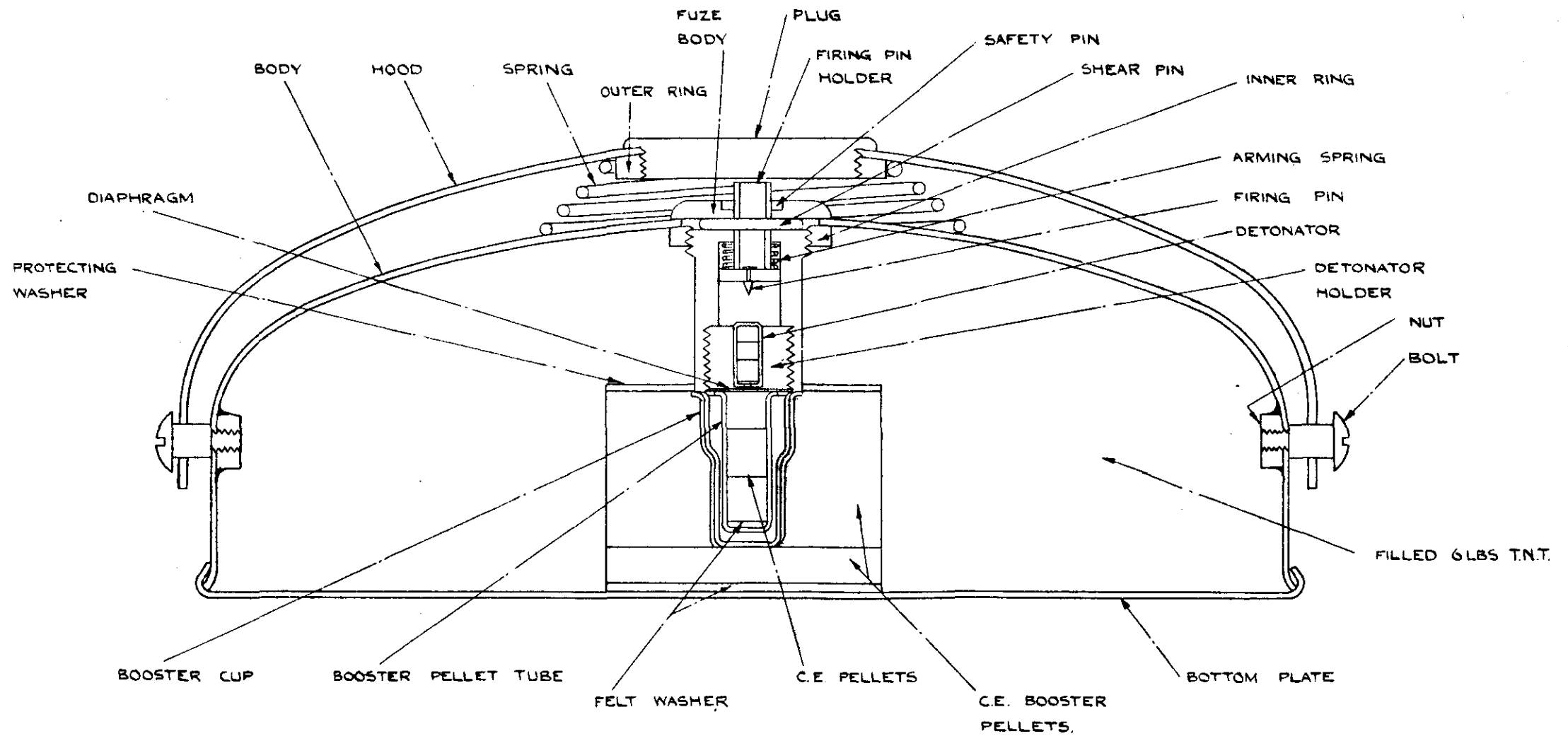


FIG 248 (ITEM. 601)
MINE, ANTI-TANK, DUTCH.



FUZE, POINT DETONATING, M. 53. (FIG 249 ITEM 602)

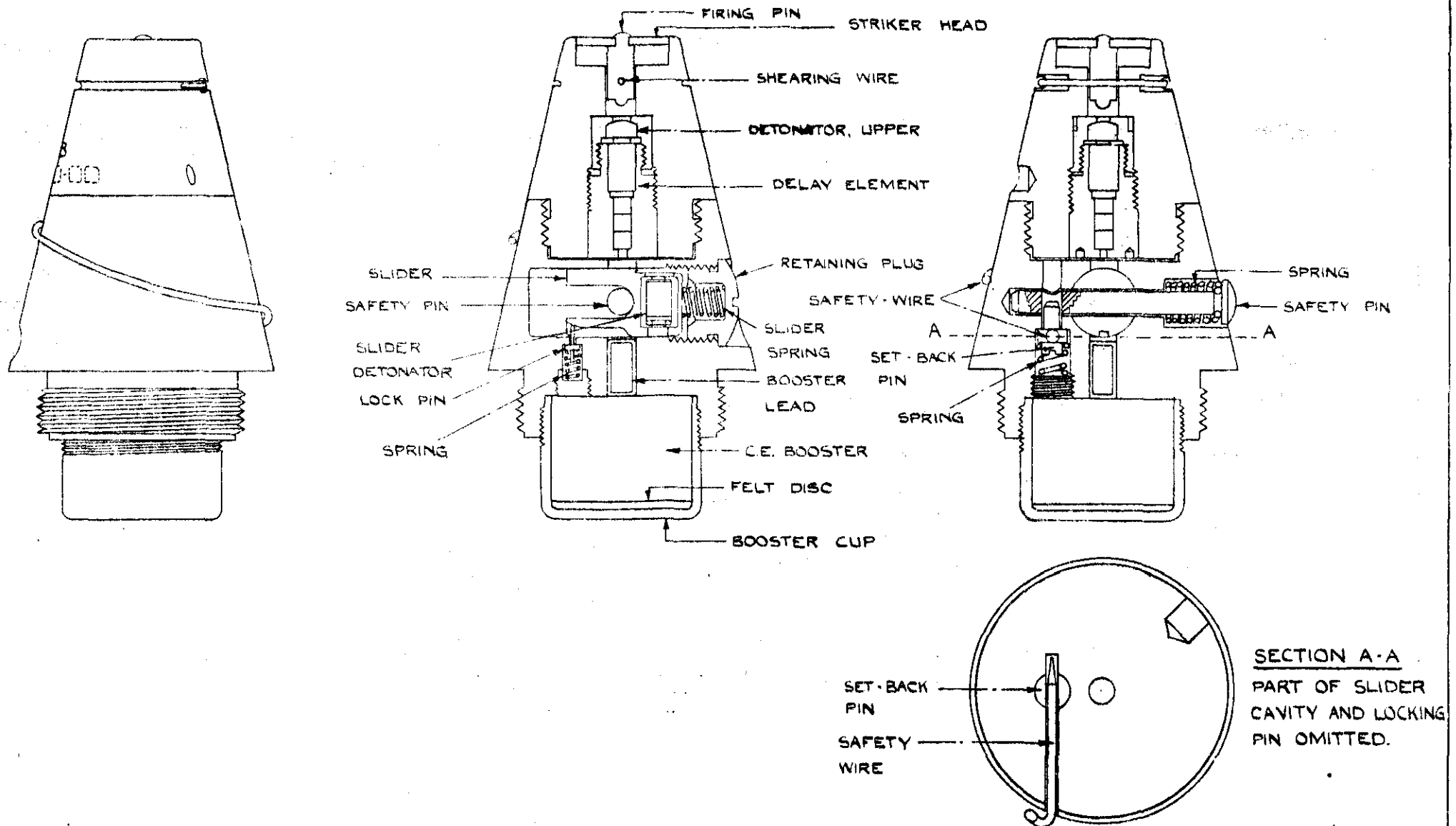


FIG 250 (ITEM 603)

76 MM GUN M1., COMPLETE ROUND WITH SHELL H.E., M42 A1

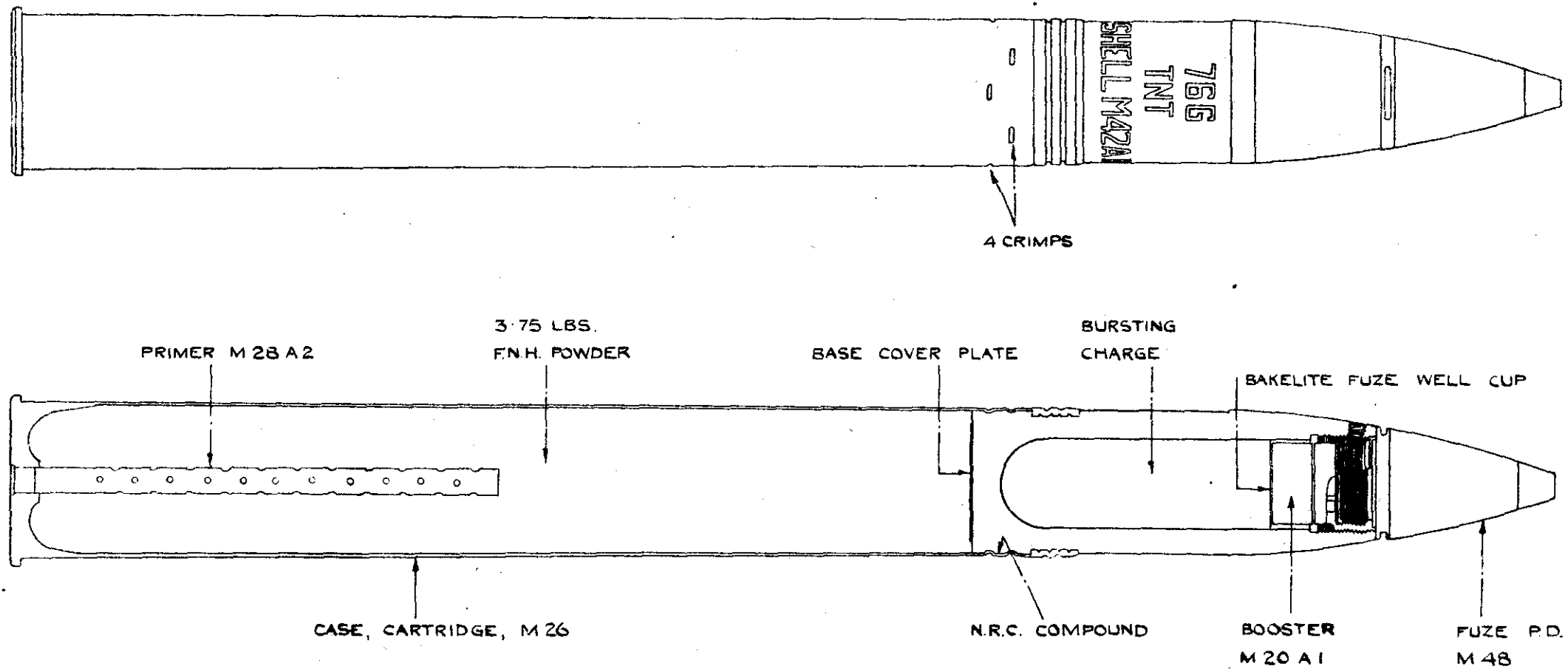


FIG. 251 (ITEM 604)
 GRENADE, HAND, FRAGMENTATION, MK. II.

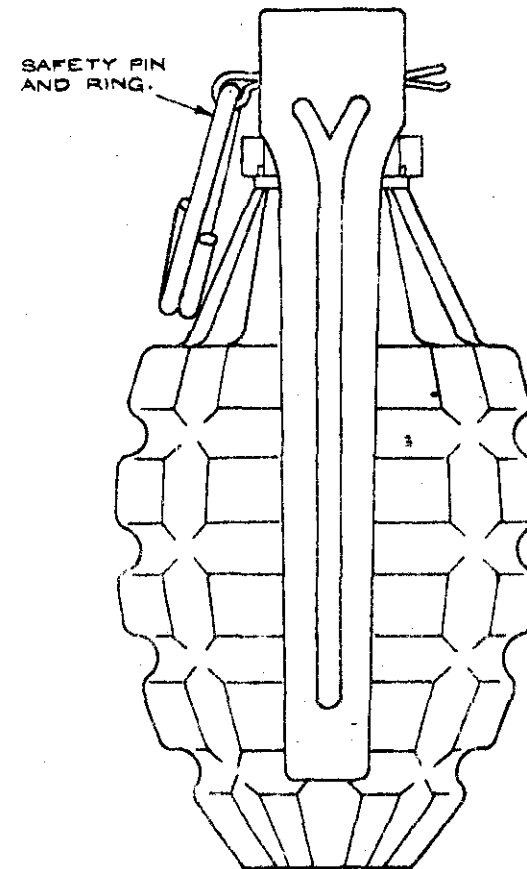
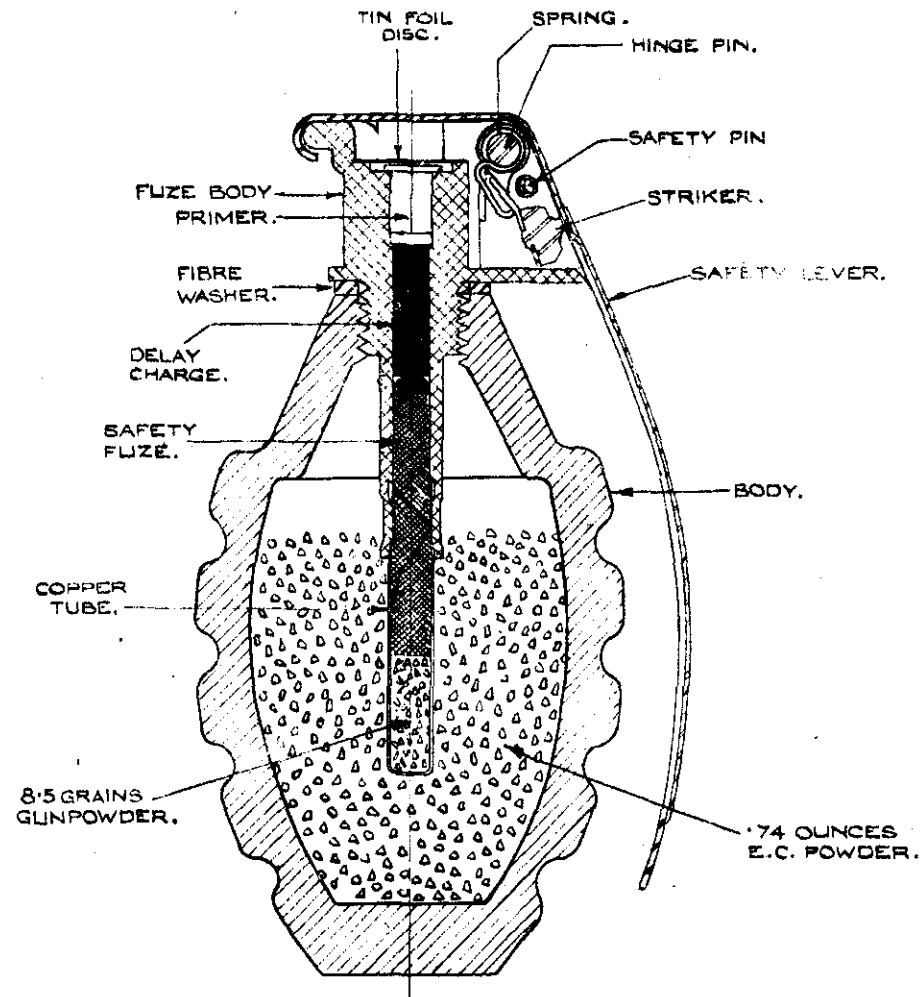


FIG. 252 (ITEM 605)
GRENADÉ, HAND, OFFENSIVE MK.III A.I.

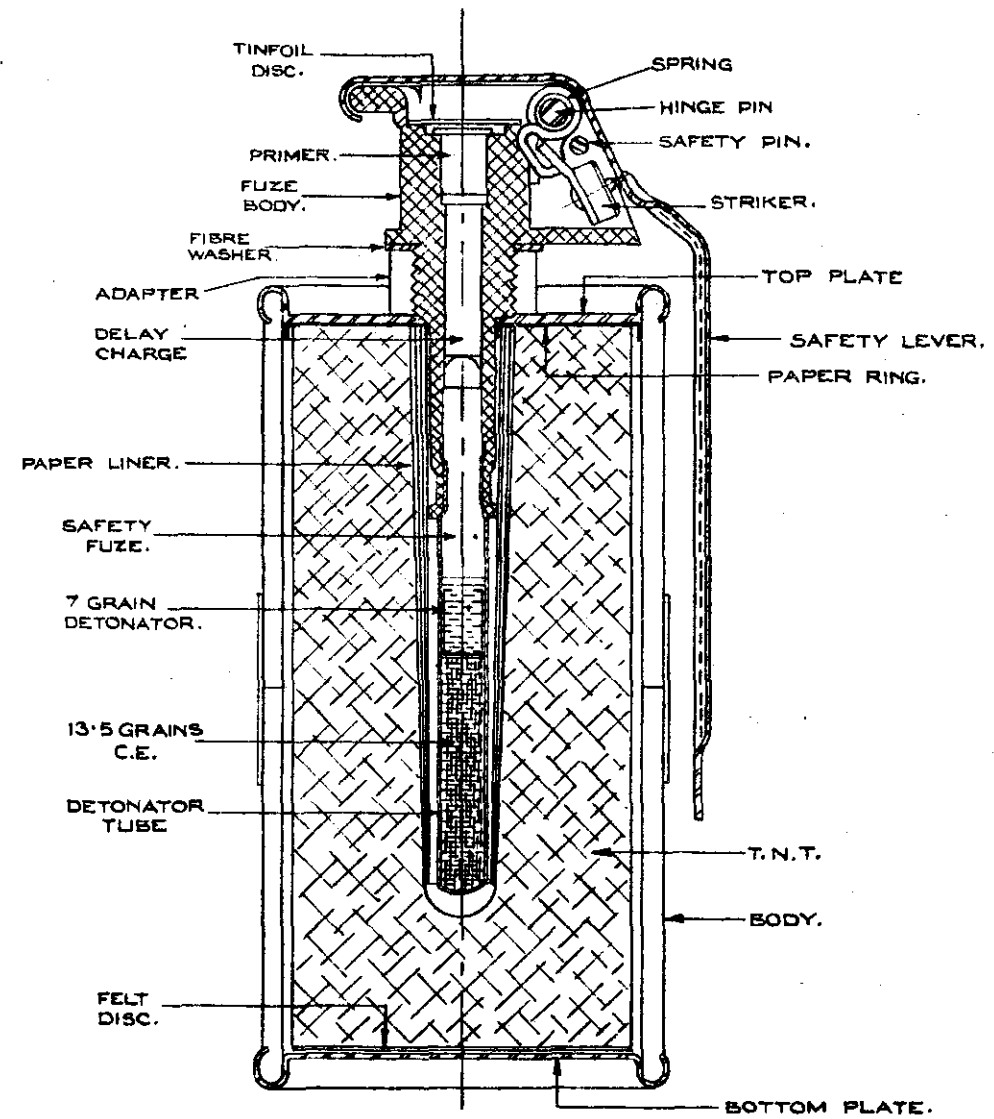
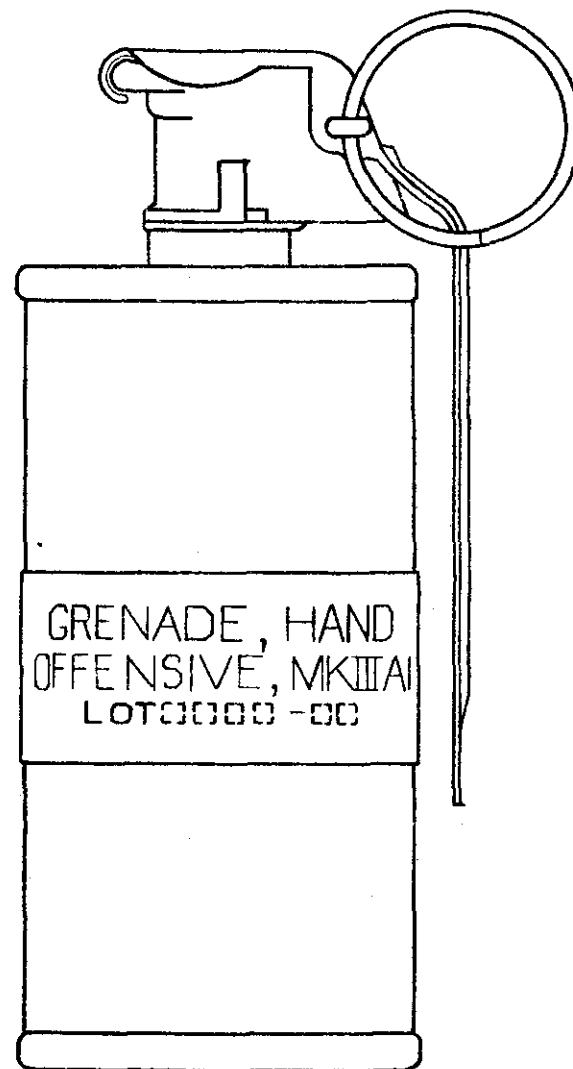
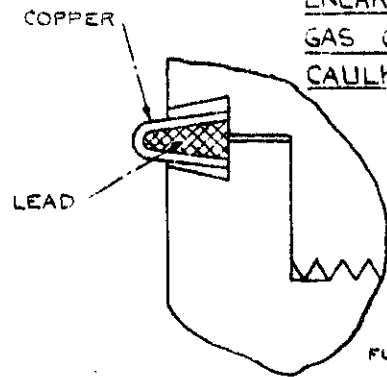


FIG 253 (ITEM 606)

SHELL H.E. AT. 75 MM M66
AND COMPLETE ROUND

ENLARGED VIEW OF
GAS CHECK BEFORE
CAULKING.



LEAD

GAS
CHECK

FUZE B.D. M62.

APPROX. 3 OZ.
CAST PENTOLITE (10/90)

PAPER DISCS
BODY

APPROX. 13 OZ.
CAST PENTOLITE (50/50)

STEEL CONE

HEAD

BALLISTIC CAP

PRIMER, PERCUSSION
M1B1A2

F.N.H. POWDER.

CASE, CARTRIDGE
M5A1

4 INDENTS

75H
H.E. A.T.
SHELL M66

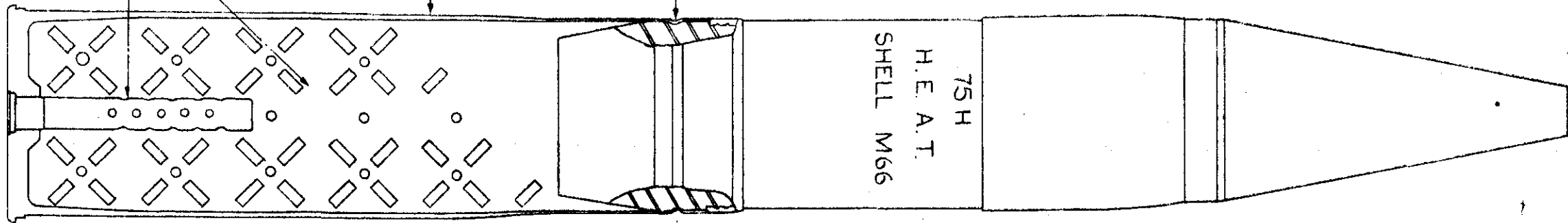


FIG 254 (ITEM 606/6)
FUZE, BASE DETONATING M62.

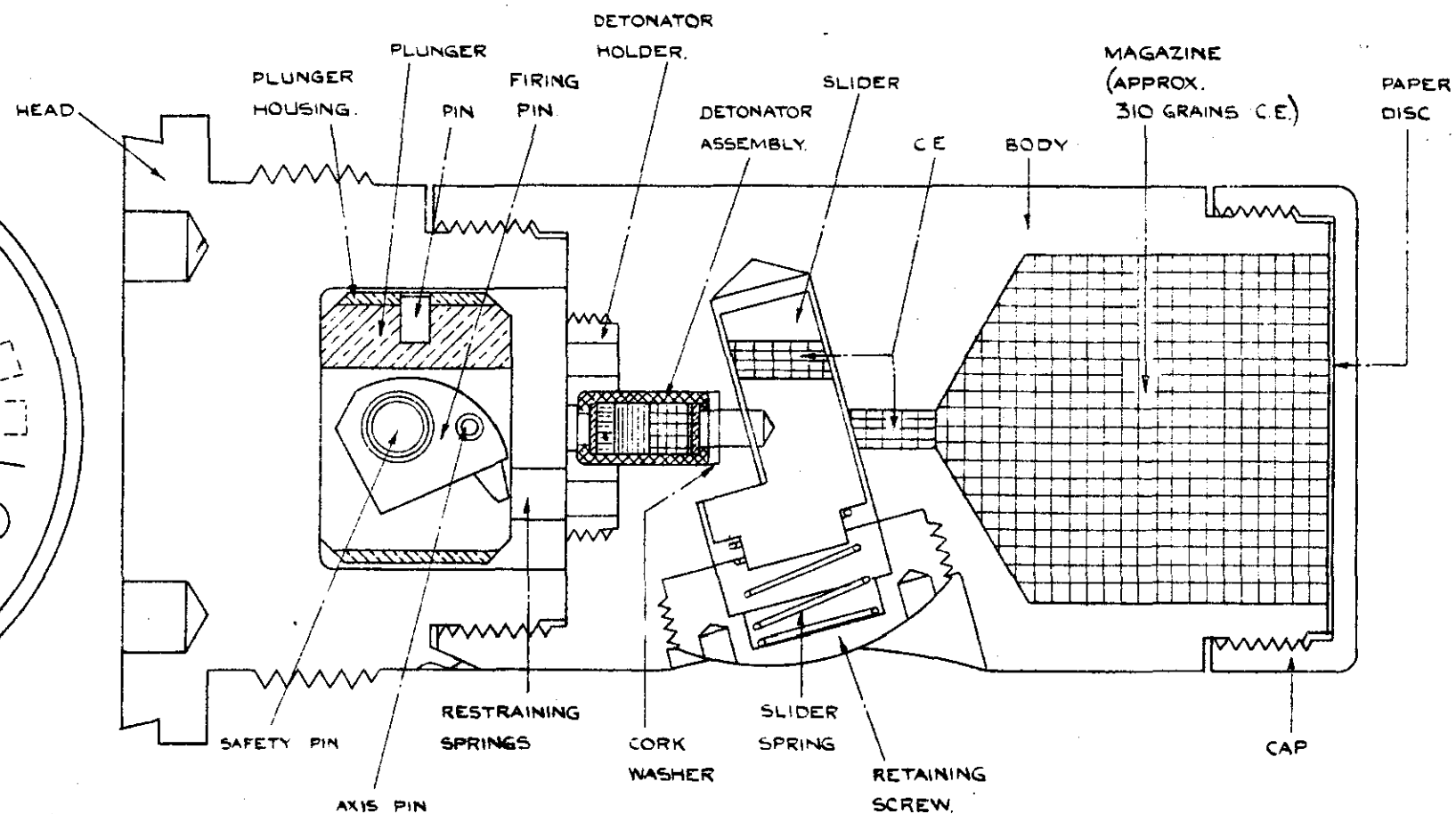
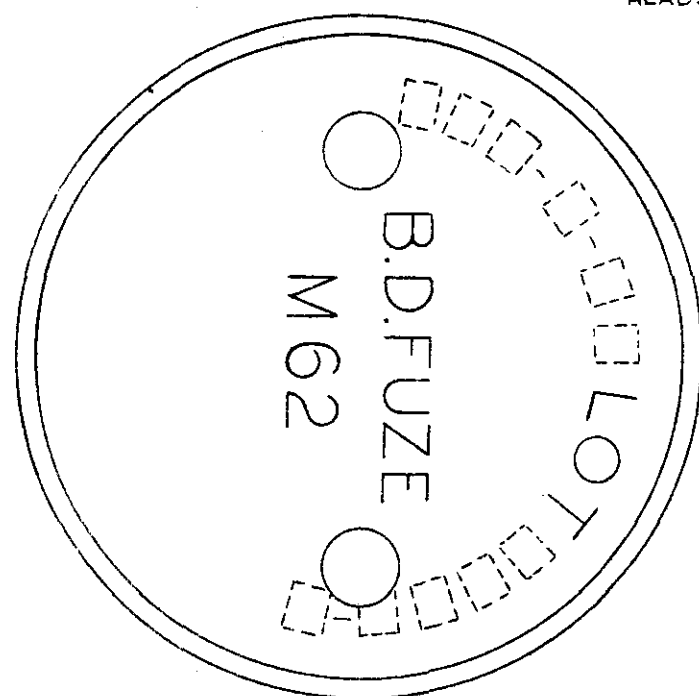


FIG.255
FUZE & BOOSTER M.I.A.I. FOR MINE ANTI TANK M.I.
(AMERICA.)

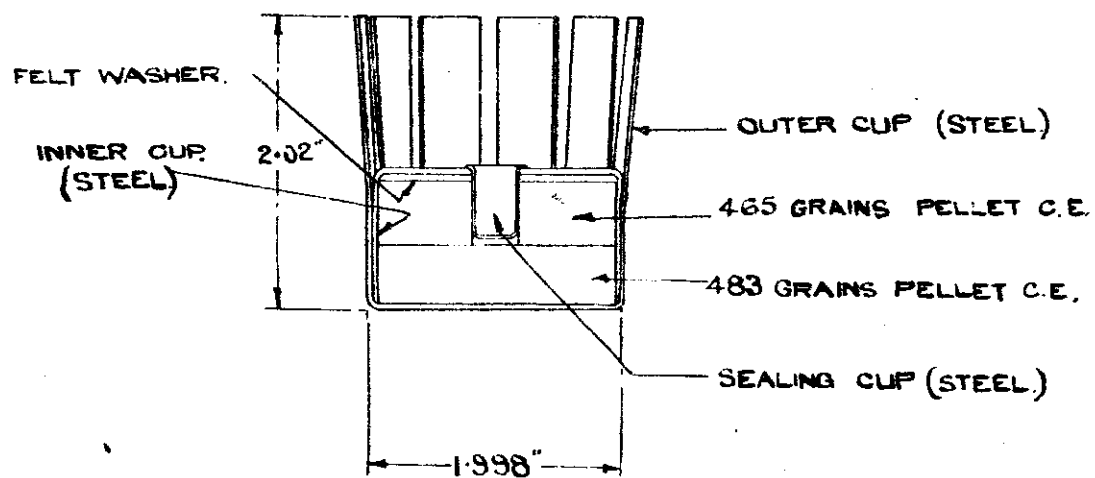
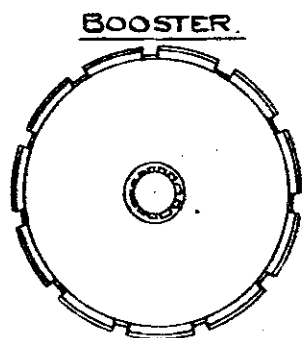
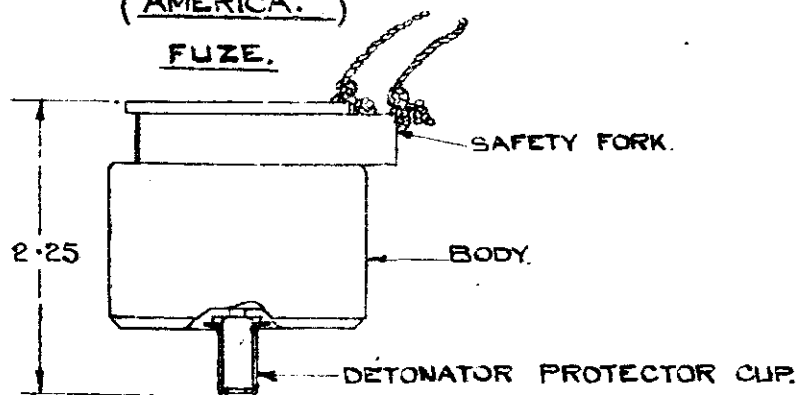


FIG. 256. (ITEM. 631.)
GERMAN, H.E., ANTI-TANK, HOLLOW CHARGE, RIFLE GRENADE.

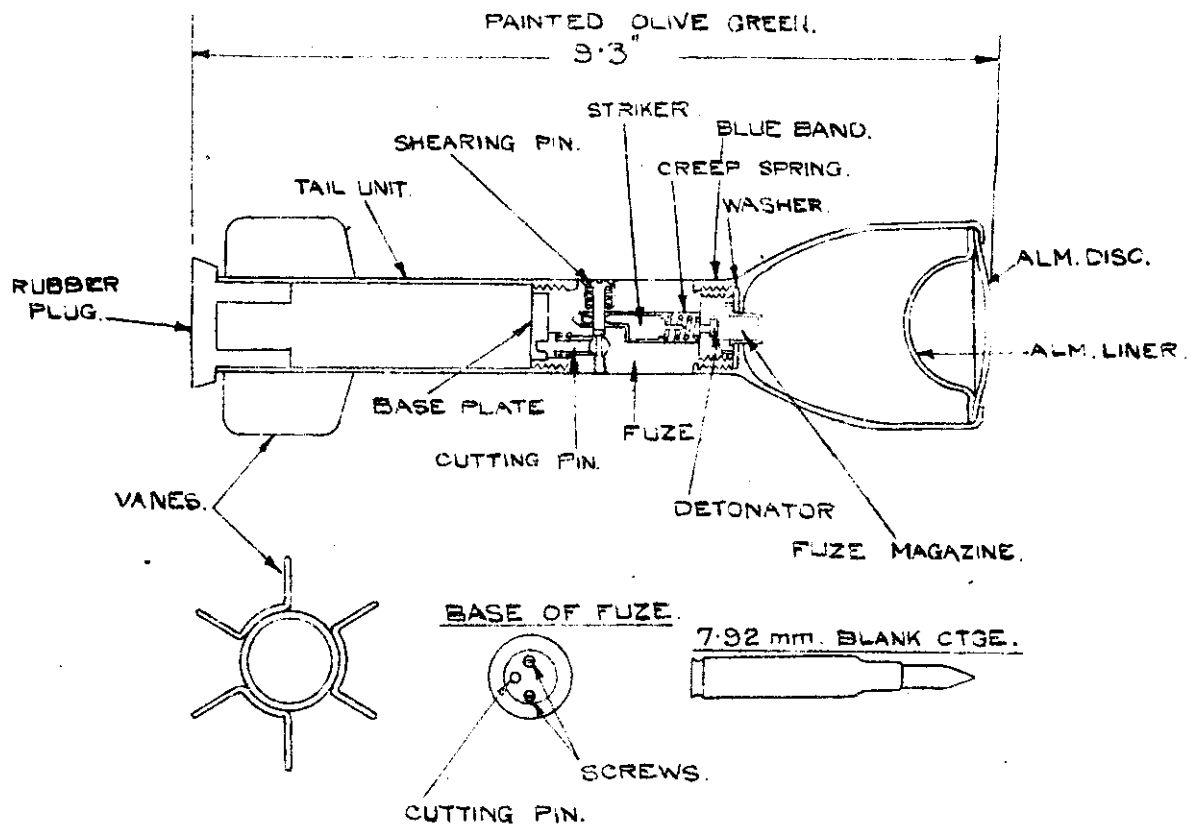


FIG. 257. (ITEM. 632.)
GERMAN H.E. RIFLE & HAND SELF DESTROYING GRENADE.

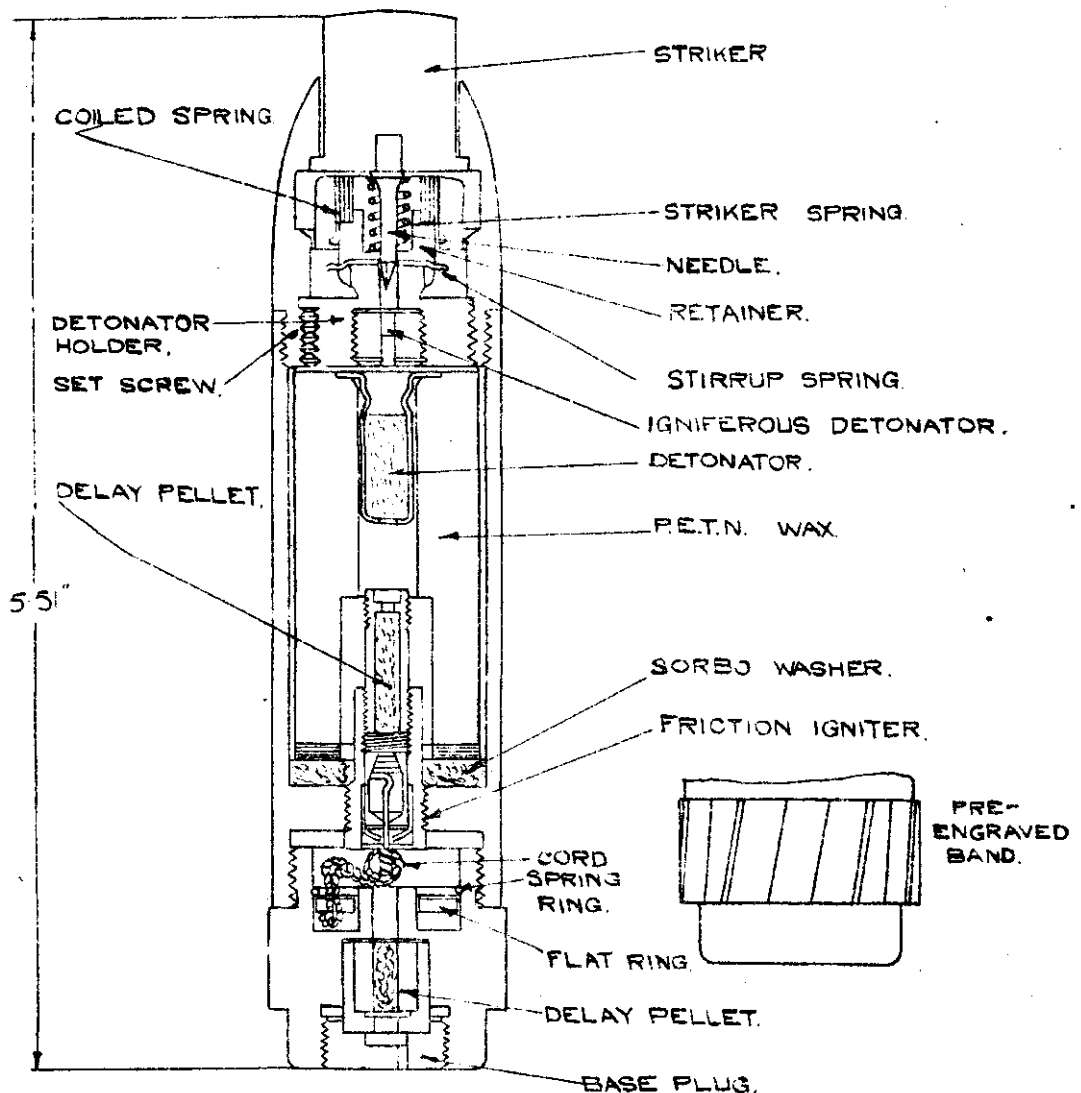


FIG. 258 (ITEM 633)
GERMAN 3.7 cm. Pak. H.E. / TRACER SHELL.

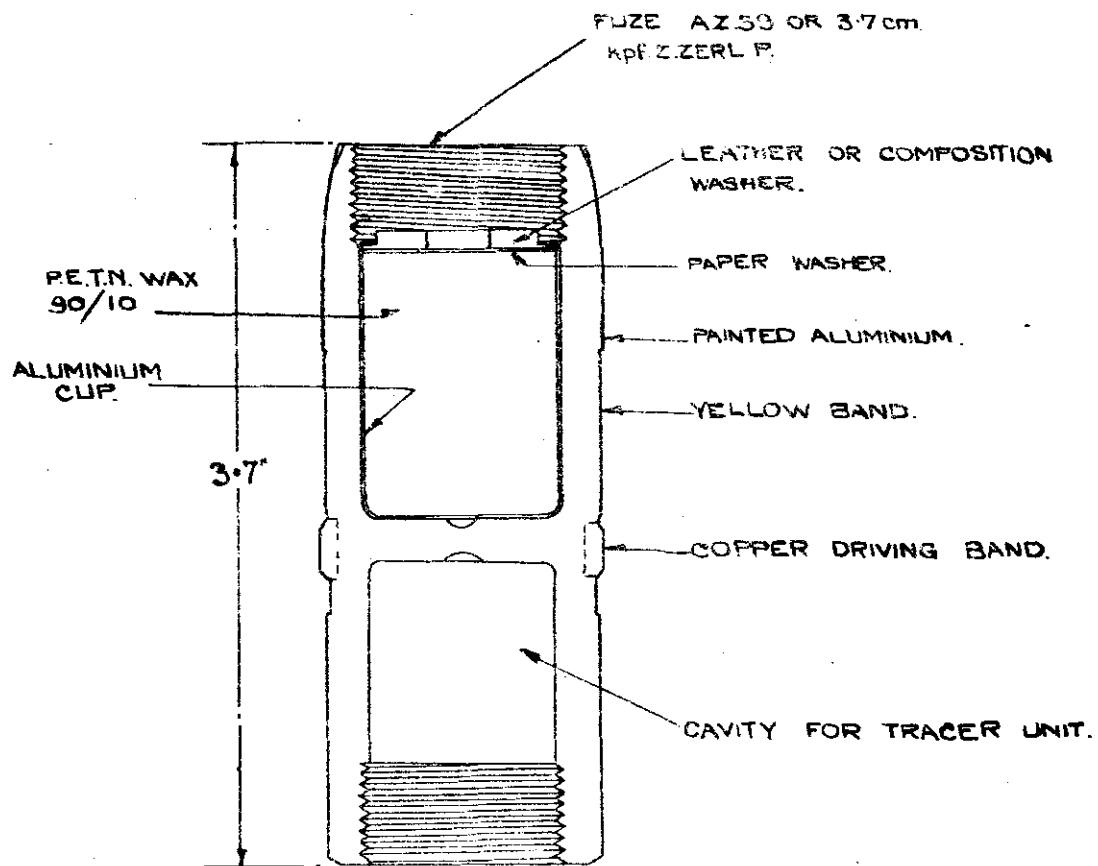


FIG.259. (ITEM.634.)

GERMAN SHELL MARKINGS.

TYPICAL STENCILLINGS.

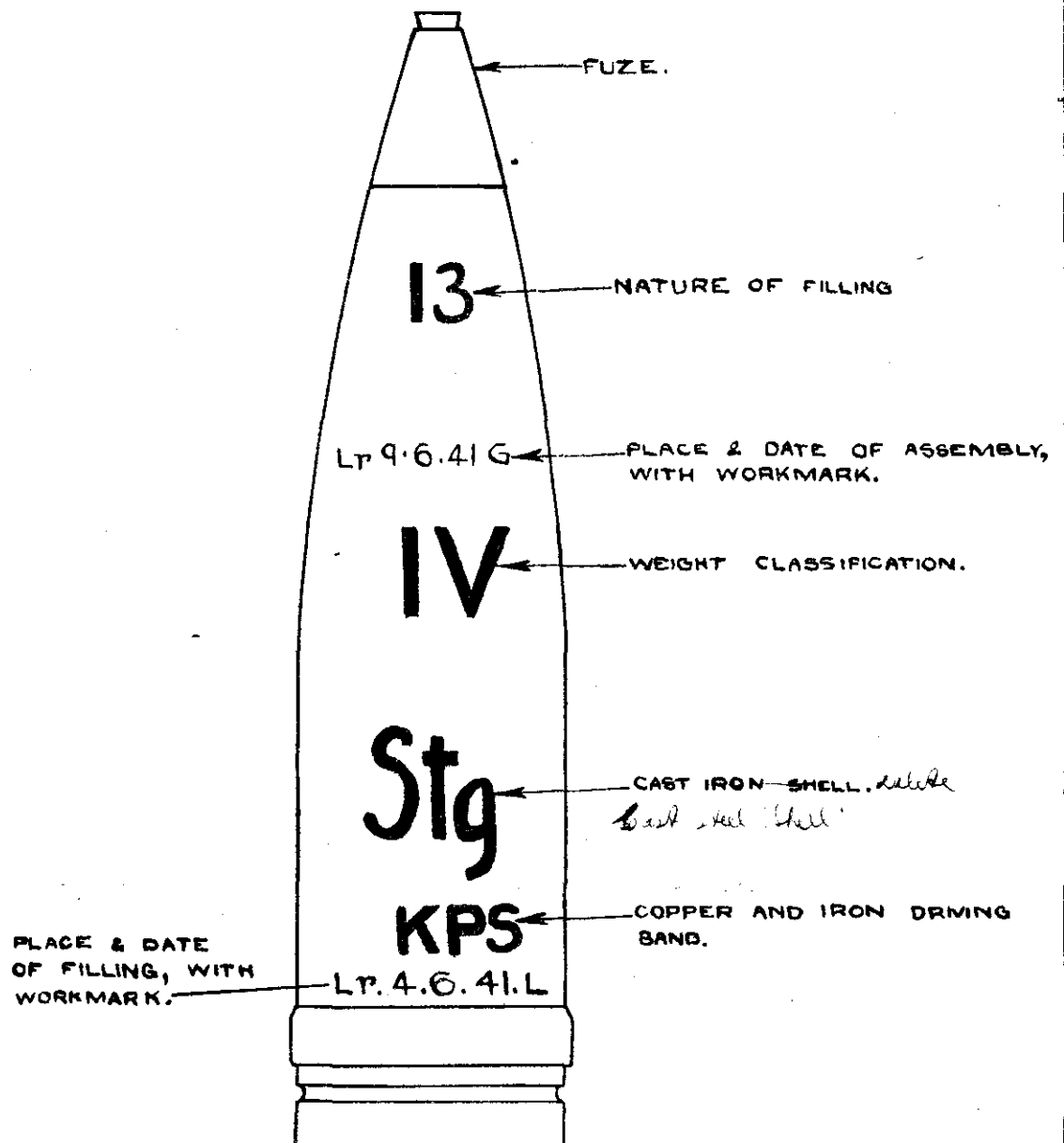


FIG. 260. (ITEM 634.)
GERMAN SHELL STAMPINGS.

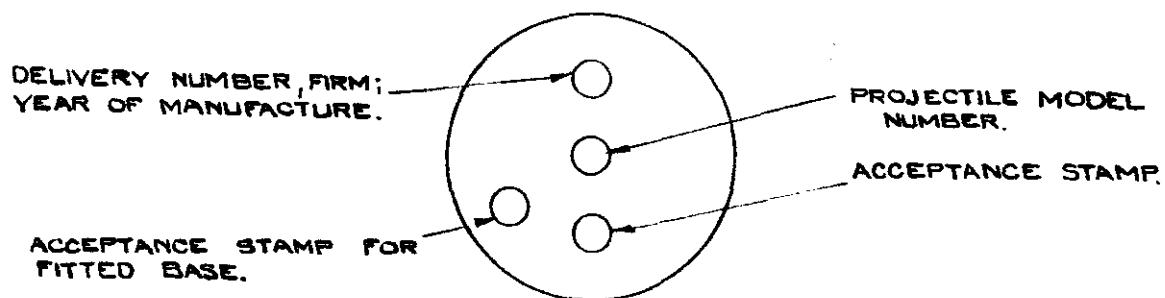
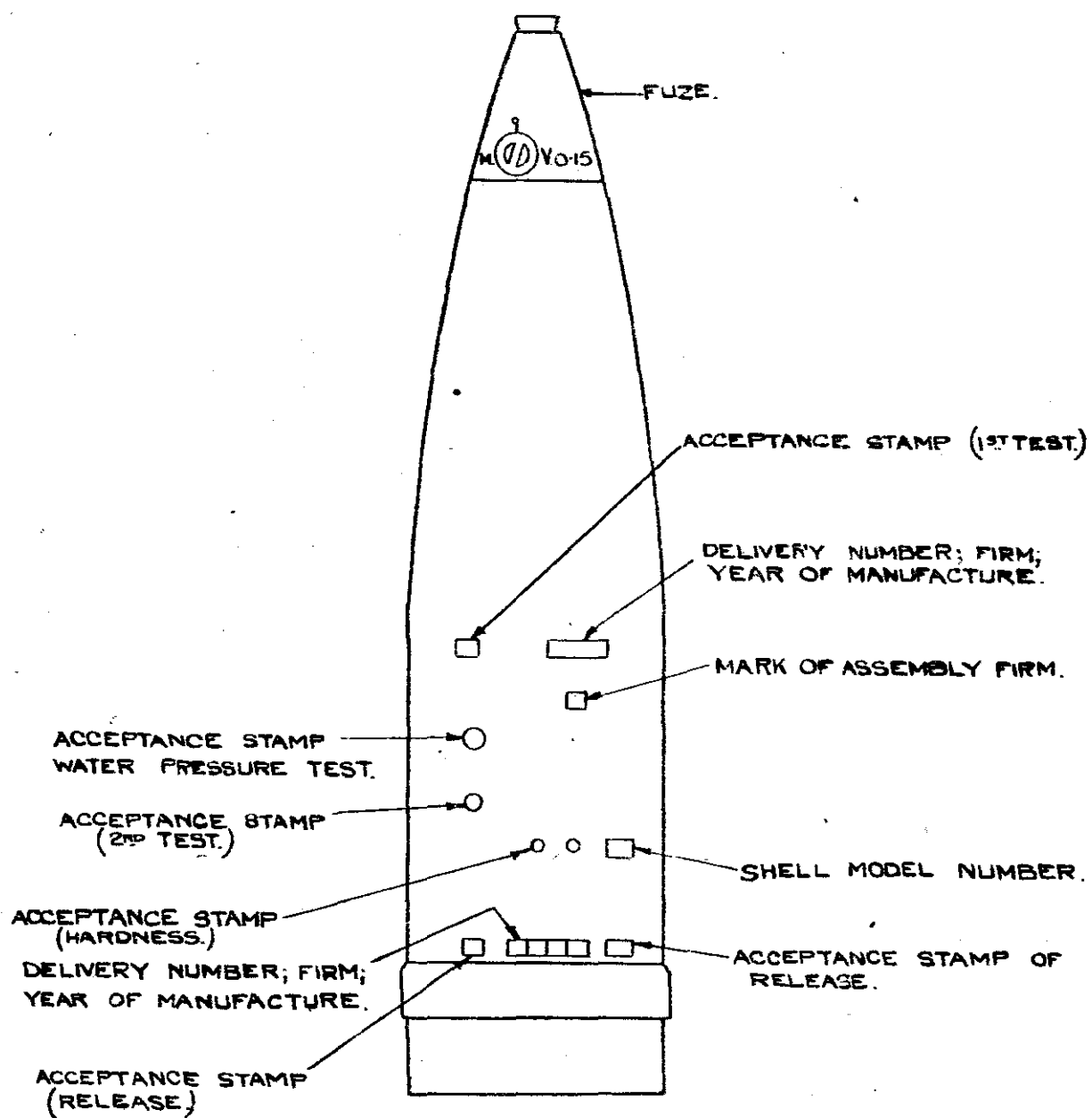


FIG. 261. (ITEM 634.)
GERMAN FIXED Q.F. CARTRIDGES
TYPICAL MARKINGS.

MARKINGS ON SIDE OF CASE.

MARKINGS ON BASE OF CASE
& PRIMER.

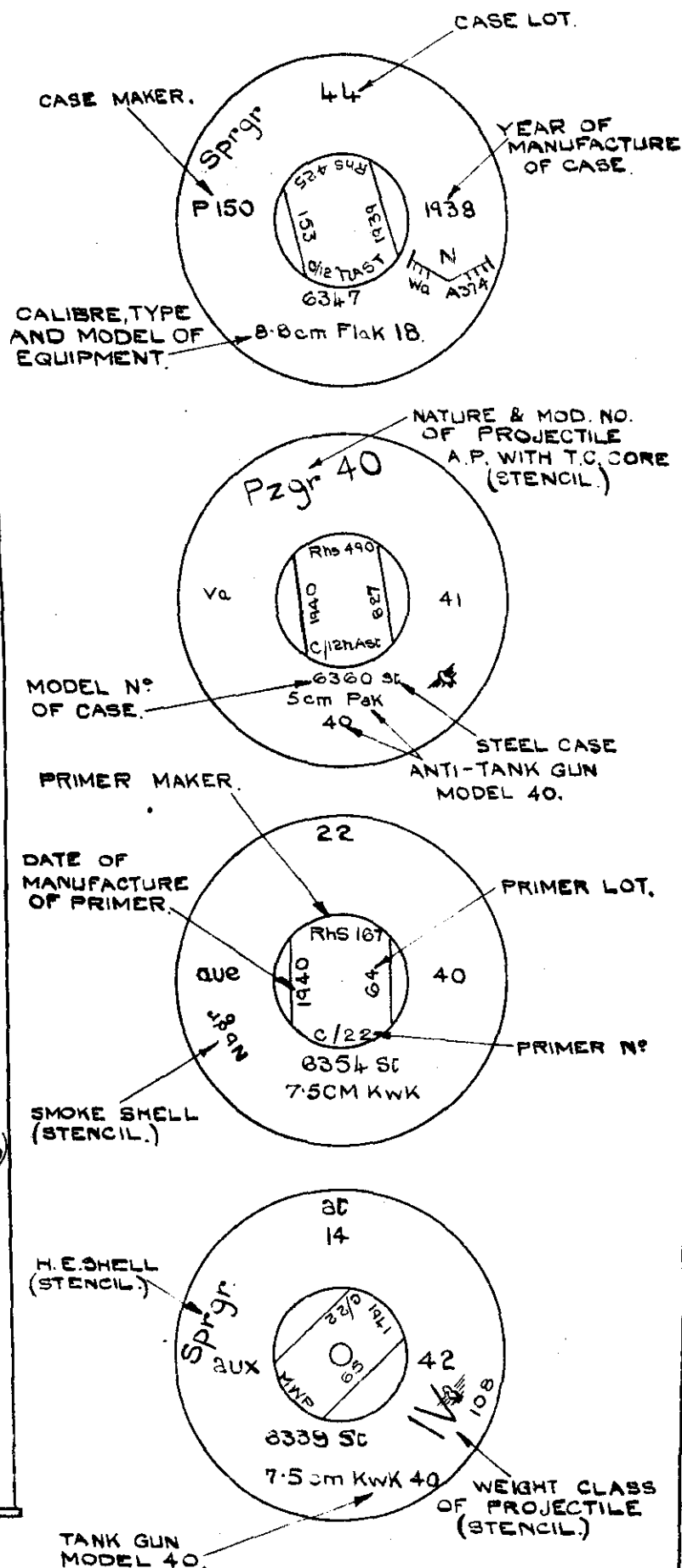
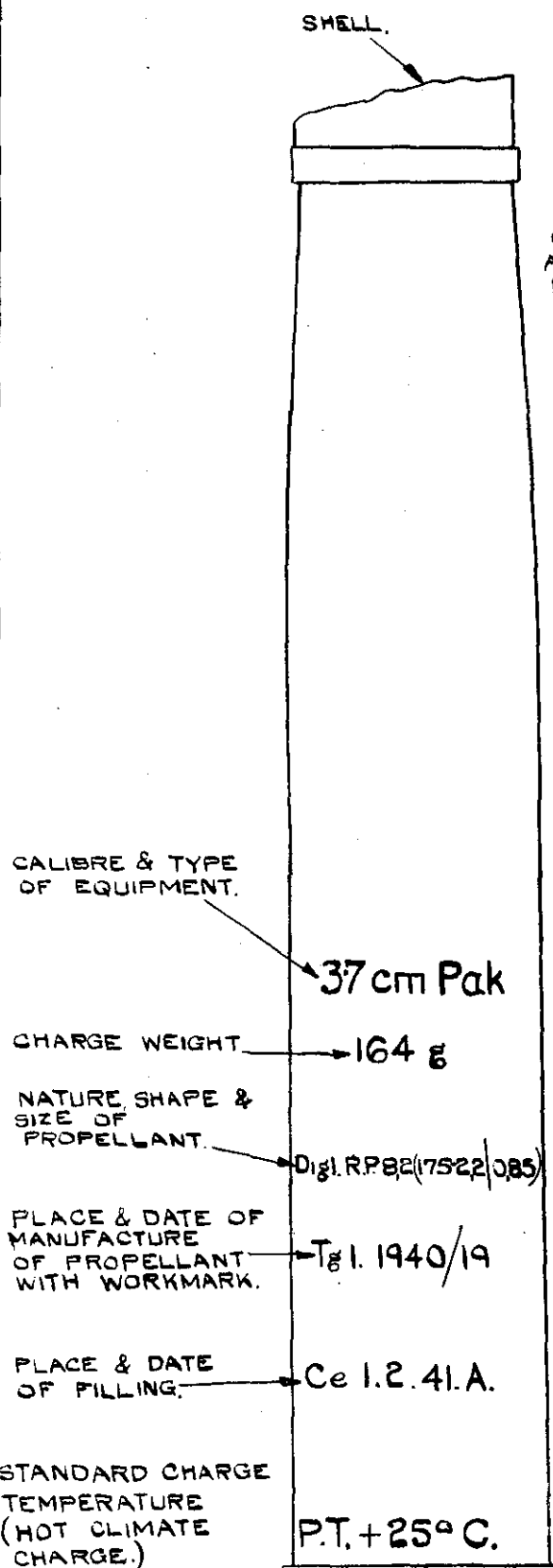
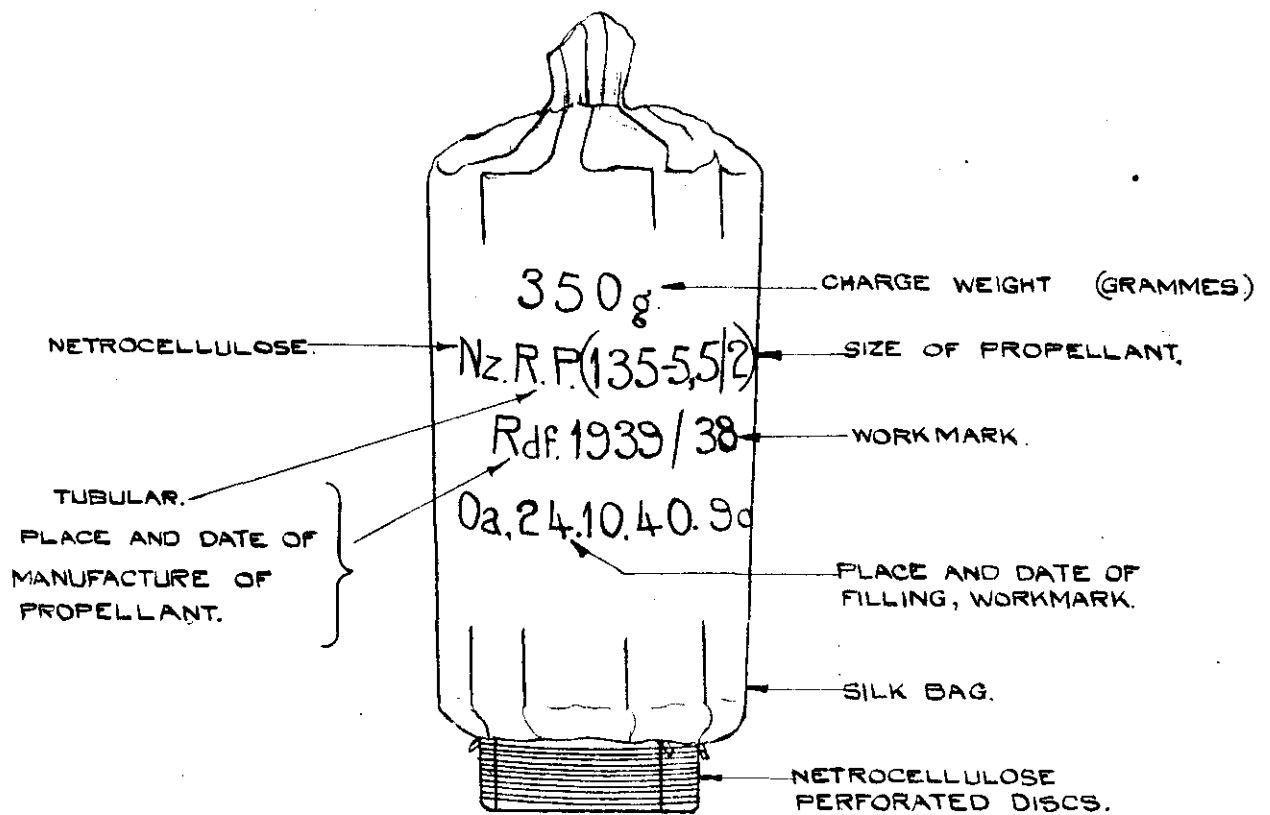


FIG. 262 (ITEM. 634.)
GERMAN Q.F. CHARGE FOR FIXED CARTRIDGE
TYPICAL MARKINGS.



5. Dimensions and Weight.

Overall length of fuze is 3.47 inches.
Length protruding from shell 2.36 inches.
Approx. weight .52 lb.

6. Packing.

Details of box packing are not yet available.

603 GUN. 76 M.M. M.1. COMPLETE ROUND WITH SHELL, H.E. M.42A1 (AMERICAN). (Fig.250)

1. The complete round, fixed Q.F. type, consists of the following components:-

Primer, percussion, M 28A2
Case, cartridge, M.26
Shell, 3 inch, H.E., M.42A1
Fuze, P.D.M.48 with Booster, M.20A1

2. Primer, percussion, M.28A2.

This primer differs from the M.28A1 (see Bulletin No.24, Item 394) in length, being 10.26 inches long.

3. Case, cartridge, M.26

The case is of brass or, alternatively, copper-silicon-alloy. It is tapered and the mouth is attached to the shell by 8 crimps arranged in two rings of 4, and sealed with N.R.C. Compound. Propellant charge consists of approx. 3.75 lbs. F.N.H. powder.

4. Shell, H.E. M.42A1.

The shell body is a steel forging and is fitted with a bakelite fuze well cup. The head of the shell is struck with a radius of approx. 7 C.R.H. and the rear portion is fitted with a gilding metal driving band. Two grooves are cut around the shell body in rear of the driving band for the attachment of the cartridge. A base cover plate is spot welded to the base.

The following bursting charges are used:-

T.N.T. Grade 1 (.86 lb.)
Amatol 50/50 with T.N.T. booster surround (.77 lb.)
Trimonite (.88 lb.)

The body of the shell is painted yellow and is marked to indicate the calibre of gun, nature of filling and nomenclature of shell.

5. Fuze, P.D.M.48

For details of this fuze see Item 393, Bull. No.24.

6. Booster M.20A1

This Booster differs from Booster M.20 (see Bulletin No.24, Item 392, Fig.140) in that the external screw threads near the top of the body are reduced in number to leave a plain ring of metal at the top of the body into which are cut the two slots for screwing the Booster into the fuze hole of the shell.

7. Dimensions.

The overall length of the fuzed round is approx. 32.29 inches.

8. Packing.

Each complete round is packed in Container, Fibre, M.92. The container is cylindrical with terne plate end pieces and is painted black. The terne plate end piece in the lid is marked to indicate the nomenclature of the gun and container. Length of container is $34\frac{1}{2}$ inches and diameter $5\frac{9}{10}$ inches.

Details of bundle packing are not yet available.

604. GRENADE, HAND, FRAGMENTATION, MK. II. (AMERICAN) (Fig. 251)

1. The grenade consists essentially of a body and a fuze. The body is made of cast iron and is screwthreaded internally at the top to receive the fuze. The outside surface is serrated horizontally and vertically to assist in forming uniform fragments when the grenade explodes. The bursting charge consists of .74 ounces E.C. powder giving a normal radius of burst of 30 yards, although fragments may fly over 200 yards.
2. The Fuze, Igniting, M10A2 gives a delay of approx. 5 seconds. The fuze body, of zinc alloy, is suitably shaped and prepared at the top to receive the safety lever, striker with spring and hinge pin and the safety pin. It is bored longitudinally to accommodate the primer, a delay charge of approx. 10 grains Gun Powder, and the upper part of a length of safety fuze. A copper tube, closed at one end, which contains a charge of approx. 8 grains of Gun Powder and accommodates the lower part of the safety fuze, is inserted into the lower end of the fuze body. External screw threads are formed near the lower end of the fuze body for the insertion of the fuze, over a fibre washer, into the grenade.

The steel safety lever is shaped to the contour of the grenade with a lip which fits over a projection formed at the top of the fuze body. A hole is bored through the lever near the top to take the safety pin. The safety pin, with a ring, passes through the safety lever and fuze body and retains the striker, with its spring under compression, in the safe position.

3. Action

The safety pin is withdrawn immediately before throwing, care being taken that the grenade is held with the safety lever firmly pressed by the palm until the grenade is thrown. When the safety pin has been removed the striker is retained in the safe position by the safety lever. On throwing the grenade the safety lever is forced clear of the grenade by the striker which is rotated by its spring on the hinge pin and strikes the primer, the resultant flash initiating the grenade filling through the delay charge, safety fuze and powder charge in the fuze.

4. Painting and Marking.

The body of the grenade is painted yellow and has the manufacturer's initials or symbol cast in the body.

5. Dimensions and Packing.

Overall length of grenade, fuze, is approx. 4.5 inches. Maximum diameter of body, approx. 2.25 inches. Details of packing are not yet available.

605. GRENADE, HAND, OFFENSIVE, MK. III.A.1. (AMERICAN) (Fig. 252)

1. The grenade, filled H.E., is used for demolition purposes and may be used in the open more safely than the Fragmentation Grenade (see ~~Fig.~~ 251) because there is no marked fragmentation. Fig.
2. It consists principally of a body and a fuze. The cylindrical body is of laminated cartridge paper closed at each end by a steel cover plate secured to the body by crimping. The top plate has a hole in the centre over which is fitted an adaptor, screwthreaded internally to take the fuze. The body is filled with pressed T.N.T. on a felt disc or, alternatively, not more than 4 T.N.T. pellets. The fuze cavity is lined with Kraft paper.
3. The Fuze, Detonating, Hand Grenade, M6A2 is screwed into the grenade body over a fibre washer and gives a delay of from 4.3 to 5.5 seconds. It differs from the M10A2 (see ~~Fig.~~ 251) in that below the safety fuze is a 7 grain detonator and a charge of approx. 13 grains C.E., both contained in a gilding metal tube inserted into the lower end of the fuze body.

4. Painting and Marking.

The grenade body is painted black. A yellow label bears the following particulars:- Nomenclature of grenade, filler's lot number and year of filling.

5. Dimensions and Packing.

Overall length of grenade fuze is approx. 5.55 inches and maximum diameter approx. 2.1 inches.

Packing details are not yet available.

606. HOWITZER, 75 M.M. M.1 AND M.1A1. (AMERICAN). COMPLETE ROUND WITH SHELL, H.E.A.T. M.66. (Fig. 253)

1. Components.

The complete round, fixed Q.F. type, consists of the following components:-

Primer, percussion, M1B1A2.
Case, cartridge, M.5A1 or M.5A1B1.
Propellant, F.N.H. Powder.
Shell, H.E.A.T. M.66.
Fuze, Base Detonating, M.62.

2. Primer, percussion, M1B1A2.

This 'push in' type primer is of brass and the body contains 100 grains Gunpowder in a paper wrapping. Overall length of primer is approx. 3.7 inches.

3. Case, cartridge, M.5A1.

The brass case has a stepped flange and the base is bored and prepared to seat the primer, the metal around the primer seating being hardened. The case is necked at the mouth and is attached to the shell by crimping.

Two types of this case are made, Type II being used with Shell, H.E.A.T. M.66. The type is stamped on the base of the case.

As an alternative to brass, the case may be made of copper-silicon alloy.

Case, Cartridge, M.5A1B1.

This is a steel case and is the substitute standard for Case, Cartridge, M.5A1.

4. Propellant.

The propellant is F.N.H.

5. Shell, H.E.A.T. M.66.

The shell body is of forged steel with streamlined base and tapered walls. The base is bored and threaded to receive the fuze and is undercut to accommodate the gas check ring. A gilding metal driving band is fitted and a groove is cut around the body in rear of the driving band for the attachment of the cartridge case by crimping. Two set screw holes are bored through the front end of the body which is prepared internally to form a seating for the steel cone and threaded to receive the head.

A thin steel ballistic cap is welded to the head of the shell, the cap also acting as a distance piece on impact to ensure the best effect from the hollow charge. The head is screwed into the body and secured by two set screws.

The interior surface of the shell is coated with acid proof paint and the body is filled through the base with 50/50 Pentolite topped with 10/90 Pentolite, to form a hollow charge. The fuze cavity is formed in the 10/90 Pentolite.

The shell is painted yellow and bears the following markings:-

75 H
H.E.A.T.
Shell M.66

Gas check.

A sectional view of the gas check arrangement is shown in Fig. 253. When the fuze is inserted an undercut groove is formed between the flange of the fuze and the base boring in the shell. A gas check ring consisting of a lead core with a copper covering is inserted in the groove and secured by caulking.

6. Fuze, R.D.M.62 (Fig. 254)

This base detonating fuze is of steel. The head is flanged at its rear end, the flange being undercut to accommodate the gas check ring. Two key holes for inserting the fuze are made in the base. External threads are formed to screw the head into the fuze body and the assembled fuze into the shell. The front end of the head is recessed to accommodate the percussion firing assembly.

The body of the fuze is recessed and threaded at its rear end to receive the detonator holder and the fuze head. A hole bored centrally through the body connects with the magazine. A transverse boring in the body carries the slider. The front end of the body is hollowed out to form the magazine and threaded externally to receive the closing cap.

The percussion firing assembly comprises a cylindrical brass housing in which is contained a brass plunger secured to the housing by a small brass pin. A slot cut in the plunger accommodates the firing pin which is held in position by a safety pin and an axis pin inserted through two holes bored in the plunger. The safety pin is in two halves, the inner ends bearing together in a hole cut in the firing pin and retained in position by two springs. It is designed so that it will not arm at 1700 r.p.m., but must arm at 2500 r.p.m. The complete assembly is held clear of the detonator by two restraining (or creep) springs ~~and plungers~~ interposed between it and the detonator holder.

The detonator cup rests on a cork washer in its holder and contains .72 grains primer mixture, 2.39 grains lead azide and a 1.05 grain C.E. pellet. It is closed at each end by an aluminium disc.

The brass slider, supported by a spring, carries a stemming of C.E. in a hole bored through it near its inner end, it must not arm at 2400 r.p.m. but must arm at 3600 r.p.m. When the slider is armed the stemmed C.E. hole makes continuity with a C.E. stemming contained in the central boring in the body of the fuze.

A filling of approx. 510 grains C.E. is contained in the magazine cavity which is closed by an onion skin paper disc and a brass cap screwed on to the fuze body.

The exterior of the fuze, above the threads on the head, is dipped in black acid proof paint.

Action.

On acceleration no action takes place.

During flight centrifugal action causes the two halves of the safety pin of the firing pin to move outwards against their retaining springs,

leaving the firing pin free to revolve on its axis pin. A bias on the firing pin brings it into the armed position. The slider, by centrifugal action, moves outwards against its spring and the stemmed hole near its inner end is brought into alignment with the central boring in the body of the fuze. The fuze is now fully armed.

On impact the plunger and firing pin are forced forward, overcoming the two restraining springs and initiating the detonator.

7. Length of complete round.

The overall length of the complete round is 23.47 inches.

8. Packing

Each complete round is packed in "Container, Fibre, 75 m.m. M.82".

The container has terne plate end pieces and is painted black. The junction of the lid and body is sealed by a strip of adhesive tape approx. 2" x 30". This sealing strip is stencilled in white to show the nomenclature of the round and both terne plate end pieces are marked in white to indicate the nomenclature of the howitzer, shell and container.

Length of container is 24 15/64 inches. Weight, empty, approx. 2.3 lbs.

607. PRIMERS PERCUSSION Q.F. CARTRIDGE. MARKING OF BOXES AMMUNITION CONTAINING "Q" PRIMERS.

Reference Item 144, Bulletin 14 and Item 285, Bulletin 20.

In some instances it is impossible to stencil the "(Q)" after the batch marking on the package because of the lack of space or the shape of the box. In these circumstances the marking "(Q)" will be stencilled in half inch lettering immediately above the last numeral of the batch number or the sub-batch letter, as applicable.

608. MINES, ANTI-TANK, M.1. (AMERICAN). REPLACEMENT OF FUZES M.1. BY FUZE M.1.A1 and BOOSTERS M.1.A1.

Fig. 255.

Reference Bulletin No. 30, Items 577 and 578.

The fuze M.1.A1 differs from the M.1 in having no magazine and is used in conjunction with the Booster M.1.A1 which is, in effect, the magazine of the M.1 modified for insertion as a separate component in the fuze socket of the mine.

Fuzes and boosters M.1.A1 will be supplied for replacement of fuzes M.1 for all M.1 mines. The following instructions for this operation have been drawn up by the U.S. Authorities :-

"(a) Remove box with extreme caution, a minimum of 150 ft. from point of storage, care being taken that box is always handled with the end in which the fuzes are packed, down. Only one box of mines should be allowed at this point of operation at one time.

(b) Gently place box down on a slant at an angle of 45 degrees with the fuze end of the box down.

(c) Open box and carefully remove tray containing fuzes. Extreme caution is to be used in this operation and care should be taken to see that the fuzes are always handled with the striker end up. As fuzes are removed from box, they should be carried to point where they can be

safely destroyed. Fuzees should not be allowed to accumulate unnecessarily at point of destruction.

(d) Remove mines from packing box and insert Booster, M.1.A1, which is shipped separately from fuze in the cavity so that expanding side strips catch under crimp at top of the socket.

(e) Place mines with boosters assembled on correct compartments in packing box.

(f) Place tray of Fuzees M.1.A1 in compartment from which tray of Fuzees M.1 was removed and close box.

(g) Add A.1 to the nomenclature to the fuzees in the marking on the box so that the correct nomenclature of Fuzees M.1.A1 is shown. Also obliterate lot number of old fuzees M.1 and show lot number of new Fuzees, M.1.A1."

609. FUZE POINT DETONATING M.57 (AMERICAN). NOMENCLATURE.

Reference Bulletin No. 29, Item 525 and Fig. 207.

The P.D. fuze T.18E2 has been designated, "Fuze P.D.M57" and now has the body tube integral with the body.

610. PROPELLANTS. STABILITY OF MAX.

Reference Bulletin No. 21, Item 311 and Bulletin No. 23, Item 366.

Climatic trials of this propellant have established that it has a safe life of at least 5 years at 90°F.

611. PROPELLANTS. CODE LETTER FOR F.N.H./D.B.

Reference Bulletin No. 30, Item 559 and Bulletin No. 24, Item 397.

The code letter K is used to indicate the propellant F.N.H./D.B.

612. CARTRIDGE Q.F. 17 PR. BATCH LABELS GIVING ADJUSTED CHARGE WEIGHTS.

Reference Bulletin No. 30, Item 589.

Labels on packages containing rounds in batches E.1, E.2 and E.3 (A.P. shot) and E.4 (A.P.C. shot) have been incorrectly completed to indicate the adjusted charge weight instead of the nominal weight.

With subsequent batches, commencing with E.5A, the labels are correctly completed to indicate the nominal charge weight.

613. PROPELLANTS. SERVICE LIFE OF N.C.T. OF 1914-1918 MANUFACTURE EXTENDED.

Reference Bulletin No. 15, Item 161.

A number of the sub batches of Q.F. 4.5 inch gun cartridges containing propellant charges of N.C.T. (1914-18) have reached, or are approaching, the end of the "Service Life" as indicated by the stencilling on the rounds. The life of these cartridges has been extended to December 1944.

614. CARTRIDGES Q.F. SUPER VELOCITY 2 PR. MARKING OF CARTRIDGES & PACKAGES.

Cartridges containing super velocity charges for the 2 Pr. Marks IX to X.A guns are distinguished by two $\frac{3}{8}$ inch bands, half an inch apart and 1.5 inches from the flange of the case and the letters "S.V."