

AMMUNITION BULLETIN N^o 40

ITEMS 994-1036

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THE CHIEF INSPECTOR OF ARMAMENTS.

MINISTRY OF SUPPLY

AMMUNITION BULLETIN NO. 40.

RESTRICTED

Issued by :-

Chief Inspector of Armaments.

Item No.

- 999 Box, Ammunition, Q.F. 17 pr. C.317 Mk.I.
- 1010 Box, Explosives, M.148 Mk.I, Extension of use.
- 1004 Cartridges, Q.F., 6 pr. 10 cwt. Packages.
- 1016 Cartridge, Q.F., 25 pr. Cordite NQ/R 014-048, Intermediate charge increment, Charge 4 oz., Mk.I.
- 996 Cartridge, Q.F., 25 pr. 2 lb. 1 oz. 12 dr. N.H.012 and F.N.H.023.
- 1018 Cartridges, B.L. 60 pr. Gun. (Table).
- 1001 Cartridge, B.L. 5.5 in. 9 lb. 13 oz. Cordite NQ/S 164-048. Package.
- 1011 " " " " " Igniters.
- 1019 Cartridges, B.L. 6 in. 26 cwt. Howitzer (Table).
- 1000 Cartridge, B.L. 7.2 in. How., Cordite N.045. Revised nominal charge weights.
- 1006 Containers, Ammunition.
- 1009 Container, Cartridge, Q.F. 25 pr. No.211 Mks.I & II.
- 997 Cylinders, Cartridge. Crating during transit.
- 1013 Explosive Labels.
- 1015 Fuze, percussion, D.A. No.244. (1) Change of detonator. (2) To be No.257 when filled non-delay.
- 1005 Generators, Smoke, No.24. Filling and Marking.
- 1014 Generator, Smoke, No.25 Mk.II (Fig.399).
- 1008 Grenade, Hand, No.83, Smoke, Mk.I. Marking.
- 1003 Grenade, Rifle, No.68, A/T. Mk.III. Marking after rectification.
- 1017 Naval Ammunition. Package Markings.
- 1012 Primers for Q.F. Cartridges. Application of Luting.
- 1002 Primer, percussion, Q.F. Cartridge, No.34 Mk.I. (Fig.398).
- 995 Propellant Code Letters.
- 998 Shell, Q.F., Smoke Emission, 95 mm. Tk.How., Mk.I. New Delay incorporated (Fig.397)
- 1007 Simulators, Gun Flash, Packages.
- 994 Storage of Ammunition.

GERMAN AMMUNITION

Item No.

1020 Tellermine (mushroom) 43, (Fig.400).
 1021 Fuze, l.I.gr.Z.23 nA, (Fig.401).
 1022 Fuze A.Z.5075 (Fig.402).
 1023 Fuze Bd.Z.5130, (Fig.403).
 1024 Gaine 34 with delay (Kl.Zdlg.34 Np.mV.) (Fig.404)
 1025 Smoke box No.8.
 1026 Smoke box No.9.
 1027 Tracer No.3. (Fig.405)
 1028 3.7 cm Pak, cartridge, G.F. H.E./T. (Fig.406)
 1029 3.7 cm Pak, hollow charge, muzzle, stick bomb. (Fig.407)
 1030 8 cm ML. mortar H.E. bomb 38. (Fig.408).
 1031 8 cm ML. mortar H.E. bomb 39. (Fig.409)
 1032 10 cm Mb mortar H.E. bomb. (Fig.410)
 1033 10.5 cm high velocity H.E. shell. (Fig.411)
 1034 15 cm high velocity H.E. shell. (Fig.412)
 1035 Fuze A.Z. 35K. (Fig.413)
 1036 Fuze Dopp.Z.S/90/45. (Figs.414, 415 and 416).

AMENDMENTS

Bulletin No.34. Item 794. Page 19, Col.7, Line 7 } For "207" substitute
 " 20, Col.7, Line 6 } "267"
 " 21. Box C.267. Amend Col.4 to read
 "27.75 x 9 $\frac{3}{8}$ x 9 $\frac{3}{8}$ ".

Bulletin No.38. Page 5. Insert "928" against item headed "PHOSPHORUS
 BURNS - TREATMENT OF"

" " Page 7. Insert "932" against item headed "CHARGE,
 DEMOLITION, No.3, 15 lb.Mk.II"

" " " Insert "933" against item headed "CARTRIDGES,
 M.L. 2 inch MORTAR, 52 and 47 GRAIN 81 mm
 POWDER - NOMENCLATURE"

" " Item 943, Line 2. For "Item 879" substitute "Item 880"

" No.39. Item 978, Line 2. For "1 oz." substitute "10 oz."

" " Item 981. DD(L)14107. Delete "No" in Col.8 and substitute
 " * * *".
 Add footnote " * * Shell filled prior to March
 1944 will not have a red filling ring".

994. STORAGE OF AMMUNITION

Due to recent developments in the design and charging of smoke and incendiary weapons it has been decided to re-arrange Groups XI and XII of the existing storage Groups shown in Magazine Regulations and to introduce an additional Group to be known as Group XV. There is a Group XIV in the Royal Navy already for stowage on board H.M. Ships.

The following information in regard to Groups XI to XV shows the new position.

Group XI

Characteristics: Incendiary and Smoke ammunition not containing phosphides, phosphorus, inflammable liquids or gel, with or without components in their packages.

Storage Conditions - Explosives storehouse.

Group XII

Characteristics: Ammunition containing phosphorus or phosphides with or without components in their packages.

Storage Conditions: Explosives storehouse.

Group XIII

Characteristics: Chemical Ammunition, with or without components in their packages.

Storage Conditions: Special Explosives Storehouse.

Group XIV.

This is for Admiralty sea stowage purposes only.

Group XV.

Characteristics: Incendiary ammunition containing inflammable liquids or gel, but not containing phosphides or phosphorus, with or without components in their package.

Storage Conditions: Special Explosives storehouse.

It will be seen that Smoke Ammunition containing phosphides has been transferred from Group XI to Group XII.

The No. 76 (S.I.P.) Grenade has been classified in Group XII, as it contains phosphorus. It must not, however, be stored or transported by road or rail with any other explosive, and for transport by sea special stowage conditions have been drawn up.

995. PROPELLANT CODE LETTERS.

Reference Bulletin No. 38, Item 931. Approval has been given for the propellant-shape letter to be included in the stencilled lettering, indicative of the type of propellant, on B.L. and Q.F. cartridges and their packages, e.g. W.M./T., N.Q./S. etc.

996. CARTRIDGES, Q.F. 25 pr., 2 lb. 1 oz. 12 dr. N.H.012 and F.N.H.023.

Reference Bulletin No.34, Item 794, page 19, Mks.I Foil and II Foil of the abovementioned cartridge have been declared "Obsolescent." Mks.III Foil and IV Foil have been approved.

The Mk.III cartridge is similar to the Mk.I and the Mk.IV is similar to the Mk.II except for the addition of a paper strip to secure the charges in the case.

997. CYLINDERS, CARTRIDGE - CRATING DURING TRANSIT.

Approval has been given for all Cylinders, cartridge, to be packed in Cases, Wood, packing, skeleton, during transit in U.K. or Overseas.

998. SHELL, Q.F., SMOKE EMISSION, 95 mm. TK.HOW. MK.I - NEW DELAY INCORPORATED.
(Fig. 397)

Reference Bulletin No.35, Item 827 and Fig. 324. M. of F. design DN(L)14881/A for the abovementioned shell has been amended to provide for Delay No. 1 to be incorporated in lieu of the Delay previously shown.

Details of method of assembly of the new Delay are shown in Fig.397.

999. BOX, AMMUNITION, Q.F. 17 pr. C.317 Mk.I.

The above steel box has been approved. It is designed to hold 2 round A.P.C.B.C. Stowage dimensions are 12.9 x 7.25 x 40 inches.

1000. CARTRIDGE, B.L. 7.2 in. HOW., CORDITE, N.045 - REVISED NOMINAL CHARGE WEIGHTS

Reference Bulletin No. 37, Item 900. Nominal charge weights for the cartridge described therein have been revised as under :-

		lb.	oz.	dr.
No. 1	Section	6	10	8
" 2	"	2	1	0
" 3	"	5	2	0
		13	13	8

1001. CARTRIDGE, B.L. 5.5 in. 9 lb. 13 oz. CORDITE NQ/S.164-048 PACKAGE.

Reference Bulletin No.38, Item 948, page 13. Container, cartridge, No.207 Mk.I has been approved for the above mentioned cartridge. Stowage dimensions are 22.75 x 4.6 in.

6 cartridges, each in container, are packed in Box No. C.224. Stowage dimensions of box are 24.7 x 15.25 x 10.2 in. Item 948, Col.5 should be amended accordingly.

1002. PRIMER, PERCUSSION, Q.F. CARTRIDGE, NO.34 MK.I
(Fig. 398)

The above primer, for use in the Q.F. 6 pr. 6 cwt. cartridge for Mk.III gun, has been approved.

It comprises a No.15 primer body into which is screwed a cylindrical brass magazine prepared with 24 flash holes. The rear part of the magazine contains 72 grains gunpowder G.7 held in place between a paper disc shellacked over the primer plug and a glazedboard cup secured to the interior of the magazine with shellac adhesive. A paper liner, shellacked externally, is located in the empty portion of the magazine and the front end of the latter is closed by a screwed in plug secured by a circular crimp.

Overall length of primer is 7.84 inches. Details of marking are included in Fig.398.

1003. GRENADE, RIFLE, NO.68, A/T Mk.III. MARKING AFTER RECTIFICATION.

No.68 Mk.III grenades which have been rectified by fitting a Mk.IV tail unit to the body will become "Mk.IV" and the grenades and packages will be marked as follows:-

- (a) Grenade body. The letter "R" stencilled immediately after the last digit in the filled Lot No.
- (b) Box P.59. The box will be stencilled "Mk.IV" and the letter "R" stencilled immediately after the last digit in the filled Lot No.

1004. CARTRIDGES, Q.F., 6 pr. 10 cwt. - PACKAGES.

The use of Box, ammunition, Q.F. 6 pr. 7 cwt. C.264 for packing Q.F. 6 pr. 10 cwt. service cartridges, as an alternative to Box C.197, has been approved.

1005. GENERATOR, SMOKE, NO.24. FILLING AND MARKING.

Reference Bulletin No.33, Item 728. The use of P.N. 421 as a filling for the No.24 Mk.I (Obsolescent) and Mk.II smoke generators has been discontinued and existing stocks of generators so filled are being used up for training.

Approval has also been given for the lettering on the Mk.II and III generators to be embossed, as an alternative to printing.

1006. CONTAINERS AMMUNITION

The materials at present in use for making the paper containers for ammunition, i.e. chipboard bonded with water soluble adhesives, do not stand up satisfactorily to damp or wet storage conditions, particularly under the conditions experienced in Jungle warfare in tropical climates. Under such conditions the existing type of paper container quickly becomes unserviceable.

To overcome these difficulties production of paper containers for ammunition is being turned over to a pitch impregnated chipboard constructed by the aid of approved waterproof adhesives. These adhesives are treated suitably to prevent mould growth or termite attack and are required to be chemically neutral to prevent the corrosion of metals.

First issues will be in priority for containers intended for use in Jungle warfare.

No special marking for the new type of container is at present contemplated but they will, for the present, be issued unpainted.

1007. SIMULATORS, GUN FLASH, PACKAGES.

Reference Bulletin No. 34, Item 762. Due to the heavy demands on Box C.147 a change over of packages for the No's 3, 4 and 5 Simulators has been agreed and details are as follows:-

Simulator, Gun Flash, No. 3 Mk.I. Each packed in Container, Packing, No.81. 48 Containers are packed in Box M.107 Mk.I stowage dimensions of which are 15 x 13.75 x 9.45 inches.

Simulator, Gun Flash, No. 4 Mk. I or II. Packed 2 in a Container, Packing, No. 83. 133 Containers (270 Simulators) are packed in Box M.110 Mk.I stowage dimensions of which are 24.1 x 15 x 9.45 inches.

Simulators, Gun Flash, No.5 Mk.I. Packed 2 in a Container, Packing, No.82. 48 Containers (96 Simulators) are packed in Box M.107 Mk.I stowage dimensions of which are given above.

1008. GRENADE, HAND, NO.83, SMOKE, MK.I. MARKING.

Reference Bulletin No.38, Item 980. The lettering on the grenade body denoting colour of smoke will now be printed in white. All remaining printed markings will be in Black.

1009. CONTAINER, CARTRIDGE, Q.F. 25 pr. No.211 Mks.I & II.

The above container has been approved and holds 1 Q.F. 25 pr. cartridge.

The Mark I container comprises a rolled paper tube fitted internally at one end with a collar to locate the mouth of the cartridge case and the end closed with a millboard, hardwood or plywood bottom secured to the tube. External dimensions are L.11.625 Dia. 4.375 inches.

The Mark II container, except that it is made of waterproof paper, is similar to the Mk.I.

The following particulars are stencilled on the outside of container:-
No. and Mark, Contractor's initials or recognised trade mark, Year of manufacture.

8 containers are packed in waterproof steel box C.314 stowage dimensions of which are 28 x 10.25 x 10.25 inches.

1010. BOX, EXPLOSIVES, M.148 Mk.I - EXTENSION OF USE.

The use of the abovementioned box has been extended to include the packing of 20 lb. Plastic Explosive 808 in eight 2½ lb. charges.

1011. CARTRIDGE, B.L. 5.5 in. 9 lb. 13 oz. CORDITE NO/S.164-048 - IGNITERS.

Reference Bulletin No. 38, Item 948, page 13. It has been found necessary to increase the capacity of both igniters for the abovementioned cartridge to hold 2 oz. gunpowder each, in lieu of 1 oz. each. The new 2 oz. igniters will be taken into use immediately supplies become available.

Details of any special marking to be applied to cartridges and/or packages will be given in a later Bulletin.

1012. PRIMERS FOR Q.F. CARTRIDGES - APPLICATION OF LUTING.

Primers for Q.F. Cartridges require by Regulations to have the threads and underside of the flange coated with Mk.IV Luting to provide a watertight joint between primer and case.

Trouble has arisen with certain equipments particularly those of the high muzzle velocity type by excess luting being blown into the breech mechanism through the firing hole bush thus preventing the free and full forward motion of the striker. Misfires result. The luting may also gum up other parts of the mechanism and render it difficult to operate.

Instructions have therefore been given to Factories that the threads only of the primer are to be filled with luting and that excess luting is to be wiped off the primer prior to its insertion in the case.

Service personnel who may have to replace primers in ammunition should therefore conform to this instruction. All surplus luting should also be wiped clear after the primer has been inserted.

1013. EXPLOSIVE LABELS

Reference Bulletin No.36, Item 850, para. 1. The proviso "subject to the approval of the Inspection Department" in connection with the use of the stencilled design of Government Explosives Label, has now been withdrawn.

1014. GENERATOR, SMOKE, NO.25, MK.II

(Fig. 399)

This generator is a modification of the No.25 Mk.I, described in Bulletin No.33, Item 727, from which it differs in the ignition arrangement and in the nature of the filling and igniter compositions.

The Mk.II generator is filled with smoke composition P.N.398. The igniter composition, about $1\frac{1}{2}$ oz. P.N.450, is stemmed in the lower part of the igniter cup with the electric igniter No. G.67 embedded in a horizontal position on top of the composition. An igniter support, consisting of a cardboard collar with a brown paper disc secured to its lower face, is positioned in the igniter cup, over the igniter composition, with approved cement. The ends of the two lengths of electric cable are passed from the igniter up through two holes in the paper disc, thence through two holes prepared in the generator lid and coiled round in the recess in the lid and covered by a glazedboard disc. The space between the igniter support and lid is filled with approved cement, thus sealing and securing the leads in the igniter cup.

Exterior finish and marking of the grenade is similar to the Mk.I except that the Mark is shown as "II".

1015. FUZE, PERCUSSION, D.A. NO.244. (1) CHANGE OF DETONATOR (2) TO BE NO.257 WHEN FILLED NON-DELAY.

Reference Bulletin No.21, Item 304.

- (1) The use of the 1.7 grain "A" detonator in lieu of the 1.62 grain detonator has been approved for this fuze.
- (2) When filled non-delay the No.244 fuze will be designated "Fuze, Percussion, D.A. No.257" and will also incorporate the 1.7 grain "A" detonator.

1016. CARTRIDGE, Q.F., 25 pr. CONDITE HQ/R.014-048, INTERMEDIATE CHARGE INCREMENT, CHARGE 4 oz., MK.I.

The above intermediate charge increment for use with charges 1 or 2 in the Q.F. 25 pr. has been approved. The charge is contained in a white cambric bag, cylindrical in shape and choked at the mouth with silk sewing after filling. The bag is marked axially with red stripes $\frac{5}{8}$ " wide at $\frac{2}{8}$ " intervals, thus giving the appearance of alternate red and white stripes. Dimensions of the filled bag are Length 5.75 inches, Diameter 1.6 inches.

The following marking is printed on the bag in black:-

"CARTRIDGE Q.F. 25 pr.
INTERMEDIATE INCREMENT
CHARGE 4 oz. HQ/R"

PACKING

8 charges are packed in tinned plate cylinder No.426 in two tiers of 4, separated by a millboard disc and with a central packing tube. The lid of the cylinder is tape banded and bears a descriptive label L.313 (black type on white paper) which is overprinted with red bars $\frac{1}{2}$ " wide at $\frac{1}{2}$ " intervals. External dimensions of cylinder are Length 12.5 inches Diameter 4.66 inches.

Six cylinders, i.e. 48 charges, are packed in the steel box B.166 stowage dimensions of which are 19.7 x 13.2 x 9 inches.

Details on Label L.313

8

INTERMEDIATE
CHARGE INCREMENTS
Q.F.25 Pr.CARTRIDGES

USE ONLY WITH
CHARGES 1 OR 2

} (Printed in bold
type)

4 oz. HQ/R.014 x .048

Lot

Filled ... /

Pkd..... /

1017. MARKING OF NAVAL AMMUNITION PACKAGES.

In connection with the use in Land Service of certain guns of Naval origin the following paragraphs, dealing with the painting and marking of Naval ammunition packages, are published for general information:-

1. PACKAGES

All ammunition packages, except those mentioned below, are painted externally with one coat of STONE colour.

(a) Packages for the following are painted as indicated :-

Smoke ammunition	-	Green
Blank gun ammunition	-	Red
Drill and Dummy ammunition	-	Black
Chemical shell	-	Grey

(b) The following packages are not painted externally or internally (except for special markings):-

Cases made of aluminium-silicon alloy.
Wood packing cases (except where specially ordered)
Projectile boxes.
Galvanised steel packages.
H.E. exploder boxes.

During a period of emergency, when galvanising etc., may be restricted, steel packages for Q.F. ammunition will be painted externally and internally.

2. TINNED PLATE CYLINDERS AND BOXES

Cylinders and tinned-plate boxes containing Q.F. cartridges, Primers for Q.F. cartridges, Tubes Vent, Pyrotechnics and miscellaneous magazine stores are painted black.

Cylinders containing Detonating Fuzes and Gaines are painted yellow.

" " Igniferous Fuzes are painted black.

" " Time and T. & P. Fuzes are painted green.

(Cylinders containing large base fuzes No.480 have, in addition to the yellow body painting, a blue band painted around the body.)

3. SPECIAL MARKINGS ON PACKAGES.

All packages containing explosives, except those painted RED, will have TWO RED BANDS one at each end painted around the smallest periphery These bands are usually 1" wide.

To permit of rapid identification of fixed ammunition packages and to distinguish between the various natures of projectiles, packages are marked with coloured bars, as follows :-

Light Blue	-	for H.A. Practice projectiles
Dull Yellow	-	" H.E. Common
Practice Yellow	-	" Practice
Red	-	" Shrapnel
White	-	" S.A.P.
Black (broken bar)	-	" C.P.

The bars are $\frac{1}{2}$ " in width and about 8" long except where broken bars are required, when they are in a broken line, each being about 4" long with a 2" space.

On packages for ammunition 4 inch and above, the bar is marked on the centre cross-batten of the lid. On other packages the bar is marked on the side bearing the label.

On 3 pr. and 6 pr. boxes (except those containing practice and sub-calibre ammunition) the bar is marked on the lid as well as on the side.

Packages for L.A. sub-calibre ammunition will have yellow lids.

To gain distinctiveness on packages for Q.F. Fixed Ammunition below 4" the bars on packages are applied at an angle and not parallel to the edge, where practicable.

Q.F. Target Smoke ammunition boxes are distinguished by a practice yellow band 1" wide.

Cardboard containers for B.L. cartridges are painted with two red bands.

When B.L. 6 in. Mk.XIII gun cartridges are packed the mark of the cardboard container is stencilled on the package following the word "Container".

Packages containing Cartridges Q.F. filled N.H or F.N.H. propellant are marked with a green bar, $\frac{3}{8}$ " wide by approx. 6" long, on the lid.

Packages containing cartridges with full service charges of N.A.Q. or N.F.Q. types of cordite are marked with a white cross ($\frac{3}{8}$ " wide arms) on the lid or lid end.

Packages containing cartridges made up with Cordite H.S.C.F./K. are stencilled on both sides and both ends with a white cross $1\frac{1}{4}$ " x $1\frac{1}{4}$ " within a white circle 2" diameter.

Typical markings on Packages for B.L. and Q.F. Cartridges

(1) Packages for B.L. Cartridges.

<u>Marking</u>	<u>Significance of marking</u>
5 - $\frac{1}{2}$ CHGS.	Number of cartridges packed and fraction of full charge, if applicable.
B.L. 8 IN. 33 LB.	Nature, calibre and weight of charge.
MK.1 FOIL	Mark of cartridge.
R.N.C. 148	Initials of propellant manufacturer and Lot number of propellant.
FLD R.L. 2/29	Monogram of filling station and date of filling.
WRAPPED	Where package contains "wrapped cartridges".

Other Markings.

(B) 1 2	Indicating letter and figures denoting the type and number of ignited and non-ignited cartridges packed, where applicable.
IN CONTAINERS MK.III	Applicable to 6 in. Mk.23 gun cartridge, indicating that cartridges are packed in cardboard containers.
EXD. B.P. 9/30	Monogram of examining station and date of examination (and other special laboratory markings, as applicable).
REDUCED	Package contains reduced charges. (on both sides and both ends of rectangular packages, where applicable.)
REDUCED PRAC.	Packages containing reduced charges for practice.
(A six pointed RED STAR)	Packages containing cartridges for star shell firings.
TESTED	Denotes that a small quantity of cordite has been removed from one or more charges of the cartridges packed, as a test sample (applicable to cartridges 4" and above made up of cordite S.C. 061 and M.C.11 and above).

(2) Packages for Q.F. Cartridges (Separate)

6 CTGS. Q.F. 4 in. Mk.IV Gun.	Number and designation of cartridges packed.
1	Mark of cartridges packed. (Word "FOIL" not required).
R.N.C. 309	Initials of propellant manufacturer and lot number of propellant.
FLD R.L. 2/31	Monogram of filling station and date of filling.

Other Markings

EXP PHD 2/32	Monogram of examining station and date of examination (or other special laboratory markings as applicable).
REDUCED	Package contains reduced charges, where applicable.
BOM	Package contains cartridges for special bombardment purposes.
M {Six pointed (Red Star) }R	Package contains cartridges for star shell firings.
PRAC ONLY	Package contains charges for practice purposes.
CHGS ONLY	Package contains B.L. type charges for Q.F. guns.
TESTED	As for B.L. Marking (See (1)).

(3) Packages for Q.F. Cartridges (Fixed Ammunition)

<u>Marking</u>	<u>Significance of Marking</u>
4 CTGS Q.F. 4 in.Mks. V & V* GUNS	Number and designation of cartridges packed.
H.E. 56B	Nature and mark of cartridge (word "FOIL" is not required.)
R.N.C. 1127	Initials of propellant manufacturer and lot number of propellant.
FID PHD. 3/37	Monogram of Filler and date of filling.

Other Markings

EXP PHD 7/37	Monogram of examining station and date of examination.
M {Six pointed (Red Star) }R.	Package contains star shell ammunition.
M {Six pointed (Red Star) }R.	Package contains star shell ammunition with special illuminating composition.
SR 354	As for B.L. marking (See (1))
TESTED	

(4) Packages for projectiles.

2 SHELL Q.F. 4" F.A. 35 LB. MK.IIB.N.T.	Number and designation of projectiles packed.
FZD or PLGD	Fuzed or plugged, as applicable.
FID. PHD. /10/43.	Filler's monogram and date of filling.
PKD PHD /11/43	Packer's monogram and date of packing. (Note: Packer's monogram and date of packing need not be stencilled if shell are packed immediately after filling).
N.O.D. 5756	Number of the method of filling design.

1018. CARTRIDGES, B.L. 60 Pr. GUN.

The following table gives particulars of cartridges to date for the B.L. 60 pr. Gun and their packages :-

Filled Design No.	Cartridge	Arrangement	Length (inches)	Diameter (inches)	Packages and Dimensions	Remarks
DD(L)7986	8 lb.12 oz. Cordite W.098 Mk.I Foil 8 lb.12 oz.Cordite W.093 Mk.I Foil.	Cylindrical bag. Igniter at each end.	18	4.25	Case,Powder, M.L.,Whole, C.118 Mk.IV to hold 10. <u>Stowage dimensions</u> 21.625 x 17.625 x 17 inches.	
DD(L)8033	8 lb.14 oz.4 dr. Cordite W.093, Mk.I Foil. (For 56 lb. shell in Mk.II Gun.)	Cylindrical bag. Igniter at each end.	18	4.25	-do-	For India
DD(L)5271	<u>REDUCED CHARGE:-</u> 6 lb.6 oz.Cordite M.D.11 Mk.II Foil. 6 lb.6 oz.Cordite R.D.B.11 Mk.II Foil.	Cylindrical bag. Igniter at each end.	15.5	4.25	-do-	
DD(L)8354	6 lb.1 oz.2 dr. Cordite W.057 Mk.I Foil 6 lb. 1 oz.2 dr.Cordite W.M.061 Mk.I Foil.	Cylindrical bag. Igniter at each end.	15.5	4.1	-do-	
DD(L)1834A R.4305	<u>FOR PRACTICE</u> 2 lb.3 $\frac{1}{2}$ oz.Cordite M.D.T. 15-13 Mk.I. 2 lb. 3 $\frac{1}{2}$ oz. Cordite R.D.B.T.15-13 Mk.I. 2 lb.3 $\frac{1}{2}$ oz. Cordite W.T. 154-136 Mk.I.	Cylindrical bag Igniter at each end	17.0 or 16.25 or 17.0 (Dependent on length of cordite from which made.)	4.4 4.6 4.4	-do- Box, Cartridge,C.125 to hold 10 <u>Stowage dimensions:-</u> 18.75 x 16.375 x 23.0 inches.	

Filled Design No.	Cartridge	Arrangement	Length (inches)	Diameter (inches)	Packages and Dimensions	Remarks
R.L.24413	4 lb. 15 oz. 6 dr.Cordite M.D.11 Mk.I.	Cylindrical bag. Igniter at each end	11	4.75	Case, Powder M.L.Whole, C.118 Mk.IV to hold 20. <u>Stowage dimensions:-</u> (See above).	Obsolete for future manufacture.
R.L.25877	9 lb.7 oz.Cordite M.D. 15 Mk.III. 9 lb.7 oz. Cordite R.D.B.15 Mk.III.	Cylindrical bag. Igniter at each end.	18	4.25	Case, Powder, M.L.Whole, C.118 Mk.IV to hold 10. <u>Stowage dimensions:</u> (See above)	Obsolescent
D.D.(L)2597/1	9 lb.7 oz. Cordite M.D.15 Mk.V. Foil. 9 lb. 7 oz. Cordite R.D.B.15 Mk.V Foil	Cylindrical bag. Igniter at each end.	18	4.25	-do-	
R.L.27777	<u>REDUCED CHARGE</u> 6 lb. 6 oz. Cordite M.D.11 Mk.I. 6 lb. 6 oz. Cordite R.D.B.11 Mk.I.	Cylindrical bag. Igniter at each end.	15.5	4.25	-do-	Obsolescent

1019. CARTRIDGES, B.L. 6 inch 26 cwt. HOWITZER.

The following table gives particulars of cartridges to date for the B.L. 6 inch 26 cwt. Howitzer and their packages :-

Filled Design No.	Cartridge	Arrangement	Nominal Weight lb.oz.dr.		Packages and Dimensions	Remarks
R.L.25185	5 lb.12 oz.N.C.T.16 Mk.I.	4 Cylindrical bags tied together with silk or shalloon braid. Igniter, 6 in."D" or "M".	No.1 Part	2 3 12	Box, Cartridge, C.166 to hold 20. <u>Stowage dimensions:-</u> 25.4 x 18.75 x 17.75 inches.	Obsolescent for future manufacture.
			" 2 Part	1 0 12		
			" 3 Part	13 8		
			" 4 Part	1 10 0		
				5 12 0		

Filled Design No.	Cartridge	Arrangement	Nominal Weight lb. oz. dr.	Package & Dimensions	Remarks.
DD(L)3569	4 lb. 11 $\frac{1}{2}$ oz. Cordite M.D.8. Mk.III. 4 lb. 11 $\frac{1}{2}$ oz. Cordite R.D.B.8. Mk.III. 4 lb. 11 $\frac{1}{2}$ oz. Cordite W.054 Mk.I. 4 lb. 11 $\frac{1}{2}$ oz. Cordite W.8. Mk.I. 4 lb. 11 $\frac{1}{2}$ oz. Cordite W.057 Mk.I. 4 lb. 11 $\frac{1}{2}$ oz. Cordite W.M. 061 Mk.I. (Above cartridges are not for use with S/L shell)	Core and two sections. Each section stitched to core in 4 places. Igniter, 6 in. "L".	No.1 & 2 Section (Core) 2 12 8 No.3 Section 11 12 " 4 Section 1 3 4 4 11 8	Box, Cartridge, C.166 to hold 25. <u>Stowage dimensions:</u> (See above)	
DD(L)3892 (1)	4 lb. 10 $\frac{1}{2}$ oz. Cordite M.D.8. Converted Mk.I. 4 lb. 10 $\frac{1}{2}$ oz. Cordite R.D.B.8. Converted Mk.I. (Above cartridges are for 86 lb. S/L Shell only.)	Core and three sections. Each section stitched to core in 4 places. Igniter, 6 in. "L".	No.1 Section (Core) 1 14 13 No.2 Section 12 7 " 3 Section 10 9 " 4 Section 1 4 11 4 10 8	Box, Cartridge, C.166 to hold 25. <u>Stowage dimensions:</u> (See above) Case, Powder, M.L. Whole C.118 to hold 20. <u>Stowage dimensions:</u> 21.625 x 17.625 x 17.0 inches.	
DD(L)3777	4 lb. 10 $\frac{1}{2}$ oz. Cordite M.D.8. Mk.I. 4 lb. 10 $\frac{1}{2}$ oz. Cordite R.D.B.8. Mk.I. 4 lb. 10 $\frac{1}{2}$ oz. Cordite W.057 Mk.I. 4 lb. 10 $\frac{1}{2}$ oz. Cordite S.C.048 Mk.I. 4 lb. 10 $\frac{1}{2}$ oz. Cordite W.M.061 Mk.I. (Above cartridges are for 100 lb. S/L shell only).	Core and three sections. Each section stitched to core in 4 places. Igniter, 6 in. "L"	No.1 Section (Core) 1 14 13 No.2 Section 12 7 " 3 Section 10 9 " 4 Section 1 4 11 4 10 8	Box, Cartridge, C.166 to hold 25. <u>Stowage dimensions:</u> (See above). Box, Cartridge, C.1 to hold 20. <u>Stowage dimensions:</u> 26.25 x 17.9 x 17.5 inches. Case, Powder, M.L. whole, C.118 to hold 20. <u>Stowage dimensions.</u> (See above)	
R.4303					

Filled Design No.	Cartridge	Arrangement	Nominal Weight lb. oz. dr.	Package & Dimensions	Remarks
DD(L)8095	4 lb. 6 oz. 4 dr. Cordite W.054 Mk.I. 4 lb. 6 oz. 4 dr. Cordite W.057 Mk.I. 4 lb. 6 oz. 4 dr. Cordite S.C.048 Mk.I. 4 lb. 6 oz. 4 dr. Cordite W.M.061 Mk.I. 4 lb. 6 oz. 4 dr. Cordite W.8.Mk.I. (Above cartridges are for 100 lb.S/L shell only).	Core and three sections. Each section stitched to core in 4 places. Igniter, 6 in. "L"	No.1 Section (Core) 1 13 4 " 2 Section 11 10 " 3 Section 9 13 " 4 Section 1 3 9 4 6 4	Box, cartridge, C.166 to hold 25. Box, Cartridge, C.1 to hold 25. Case, powder, M.L. Whole, C.118. Stowage dimensions: (See above) Box, Cartridge, C.224 to hold 10, each in Container, Ctge. No.11 with packing pieces. Stowage dimensions - 24.7 x 15.25 x 10.125 inches.	
DD(L)10742	5 lb. Cordite, N.Q.045 Mk.I. (For 100 lb. S/L shell only).	Core and three sections. Each section stitched to core in 4 places. Igniter, 6 in. "L"	No.1 Section (Core) 2 1 0 " 2 Section 13 8 " 3 Section 11 0 " 4 Section 1 6 8 5 0 0	-	For record
DD(L)11357	5 lb. 2 oz. 8 dr. N.H.025 Mk.I. (For 100 lb.S/L Shell only).	4 cylindrical bags tied together with silk or worsted webbing. Igniter 6 in. "U".	No.1 Part 2 1 8 " 2 Part 13 8 " 3 Part 11 8 " 4 Part 1 8 0 5 2 8	Box, Cartridge, C.166 to hold 20. Stowage dimensions:- (See above)	

Filled Design No.	Cartridge	Arrangement	Nominal Weight lb.oz.dr.	Package & dimensions	Remarks
DD(L)2874	<u>SUPERCHARGE FOR 86 LB. S/L</u> <u>SHELL ONLY:-</u> 5 lb.3 oz.2 dr. Cordite M.D.11 Mk.I. 5 lb.3 oz.2 dr. Cordite R.D.B.11 Mk.I.	Cylindrical bag. Igniter, 6 in. "L".	5 3 2	Box, Cartridge, C.166 to hold 25. <u>Stowage dimensions:</u> (See above) Case, Powder, M.L. whole, C.118 to hold 20. <u>Stowage dimensions:</u> (See above)	
DD(L)10683	<u>SUPERCHARGE FOR 100 LB. S/L</u> <u>SHELL ONLY:-</u> 5 lb.8 oz. Cordite W.T. 206-100 Mk.I. 5 lb.8 oz. Cordite W.M.T. 211-100. Mk.I.	Cylindrical bag Igniter, 6 in. "L"	5 8 0	Box, Cartridge, C.239 to hold 6. <u>Stowage dimensions:</u> 25.4 x 17.6 x 10.3 inches.	
DD(L)11963	6 lb. 14 $\frac{1}{2}$ oz. N.H.033 Mk.I.	Cylindrical bag, neck choked with silk sewing. Igniter, 1 $\frac{1}{2}$ oz. G.12 powder.	6 14 8	Box, Cartridge, C.224 to hold 6, each in Container, Ctge. No.55. <u>Stowage dimensions:-</u> (See above).	

R.4303

1020. GERMAN TELLERMINE (MUSHROOM) 43 WITH FUZE T.Mi.Z.42.
(T.Mi.Pilz 43/ T.Mi. Z.42)
Fig. 400.

This model of the Tellermine, known as the mushroom type presumably because of its cover plate, differs from the 42 model, described in Bulletin No.34, mainly in the design of the cover plate. The mine, like the earlier models, is functioned by pressure applied to a contact fuze or by detonators in the side and base which may be initiated by "booby trap" devices such as the pull igniter Z.Z.35 or by instantaneous detonating fuze connected to another mine. The fuze used, the T.Mi.Z.42, is the same as that described for the Tellermine 42 in Bulletin No.36 and is inserted below the cover plate.

The mine is 12.3 inches in diameter and has a convex head to which is fitted a three tier circular cover plate with a maximum diameter of 7.5 inches at the base. The overall height of the mine with the cover plate is 3.6 inches. The weight of the mine with its amatol bursting charge and P.E.T.N./Wax exploders is approximately 17 lb. 5 oz. The exterior is painted grey and is stencilled on the top, in white, with the abbreviated designations of the mine and fuze, "T.Mi.Pilz 43/T.Mi.Z.42.13A". The marking "13A", following the marking relating to the fuze, indicates the bursting charge to be Amatol 50/50.

Body.

The steel body consists of two main parts, the charge container and the base plate. The base plate closes the base of the container and is provided with a stepped rim which fits inside the container and is secured by the lower edge of the container being turned in to engage the step. A socket for a detonator and pull igniter is fitted in the base plate. A screwthread is formed for the insertion of the pull igniter. The socket is secured by two clips which engage in a slotted flange at its base.

The steel charge container is fitted with a side lifting handle and may have a strip shaped to form a loop fitted also on the side. The top of the container slopes upwards towards the centre where it is flat with a groove encircling the fuze hole. Inside the container, below the fuze hole, a steel socket is fitted to receive the fuze. The socket is screwthreaded internally for the assembly of the cover plate and is fitted with a container at its base to accommodate the main detonator. A socket for the insertion of a detonator with a pull igniter is fitted in the side of the container.

Cover Plate Assembly.

The cover plate is attached to the body by a screwthreaded sleeve, protruding from the centre of its base, which is screwed into the fuze socket in the top of the body. A rubber washer seals the joint between the top of the body and the underside of the cover plate. The cover plate assembly consists of a light pressed steel circular cover, shaped to form three tiers, with a pressure plate secured inside the top tier and a supporting plate closing the base. The screwed sleeve for the assembly of the cover plate with the body is fitted in the supporting plate.

The diameters of the three tiers of the cover are approximately 7.5 inch at the base, 6.7 inch at the centre and 5.9 inch at the top, the heights being approximately .3 inch, .5 inch and .4 inch respectively. The pressure plate is held inside the top tier by spot welding at points on its circumference and consists of a mild steel circular plate with a circumferential rim on its underside. The supporting plate is held inside the bottom tier by spot welding, in the same way as the pressure plate, and by the rim at the base of the cover being turned in under a rim on the base of the plate. The plate is of mild steel with a circular corrugation and with a rimmed hole in the centre in which the screwthreaded sleeve is secured by spot welding.

Bursting Charge and Exploders.

The interior of the body is painted black before filling. The bursting charge consists of 11 to 11.5 lb. of Amatol 50/50 filled from the base to a density of 1-4. An unwrapped exploder pellet of P:E:T:N./Wax 89/11 is inserted

to form a surround for each of the detonator holders during the process of filling. The weights and densities of the exploder pellets are :-

Exploder for main detonator $4\frac{1}{2}$ oz. density 1.57
Exploder for side detonator $1\frac{3}{4}$ oz. density 1.56
Exploder for base detonator $1\frac{3}{4}$ oz. density 1.56

Main Detonator

The main detonator is attached to the fuze and is described, with the fuze, in Bulletin No.36.

Action

The cover plate is removed to insert the fuze with the main detonator. When a load is applied to the cover plate the thin wall of the cover collapses and the pressure plate is forced down on the striker of the fuze with the result that the shear pin is severed and the fuze functions. The load required to function the mine with the T.Mi.Z.42 fuze will be approximately the same as for the Teller mine 42, that is, 570 lb.

The mine can also be detonated by pull igniters which function if an attempt is made to lift the mine before these are disconnected. The pull igniter Z.Z.35 is described in Bulletin No.33. The position of the sockets for these igniters in the side and base of the mine have been found to vary. Regarding the centre of the lifting handle as 12 o'clock, the side socket may be found between the positions of 2 and 3 o'clock or at 6 o'clock. The base socket is about 4 inches in from the periphery and may be found at positions corresponding to 1 o'clock or between 8 and 9 o'clock. There may, of course, be further variations.

1021: GERMAN FUZE I.I.gr.Z.23 na

Fig.401.

The fuze is used in the H.E. shell (I.gr.18) and the H.E./Al shell (I.gr.18Al) for the 7.5 cm light infantry howitzer I.I.G.18. References are made to its use in the description of the 7.5 cm light infantry shell in Bulletin No.34.

As will be seen by the drawing, the fuze is of the normal 23 type with an optional delay of .15 of a second but has a collar weight in the form of a cylindrical iron ring below the graze pellet. The collar has a chamfered central hole to engage a corresponding surface on the detonator plug which protrudes from the base of the graze pellet. The collar is retained in a central position within the fuze by a holder which consists of a brass washer with arms cut and bent up to engage the wall of the collar. A lateral thrust on graze would cause the collar to move sideways and an action similar to that of an "All-ways" fuze would be brought about by the inclined surfaces of the collar and detonator plug.

1022. GERMAN FUZE A.Z. 5075

Fig. 402.

This fuze is used in the nose of the 3.7 Pak hollow charge muzzle stick bomb and, excepting the magazine and magazine assembly, is similar to the nose fuze described for the rifle and hand grenade in Bulletin No.31.

The aluminium body protruding from the nose of the bomb is ogival in shape with an aluminium striker protruding from a hole at the top. The weight of the fuze is 2 oz. $4\frac{1}{2}$ drs. The designation has not been stamped on fuzes examined to date.

The ogival aluminium body is screwthreaded externally for insertion in the bomb and is screwthreaded internally at the base to receive the adapter for the magazine. The interior is recessed for the mechanism, the recess being enlarged near the top to permit the expansion of a coiled spring strip.

The aluminium striker is cylindrical with a flange at the base which engages a step in the body and so limits its upward movement. A steel needle protruding from the base of the striker is secured by an aluminium screw inserted in the head. The striker is supported by a spiral spring and a coiled spring strip both of which are positioned between the base of the striker and an aluminium spring holder.

The spring holder is in the form of a cylinder with a central hole for the needle and a recess in the top to receive the base end of the spiral spring surrounding the needle. Near the top the holder is reduced in diameter to form a step for the assembly of the coiled spring strip. The lower part of spring holder is recessed to fit over the top of the magazine holder. The wall of the recess is cut away at four places to permit the four arms of the retaining spring to protrude for the support of the arming sleeve. The retaining spring consisting of a steel disc with a hole for the needle in the centre and four arms curved slightly upwards, is held between the spring holder and the top of the magazine holder. The four portions remaining of the wall of the recess in the base of the spring holder are bent inwards to engage an inclined surface near the top of the magazine holder.

The steel arming sleeve, surrounding the coiled spring strip, fits around the upper part of the spring holder and is supported by the retaining spring. Inside the sleeve, near the base, a circumferential groove is cut to engage the arms of the retaining spring when the sleeve is in the armed position.

The magazine holder consists of a cylindrical aluminium plug recessed and screwthreaded internally at the base for the insertion of the magazine. A shoulder formed around the exterior engages a corresponding shoulder in the adapter and carries a locating pin which enters a hole in the shoulder of the adapter. A projection at the top of the holder is bored centrally for the needle and is chamfered near its base for the attachment of the spring holder. The aluminium magazine contains 6.2 grains of P.E.T.N. under a 5.4 grain detonator. The detonator contains 93.7 per cent of lead azide and 6.3% of tetrazene.

The aluminium adapter for the attachment of the magazine consists of a screwed ring with a stepped hole for the magazine holder. A rubber ring, to cushion the set back of the arming sleeve, is fixed in a groove in the top of the adapter.

Action.

With the arming sleeve supported on the retaining spring, the coiled spring strip prevents the striker spring being compressed and thus holds the needle away from the detonator.

On acceleration the arming sleeve sets back on the rubber ring in the adapter and bends back the four arms of the retaining spring. Rebound of the sleeve is prevented by the arms entering the groove inside the sleeve. The coiled spring strip is then free to expand into the enlarged part of the body recess leaving the striker supported only by the spiral spring.

On impact the striker is forced in and the needle pierces the detonator.

1023. GERMAN FUZE BASE PERCUSSION NO.5130
(Bd.Z.5130)

Fig. 403

The fuze is used in the 3.7 cm Pak; hollow charge; muzzle stick bomb and is of the igniferous type with a graze action. The designation of the fuze "Bd.Z.5130" is stamped in the base. The weight of the fuze is 4 oz.12 dr.

The body of the fuze is cylindrical with a screwthreaded portion of reduced diameter at the head for insertion in the bomb. A large recess formed from the head, contains the graze pellet and is closed at the top by the detonator holder. A smaller recess near the periphery is formed from the base and contains a detent supported by a spiral spring. This recess is closed at the base by a disc secured by the turned over metal of the body. A channel, with a downward incline towards the side, is drilled from the exterior of the body, through the recess containing the detent and into the recess containing the graze pellet. A ball which engages a shoulder on the graze pellet is held in this channel, between the two recesses, by the detent. Two key flats are formed near the base end of the body.

The graze pellet consists of a solid cylindrical pellet fitted with a needle at the head. An inclined shoulder, with which the ball engages, is formed below the head. A helical spring is held between the head of the pellet and the base of the detonator holder, the smaller end of the spring fitting around the needle.

The detonator holder consists of a flanged cup with a flash hole in its base and contains an igniferous detonator stamped with the number "26". The detonator is retained by the mouth of the cup being turned in to overlap a washer. The holder is supported at its flange by a step formed in the top of the recess and is secured by turned in metal of the body.

The detent is a solid cylindrical pellet with a concave head and a short stem at the base around which the upper end of spiral supporting spring is positioned

Action.

During transport the graze pellet is held away from the detonator by the ball which is held in contact with the shoulder on the pellet by the detent.

On acceleration the detent, overcoming the spring, sets back and thus releases the ball which moves down the inclined channel and leaves the graze pellet held off the detonator only by the helical creep spring. The concave head of the detent is apparently design to receive the ball when the detent rises again and so to push the ball up into the top of the recess.

On graze the pellet moves forward compressing the creep spring and the needle pierces the detonator.

1024. GERMAN SMALL P.E.T.N. GAINIE 34 WITH DELAY (Kl.Zdlg.34 m.V.)

Fig. 404

The gaine is used in the 8 cm. mortar H.E. bombs models 38 and 39 and is distinguished from the Kl.Zdlg.34 Np, described in Bulletin No.39, by the letters "m.V." stencilled in black after the number on the exterior of the gaine.

The dimensions of the gaine are practically the same as the non delay type, the small differences probably being within the tolerances permitted in manufacture. The essential difference is in the filling of the detonator container. The difference here, as shown in the drawing, consists of two additional compositions introduced above the cup containing the lead azide and lead styphnate and the use of another cup, with a flash hole closed by a fabric disc, as a means of closing the top of the detonator container.

The delaying effect obtained by the combination of the gaine and the delay chamber in the 8 cm mortar bombs is reported to be approximately .7 of a second.

1025. GERMAN SMOKE BOX NO. 8 FOR H. E. SHELL
(Rauchentwickler Nr 8)

Some details of this smoke box were included in the description of the 7.5 cm Kw.K. H.E. cartridge in Bulletin No. 26 (Item 464).

The box consists of a bakelised cardboard cylindrical container 1.7 inches long and 1 inch in diameter closed at the top and bottom by plastic discs. The composition weighs 28.3 grams and consists of :-

Red phosphorus	82.3 per cent
Paraffin wax	12.8 per cent
Magnesium phosphates	4.9 per cent

In addition to the designation "Rauchentwickler Nr 8", the label on the top of the box examined bore the date 1941. The composition differs from that given in Pamphlet No. 4 by the substitution of magnesium phosphates for alumina.

1026. GERMAN SMOKE BOX NO. 9 FOR H. E. SHELL
(Rauchentwickler Nr 9)

The box consists of a bakelised cardboard cylindrical container 2.3 inches long and 1.4 inches in diameter with a closing cap of plastic. The composition weighs 85.82 grams and consists of :-

Red phosphorus	82.3 per cent
Paraffin wax	12.2 per cent
Magnesium phosphates	5.5 per cent

The box examined bore no markings.

1027. GERMAN TRACER NO. 3
(Lichtspurhulse Nr 3)

Fig. 405.

This type of tracer is used in 3.7 cm Pak and Flak H.E. shell.

The tracer body of rust-proofed steel is 1.77 inches long and .9 inch in diameter with an external screwthread near the base for insertion in the shell. The front end is closed by a steel disc over which the rim of the body is turned. The base is closed by a celluloid disc. The filling is contained in a steel inverted cup the interior of which is lubricated with graphite. The filling consists of two pressed pellets of tracing composition and a third base pellet of tracing composition with priming composition at its base. The pellets are covered with a thin even coating of graphite. Only the priming composition has a serrated finish. The priming is unusually small (a layer about .04 inch deep weighing 7.7 grains) and is pressed with the lower pellet.

The three increments of tracing composition total 197.5 grains and were found by analysis to consist of :- magnesium metal 32 per cent, magnesium hydroxide 6.2 per cent, barium nitrate 36.3 per cent, barium carbonate 11 per cent, sodium oxalate 12.4 per cent and 2.1 per cent of organic matter in the form of a waxy substance.

The priming composition consists of :- magnesium metal 2.7 per cent, barium nitrate 42 per cent, strontium nitrate 3 per cent and 28 per cent of organic matter which appears to be a phenolic resin.

The tracing composition, spinning at 30,000 revolutions per minute, burnt with a white light of 1,050 candle power. The estimated duration of the trace is 8 seconds.

The weight of the filled tracer is approximately 3 oz. 8 dr.

1028. GERMAN 3.7 cm Pak CARTRIDGE Q.F., H.E./TRACER
(3.7 cm Sprgr Patr 18 umg)

Fig. 406.

This fixed Q.F. H.E. round, fired from the 3.7 cm anti-tank gun, is similar to the round described in Bulletin No. 31 except that the H.E. bursting charge is of T.N.T. This is indicated by the H.E. numeral "27" stencilled above the shoulder of the shell. The shell described in Bulletin No. 31 is normally marked "32" to indicate the P.E.T.N./Wax 90/10 filling.

The shell, fitted with the A.Z. 39 fuze, is painted aluminium colour and has a yellow band about midway between the single driving band and the fuze. This band distinguishes the H.E./T. shell from the normal H.E. shell. The brass case (or steel with a brass coating) is 9.8 inches in length and has the model number, "6331", and the designation of the equipment stamped in the base. The marking "Sprgr" is stencilled in white also on the base of the case. The length of the complete round is 13.4 inches and the weight, 2 lb. 13 oz. 8 drs.

The complete round consists of the following components :-

Fuze A.Z. 39 (Described in Bulletin No. 26)
 H.E./Tracer Shell
 Tracer No. 3
 Case model 6331 or 6331 St.
 Propellant charge of double base composition with igniter
 Primer percussion C/13 NA.

Shell (Sprenggranate 18 umg.)

The shell with its upper and lower cavities separated by a diaphragm is the same as that described in Bulletin No. 31. The aluminium container in the upper cavity contains a 14 dram pressed pellet of flake T.N.T. of density 1.56. The lower cavity contains a comparatively large tracer. The weight of the empty shell is 14 oz 8 drs. The weight of the filled shell with fuze and tracer is 1 lb. 5 oz. 5 dr.

Tracer:

A description of the No. 3 tracer is included in this bulletin;

Case

The case is 9.84 inches long with an increase in taper at 9.25 inches from the base. The external diameters in front of the flange, at the shoulder and the mouth are 1.81, 1.57 and 1.52 inches respectively. The effective capacity is approximately 17.69 cubic inches (290 cc).

The designation of the equipment and the particulars of the propellant charge are stencilled in black on the side of the case. The marking "P.T.+ 25°C", indicating the charge weight to be based on a standard charge temperature of 25° Centigrade, is also stencilled on the side of the case in red.

Propellant Charge.

The weight, nature and size of the propellant charge, as marked on the case, is 164 grams of Digl. R.P.- 8,2 - (175.2, 2/0, 85). This marking is repeated on silk tape attached to the igniter bag. The propellant is in tubular form, the dimensions of the smooth black tubular sticks in inches being:- length 6.89, external diameter .087, internal diameter .033. The composition of the propellant, as found by analysis consists of :- nitrocellulose 65.12 per cent (nitrogen content 12.14 per cent), diethylene glycol dinitrate 31.52 per cent, centralite 2.65 per cent, potassium sulphate .42 per cent and .29 per cent of graphite.

The igniter consists of a circular silk bag secured to the base of the charge by a silk tape and containing 34.4 grains of the usual greyish green porous nitrocellulose powder in the form of short cylindrical grains. The mean dimensions of the grains are .043 inch length and diameter. The composition, as found by analysis consists of :- nitrocellulose (including graphite) 87 per cent, diethylene glycoldinitrate 11 per cent, centralite .5 per cent, diphenylamine .5 per cent and 1 per cent of volatile matter.

Primer.

The primer percussion C/13nA is described in Bulletin No.32. In this instance, as in other of these primers recently examined, the amount of mercury fulminate in the cap composition has been decreased and granular gunpowder has been introduced between the cap and the pellet of pressed gunpowder. The cap composition consists of the following:- mercury fulminate 30.6 per cent, potassium chlorate 35.2 per cent, antimony sulphide 27 per cent and 7.2 per cent of ground glass.

1029. GERMAN 3.7 cm Pak HOLLOW CHARGE MUZZLE STICK BOMB (3.7 cm Pak Stiel Granate)

Fig. 407.

The bomb is fired from the 3.7 cm Pak (anti-tank gun) by inserting the rod at the tail of the bomb in the muzzle of the gun and using a separate Q.F. cartridge. The estimated performance against homogeneous armour plate is 5 inches at the normal and 3.5 to 4 inches at 30 degrees.

The streamlined body of the bomb has a dome shaped impact cap carrying a nose fuze and is fitted with a tail unit consisting of a steel rod surrounded by a perforated steel sleeve carrying three pairs of vanes. The overall length of the fuze bomb is 29.1 inches and weight, filled and fuze, is 19 lb. The exterior, except the rod, is painted deep olive green and stencilled in black. The stencilling includes the H.E. numeral "95" indicating the filling to be cyclonite/T.N.T. 60/40.

The complete round consists of the following components :-

- Fuze A.Z. 5075
- Bomb with tail unit
- Two small gaine, Kl. Zdlg C/34 Np.
- Base fuze Bd.Z.5130
- Cartridge case model 6331 St.
- Propellant charge of Ngl.R.P. - 9,5 - (188 x 2,5/0,9)
- Primer percussion C/13nA St.

Fuzes A.Z.5075 and Bd.Z.5130 are described in this bulletin. The small P.E.T.N. gaine, "Kl.Zdlg 34 Np" is described in Bulletin No.39. Primer C/13nA St is described in Bulletin No.32.

Bomb Body.

The steel cup-shaped streamlined body has a thin wall and a flat base with a hole in the centre. Welded to the base is a steel ring carrying a fuze socket which fits into the hole in the base and protrudes below the ring. The socket is screwthreaded internally near the base for the insertion of the base fuze and is also screwthreaded externally for the assembly of the tail unit. The bursting charge, consisting of approximately 5 lb. 5 oz. of cyclonite/T.N.T. 60/40, is contained in a paper carton and comprises two pellets. The pellets are shaped to fit closely in the body and to receive the cavity liner for the "hollow". The liner is of mild steel and is coned towards the base which is rounded. A short metal flash tube, fixed in a hole at the base of the liner, leads to a cavity containing a gaine in the base of the lower pellet of the bursting charge. The liner is coned at approximately 40 degrees and has a small external flange at the top. The usual black bituminous composition secures the paper carton of the bursting charge to the body and the whole is retained by a thin steel collar which is rolled into the body near the top and has an internal rim overlapping a number of plastic washers assembled on the flange of the liner.

The steel dome shaped impact cap is cannellured near its base where it is supported by the collar to which it is attached by spot welding. A fuze socket is welded in a hole at the top of the cap for the insertion of the nose fuze.

The gaines are inserted through the socket for the base fuze. The upper gaine has its detonator towards the nose fuze and the lower, which is practically wholly contained in the socket, has its detonator towards the base fuze.

Tail Unit

The hollow steel tail rod is approximately 15 inches long and 1.42 inches in diameter. The base end is closed and near this end there are circumferential grooves which probably serve to obstruct the passage of the propellant gases over the rod. The upper end of the rod is screw-threaded internally for assembly to the fuze socket at the base of the bomb body. A steel ring welded at the top of the rod carries a steel perforated sleeve of approximately 2.4 inch diameter which surrounds the rod and extends down to three inches from its base. The perforations are of about .75 inch diameter and extend throughout the length of the sleeve. Six vanes, formed in pairs, are attached near the base end of the sleeve.

Cartridge.

The case is the normal 3.7 cm Pak model 6331 St closed at the mouth by a cork disc. The propellant charge consists of 216 grams of Ngl.R.P. 9,5 - (188.2, 5/0, 9). This is a double base propellant of nitroglycerine and nitrocellulose in tubular form. The dimensions of the tubular cords are :- length 7.4 inches, external diameter .098 inches, internal diameter .035 inches.

The igniter at the base of the charge contains 10 grams of Nz.Man. N.P. (1,5 - 1,5). This is the nitrocellulose powder in the form of small cylindrical grains normally used in igniters.

1030, GERMAN 8 cm M.L. MORTAR H.E. BOMB 38
(8 cm Mgr 38)

Fig. 408.

The H.E. bomb, Model 38, for the 8 cm mortar (s.Gr.W 34 8cm) contains an ejection charge inside its lightly attached head which, after impact, throws the body into the air where the bursting charge is detonated.

The bomb is painted deep olive green and is stencilled in black. The stencilling includes the H.E. numeral "14" on the head indicating a bursting charge of T.N.T. and the model number "38" below the weight class marking on the streamlined portion of the body. Externally the bomb has the same appearance as the dull red Model 34 bomb described in Bulletin No. 32 but, in the absence of markings, it can be identified by the presence of four equally spaced pins in the second rib of the parallel portion and four similarly spaced grub screws in the head just above the parallel portion. A later model, Model 39, has only the four screws in the head. A bomb, filled and fuzed, bearing the weight class marking for Class II, weighed 7 lb. 5 oz. 8 drs.

Bomb

The bomb consists of three main parts, the head, the body and the tail unit. The tail unit is the same as that of the Model 34. The head extends down to the parallel portion of the bomb and fits over a rim formed on the closing plate in the top of the body. The head is secured to the side of closing plate by four equi-distant screws inserted from the exterior and contains an ejection charge in a celluloid capsule. The body, containing the bursting charge, is closed at the top by a circular closing plate which rests on an internal shoulder in the body and is secured by four pins also inserted from the exterior. The closing plate

is recessed from the top leaving a circumferential rim which fits into the head. A screwthreaded hole is formed in the centre of the closing plate for the insertion of the delay chamber. The delay chamber consists of an inverted cup with a small central orifice in the closed upper end. Externally the chamber is screwthreaded and flanged near the top for insertion in the closing plate and below this it is reduced in diameter and screwthreaded to receive an exploder container assembled at the base end.

Ejection Charge.

The ejection charge in the head of the bomb, consisting of 12.32 grams of nitrocellulose powder in the form of porous green cylindrical grains, is contained in a celluloid capsule which is shaped to fit the cavity in the head and the recess in the closing plate. A celluloid cup set in the top of the capsule, beneath the fuze, contains an ignition charge consisting of pressed gunpowder primed with a white ignition composition. The composition consists of lead thiocyanate, nitrocellulose, sulphur and potassium perchlorate and is also used to seal five holes in the base of the capsule above the delay chamber.

Bursting Charge.

The bursting charge, contained in the body below the closing plate, consists of 13 oz. 12 drs. of T.N.T. with a short central cavity to receive the exploder container.

Gaine and Fuze.

The small P.E.T.N. delay gains (Kl.Zdlg 34 m.V.) housed in the exploder container is described in this Bulletin as a separate item. The fuze, Wgr.Z.38, is included in the description of the 5 cm bomb in Bulletin No.24.

Cartridges

The primary and augmenting cartridges were the same as those used for the 34 bomb (See Bulletin No.32) but four augmenting cartridges are now being used, instead of three, to increase the range.

The composition of the 10 grain double base flake propellant (Ngl.Bl.P.-12,5(1.1.0,2)) used in the primary cartridge consists of 59.92 per cent of nitrocellulose (nitrogen content 13.36%) and 39 per cent of nitroglycerine and includes .86 per cent of ethyl centralite and .22 per cent of graphite. The initiator composition in the cap consists of 37.5 per cent of lead styphnate, 4.2 per cent of tetrazine, 7.4 per cent of antimony sulphide, 12.4 per cent of calcium silicide and 38.5 per cent of barium nitrate. This composition is of approximately the same analysis as that of the "Sinoxid" cap known before the War.

The composition of the double base ring propellant in the augmenting or secondary cartridges consists of 60.61 per cent of nitrocellulose (nitrogen content 13.35 per cent), 38.29 per cent of nitroglycerine, .7 per cent of akardite and .4 per cent of graphite. The weight and designation of the propellant in each of the cartridges, as indicated by the markings, is 9 grams of Ngl.Rg.P.12,5. The size, when three augmenting cartridges are provided, is (0,4 - 70/35). The size of propellant in the rounds provided with four cartridges is (0,4 - 60/30).

Action.

On impact, the flash from the detonator of the fuze, with the assistance of the ignition charge in the top of the capsule, ignites the nitrocellulose ejection charge. The explosion of the charge ejects the body of the bomb from the head and, at the same time, initiates the gaine through the orifice in the top of the delay chamber. The delay resulting from the passage of the flash through the orifice and the chamber, also the delay arrangement in the top of the gaine, provides a time interval, reported to be about .7 of a second, between impact and the detonation of the bursting charge. The height to which the bomb will be thrown in this time depends

upon the nature of the ground. Bursts have been reported at heights between 20 and 60 feet (nature of ground not specified) but it is understood that the bomb is intended to detonate at heights between 3 and 20 feet.

1031. GERMAN 8 cm M.L. MORTAR H.E. BOMB 39
(8 cm Wgr. 39)

Fig. 409.

The H.E. bomb, Model 39, for the 8 cm mortar (s.Gr.W.34 8 cm), like the Model 38 bomb also described in this Bulletin contains an ejection charge inside the lightly attached head which, after impact, throws the body into the air where the bursting charge is detonated.

The bomb is painted deep olive green or dull red and is stencilled in black. The deep olive green bombs encountered to date have been fitted with steel fuzes (Wgr.Z.38 St) and have been stencilled below the parallel portion of the body with the H.E. numeral "14". This indicates a bursting charge of T.N.T. The dull red bombs have been fitted with the normal alloy fuze (Wgr.Z.38) and have the H.E. numeral "13" stencilled in the same position which indicates a bursting charge of amatol 40/60. The bomb can be distinguished from the 34 and 38 models by the four small equi-distant screws securing the head to the body. These are found just above the grooved parallel portion of the bomb and are normally covered by a wax-like sealing composition.

By reference to the drawings it will be seen that the 39 Model differs from the 38, already described, in that instead of the body being closed at the top by a closing plate, secured by pins, a diaphragm is formed integral with the body. Also, the celluloid capsule containing the ejection charge is of a different shape and is without the holes sealed with ignition composition in its base.

Cartridges

A primary cartridge and four augmenting cartridges of the types used with the earlier pattern bombs are used. The size of the propellant rings in the augmenting cartridges differs in that the external and internal diameters are 60 mm and 30 mm, respectively, instead of 70/35.

1032. GERMAN 10 cm Nb MORTAR (10.5 cm CALIBRE) H.E. BOMB
(10 cm Wgr.)

Fig. 410.

The bomb is fired from the 10 cm Nb.W. (M.L. smoke mortar) with three charges consisting of a primary cartridge with one, two or four augmenting cartridges.

The streamlined bomb is fitted with a tail unit consisting of a perforated container for the primary cartridge and eight fins formed in pairs. The bomb is fuzed with the fuze Wgr.Z.38 and is painted deep olive green with black stencilling and a yellow band near the tail end of the body. The H.E. numeral "14", stencilled on the head, indicates a bursting charge of T.N.T. The overall length, including the fuze, is 17.1 inches and the total weight, filled and fuzed, is 16 lb.11 oz. 12 drs.

The body of the bomb has a grooved cylindrical portion between the rounded head and the streamlined lower part and at this point is 10.44 cm in diameter. A fuze-hole bush inserted in the nose carries an exploder container welded at its base.

Method of Filling.

The bursting charge consists of 3 lb. 7 oz. 12 drs. of T.N.T.

with a central cavity which contains a No.8 smoke box under the exploder container which holds a large C/98 P.E.T.N. gaine. The smoke box, gaine and fuze are described in the following Bulletins:-

Smoke box (Rauchentwickler Nr8)	Bulletin No.26 and this Bulletin
Gaine (Gr.Zdlg C/98 Np)	Bulletin No. 32
Fuze (Wgr.Z.38)	Bulletin No. 24

Cartridges.

A cardboard distance cylinder .55 inch in length is inserted in the cartridge container in the tail unit before the primary cartridge. The primary cartridge has the usual rolled paper body and is stamped "10 cm" in the brass base. The cartridge is 2.88 inches in length and 1.04 inches in diameter at the mouth. The paper body is blue. According to the details given in a German handbook, the propellant charge consists of 4 grams of nitrocellulose powder in the form of small cylindrical grains (Nz.Man.N.P.(1,5 - 1,5) + Wgr.) with the addition of 11 grams of nitrocellulose powder in the form of square flake (Nz.M.W.Bl.P.(2.2.0,45)).

The augmenting cartridges, four per bomb, are similar to those used in the 8 cm mortar, each consisting of a flat ring-shaped bag containing rings of double base propellant (nitroglycerine and nitrocellulose). The bag and the rings have a radial split for the assembly of the cartridges above the fins on the tail unit of the bomb. The designation of the equipment, "10 cm Nb W" is stencilled on the bag. The weight, designation, shape and size of the propellant, as stencilled on the bag, are 21 grams Ngl. Rg.P.-12,5 - (0,2 - 90/45).

1033. GERMAN 10.5 cm HIGH VELOCITY H.E. SHELL

Fig. 411.

The shell consists of an 8.8 cm streamlined body fitted with a hollow steel centering ring of 10.4 cm diameter forming a shoulder and a corresponding base ring carrying the driving band both of which become detached during flight. The exterior is painted yellow and stencilled in black. The stencilling includes the H.E. numeral "14" near the nose, indicating a T.N.T. bursting charge, and the marking "R8" at the approximate centre of the body. This marking indicates the inclusion of a No.8 smoke box (Rauchentwickler Nr 8). With the optional delay fuze A.Z. 23 (VO,15), with which it is fuze, the overall length is 17.5 inches and the total weight, 24 lb 1 oz. 8 dr. Without the rings the weight is 20 lb. 10 oz. 8 drs.

Shell

The streamlined body of the shell has a comparatively thin wall and a head of large radius. Three equally spaced circular recesses are formed in the lower part of the head for the attachment of the centering ring. Just above the base of the shell, three corresponding circular recesses are formed to receive the inner ends of the sealing cylinders between the segments forming the base ring. This portion of the shell is grooved to engage a corresponding face inside the base ring and thus prevents longitudinal movement of the ring.

The steel centering ring consisting of a short cylinder with an internal flange at the base and a coned top is cut radially at three equidistant points so that it is almost in three segments. On the interior of the cylindrical portion of the ring, midway between the cuts, three sockets are welded. The sockets are shaped at their inner ends to fit over a steel ball protruding from each of the recesses in the head of the shell and are screwthreaded internally to receive a grub screw. The band is assembled by placing it over the head of the shell and tightening the screws to engage the balls.

The base ring consists of three segments with a coned fairing, also in three parts, welded to its upper periphery. The segments are each keyed to the shell by a steel cylinder which passes through a hole in the centre of the segment and is held between a recess near the base of the shell and the inner side of the driving band. The junction between the adjoining ends of the segments is sealed against the pressure of the propellant gases by a steel sealing pin which is inserted into a channel formed by coincident semi-circular grooves in the adjoining ends. The segments are retained in position by the steel driving band which is carried in a groove formed in the segments. The number "783" was stamped in the base of each of the segments on the shell examined. This stamping was probably used to guide assembly.

A steel exploder container of the usual type is screwed into the fuze hole.

Method of Filling.

The bursting charge consists of 1 lb. 13 oz of cast T.N.T. with a central cavity for the exploder container and the No.8 smoke box beneath the container. The gaine held in the container is the larger size of the G/98 model with a P.E.T.N. magazine filling. This gaine, the "Gr. Zdlg. C/98 Np", is described in Bulletin No.32. The smoke box, "Rauchentwickler Nr 8", is described under a separate heading in this Bulletin.

1034. GERMAN 15 cm HIGH VELOCITY H.E. SHELL

Fig.412.

This shell is similar to the 10.5 cm H.V. shell described in this Bulletin and consists of a streamlined 12.8 cm. shell with a centering ring of 14.84 cm diameter forming a shoulder and a corresponding base ring carrying the driving band. The construction of the base ring differs from that of the 10.5 cm. shell. Both of the rings are designed so that they become detached during the flight of the shell. The exterior is painted yellow and stencilled in black. The shell examined had no H.E. numeral stencilled on it but this was stamped, in accordance with the usual practice, near the fuze hole. The normal marking for the T.N.T. bursting charge would be the numeral "14" stencilled in black near the fuze hole. The marking "R9", indicating the inclusion of a No.9 smoke box (Rauchentwickler Nr 9) is stencilled prominently on the head above the centering ring. The shell examined also bore the stencilling "Z 3033" as shown in the drawing. The meaning of this marking is not apparent.

With the optional delay fuze A.Z.23 (V 0,15), with which it is fuzed, the overall length is 25.6 inches and the total weight 65 lb. Without the rings the weight is 57 lb. 15 oz. 12 drs.

Shell.

The streamlined body has a comparatively thin wall and a head of large radius. The method of attachment and the construction of the centering ring is the same as that described for the 10.5 cm shell. At the base the body is reduced in diameter for the assembly of the base ring and has three equally spaced recesses each of which contains a protruding steel ball for the keying of the base ring.

The base ring, consisting of three segments with a coned fairing in three corresponding parts welded to it, has an interior shoulder which engages a shoulder near the base of the shell to prevent longitudinal movement. Each of the segments has a recess at the centre of its inner side to engage the steel balls protruding from similar recesses in the shell. A small radial channel leads from the recess to the exterior of the segment. The junction between ends of adjoining segments is sealed against the

pressure of the propellant gases by a steel pin inserted into a channel formed by coincident semi-circular grooves in the adjoining ends. The segments are held in position around the base of the shell by the steel driving band. The groove for the driving band, formed in the segments, has a band of milling protruding from the centre to prevent independent rotation of the band. Each of the segments on shell examined had the number "156" stamped in its base. This number was also stamped in the body about two inches above the fairing. The three portions of the fairing were stamped "273", "274" and "275" respectively. These numbers were also stamped in the shell above the respective portions of the fairing and are probably a guide for assembly.

A steel exploder container, larger in size than that in the 10.5 cm shell, is screwed into the fuze hole.

Method of Filling.

The bursting charge consists of 8 lb. 14 oz. 5½ drs. of T.N.T. cast with a central cavity to accommodate a No. 9 smoke box under the exploder container. The container holds a large P.E.T.N. gaine, the "Zdlg 36 Np", which has a convex base and has a filling about three times the weight of that in the Gr.Zdlg C/98 Np. The weight of the filling is 107.5 grams. The large C/98 Np gaine contains approximately 35 grams.

The smoke box, Rauchentwickler Nr 9, is described under a separate heading in this Bulletin.

1035. GERMAN FUZE A.Z. 35K.

Fig. 413.

The fuze is of the igniferous type with a combined graze and direct action mechanism and an optional delay setting device which produces a .3 second delay. In conjunction with a gaine it is used in the H.E. shell, "K.Gr.39" in the 17 cm Mrs. L. equipment (a 17.25 cm gun on the high angle 21 cm mounting).

Constructed mainly of steel, the portion protruding from the shell is coned with a flat top and is closed at the nose by a brass disc. The designation, "A.Z.35 K" is stamped near the base of the coned head and, diametrically opposite, is a delay setting plug with setting marks lettered "M" and "O" stamped adjacent to it on either side. The overall length of the fuze is 4.94 inches and the weight 2 lb. 3 oz. 5 dr. The portion which is exposed when in the shell protrudes to a length of three inches.

The fuze body is screwthreaded externally for insertion in the shell and below the thread it is reduced in diameter and has a side aperture for the assembly of a centrifugal bolt attached to a shutter. The aperture is closed by a plate secured by a screw. Above the threaded portion a flange is formed which is coned to match the head. Above the flange the body is reduced in diameter and screwthreaded externally to receive the head. The delay setting plug, engraved with an arrowhead, is screwed into a radial hole in the flange, and on its inner end has an eccentric projection which bears on the upper end of the shutter locking bolt. The body is recessed from the base to accommodate the delay arrangement with a perforated pellet of gunpowder, and is closed by a screwed plug with a central flash hole. A flash channel in the top of the recess communicates with an upper recess containing a steel graze pellet carrying the detonator. This recess is enlarged near the top to form a platform for five pivoted centrifugal segments of aluminium. The segments are held in a position to overlap a shoulder on the graze pellet by an expanding spring ring surrounding them. The needle, carried in a cylindrical pellet of aluminium, is supported above the graze pellet by a spiral creep spring, the pellet being kept in alignment with the wooden hammer in the fuze head by a steel sleeve which fits over and protrudes above the pellet. The pellet and sleeve are accommodated in a central hole in a screwed plug which closes the top of the upper recess.

The delay holder consists of an aluminium cylindrical pellet with a flash channel through the centre and a second channel, displaced from the centre, which contains a pressing of delay composition. A guideway for the shutter is cut in the top of the pellet and extends beyond the central open flash hole. The figures "0,30" (indicating a delay of .3 second), are stamped in the base of the holder. A thin disc of tin placed over the top of the holder has two perforations which correspond with the holes in the holder and is cut away to permit movement of the centrifugal bolt.

The shutter consists of a copper plate which fits in the guideway on the delay holder and is connected at its outer end to a centrifugal bolt. The bolt is pressed towards the centre of the body by a spiral spring held between the outer end of the bolt and a ring shaped recess in the plate closing the aperture in the side of the body. The shutter locking bolt is contained in a vertical channel between the top of the aperture and the top of the body and consists of a solid cylindrical pellet of steel with a stem at its base. A spiral spring surrounding the stem supports the pellet, the upper end of which is engaged by the eccentric projection on the inner end of the delay setting plug.

Action

When delayed action is required the delay setting plug is turned so that the arrowhead engraved in its head is set to the "M" graduation on the flange. At this setting the eccentric on its inner end is lowered and the shutter locking bolt is pushed, against this spring, down into the aperture in the side of the fuze body, thus preventing the centrifugal bolt from moving outwards. For non-delay action the plug is set to the "0" graduation. The eccentric is then in the raised position and the shutter locking bolt is clear of the path of the centrifugal bolt.

During flight the coil of the expanding spring ring is enlarged and the segments swung clear of the graze pellet by centrifugal force. When set for non-delay the centrifugal bolt is also thrown outwards taking with it the shutter and thus exposing the open flash hole in the centre of the delay holder. If set for delay the centrifugal bolt is held by the locking bolt. During the period of deceleration, "creep" of the graze pellet is prevented by the creep spring. On graze the pellet, overcoming the spring by its momentum, moves forward and the detonator is pierced by the needle. When suitable impact is obtained, the hammer, and consequently the needle, is driven in at the same time as the pellet moves forward and direct action results. The path of the flash from the detonator to the magazine is governed by the setting. If set for delay, the empty channel in the delay holder is masked by the shutter and the path is through the channel containing the delay composition. If set for non-delay the flash passing through the exposed empty channel will reach the magazine first.

36. GERMAN MECHANICAL TIME AND PERCUSSION FUZE S/90/45.

(Dopp.Z. S/90/45)

Figs. 414, 415 & 416.

The fuze has a mechanical time action with a maximum time of running of 90 seconds and a graze action of the normal German type. The time mechanism appears to be a 45 second mechanism modified by a change in the ratio of the gear train and an increase in the strength of the main spring. The fuze is presumably used as an alternative in the H.E. shell (K.Gr 39) and the H.E.B.C. shell (K.Gr.38 (Hb)) for the 17 cm K.Mrs.Laf. The weight of the fuze is 1 lb.12 oz.

In external appearance the fuze consists of a flat topped cone shaped head of aluminium secured to a dull steel body near its base by a bright steel securing ring. The upper part of the body is coned above the flange to match the head. Below the flange it is screwthreaded for insertion in the shell and below the thread there is a plain cylindrical portion. The designation of the fuze, "Dopp Z.S/90/45", is stamped in the body above the

flange. Rectangular key slots for setting are formed in the head and the body and a setting arrow for percussion action is engraved in the head adjacent to the slot. When inserted in the shell the fuze protrudes to the extent of approximately 3 inches. The diameter of the screwthreaded part is 1.96 inches.

Body.

The body is recessed at the base to accommodate the shutter assembly and, equally spaced around the recess, there are three vertical channels for the bolts securing the time mechanism unit. An additional vertical channel, closed at the base by a screwed plug, accommodates the holder of the detonator for the time action. A radial channel in the wall of the recess contains a brass centrifugal bolt and is closed at the outer end by a screwed plug. A portion of the top of the recess is cut away to permit movement of the bolt and a flash channel in the centre of the top connects with a recess in the upper part of the body.

The upper recess contains the graze pellet of the percussion mechanism and is connected to the channel containing the detonator for the time action by an inclined channel which enters the recess near its base. Near the top, the recess is enlarged to form a platform on which four centrifugal segments of brass are fitted on steel pivots. Above this the recess is screwthreaded to receive the permission needle holder. The coned flanged top of the body is recessed to form a platform for the time mechanism unit and is screwthreaded internally to receive the securing ring for the aluminium head. Two holes, diametrically opposite, are formed in the platform to receive the locking plungers of the time unit. There is also a locating stud for the unit, and a circular seating for a presspahn washer. Four small screws are inserted through the coned flange to lock the securing ring when the fuze is tensioned during assembly.

Percussion Mechanism

The graze pellet, carrying an igniferous detonator secured by a perforated screwed plug, is of brass with a shoulder near the top which is engaged by the four centrifugal brass segments. The segments are retained in a position overlapping the pellet by an expanding spring ring. A spiral creep spring is fitted between the pellet and a needle holder which consists of a steel disc screwed into the top of the recess containing the graze mechanism. The needle protruding from its underside has a pyramid shaped point.

Shutter Assembly

The assembly contained in the lower recess in the body consists of a copper plate shutter moving in a guideway formed in the top of a cylindrical aluminium holder. The holder has a central flash hole and is recessed at one side for the centrifugal bolt which, under the pressure of its spiral spring, bears against the outer end of the shutter and keeps the shutter in a position masking the flash hole in its aluminium holder. The centrifugal bolt is a cylindrical pellet of brass with a recess at its outer end to locate the inner end of its spiral spring. The outer end of the spring is held under compression by the screwed plug closing the radial channel in the wall of the recess and located by a circular groove in the inner face of the plug. A thin disc of tin, with a central flash hole and with part of its circumference cut away for the centrifugal bolt, is placed on top of the shutter holder. The recess containing the shutter assembly is closed at the base by a screwed plug which has a central flash hole. The flash hole is closed by a thin disc of tin fitted between the inner face of the plug and the base of the shutter holder.

Head Assembly

The flat topped aluminium head is in the shape of a cone with a cylindrical portion near the base. An external flange is formed at the base which supports the tensioning wire. The underside of the flange is cut away at four places to receive corresponding projections at the base of the dome. The dome, fitted inside the head, is of thin aluminium and is in the form of an inverted cup which fits over the time mechanism unit and is keyed to the flange at the base of the aluminium head by four projections at its base. The inside of the top of the dome is shaped to form a handrace against which the hand on the top of the time unit bears when rotating. Part of the race is cut away so that the hand can be pushed upwards by its spring when in alignment with the slot so formed.

The head of the fuze is secured to the body by a steel securing ring which screws into the internal screwthread above the flange. Between the base of the securing ring and the flange at the base of the head there is a length of waved spring wire which is compressed between the ring and the flange when the ring is screwed down. By this means the tensioning of the head is adjusted during assembly so that it can be turned for setting but will not slip.

Time Mechanism Unit

The time mechanism is assembled in a cylindrical unit of superimposed brass plates with an aluminium hand on the top and two locking plungers in slots cut down diametrically opposite sides of the cylindrical assembly. The plungers are comparatively weighty and consist of steel strips tapering towards the base on the inner side. On the outer side of each, approximately at the centre, a projecting vertical knife edge is formed. A spring loaded ball protruding from one side of the plungers engaged a corresponding recess in the slots and thus supports the plungers which protrude below the base of the unit into recesses in the fuze body.

The mechanism is similar to that in the S/30 and S/60s fuzes, that is, it consists principally of a spring loaded striker held off the detonator by an eccentric cam collar on the striker which is supported by a pillar and a centrifugal safety catch. The cam collar is kept in this position by a safety lever which fits over flats formed on the forward end of the striker and is held by the ring shaped centre of the hand. The hand, with a spiral spring beneath it, is keyed to rotate with the centre arbor under the control of a train of gear wheels and an escapement and, before firing is held by the pivoted trigger. Adjacent to the trigger a safety bridge is fitted with overlaps the hand to prevent functioning at settings of less than approximately one second. The spring plunger supporting the trigger engages in the end of trigger instead of the inner side as with the S/30 and S/60s fuzes. The use of a stronger main spring, which is of wider strip than the original, has resulted in the use of a thin steel disc instead of the normal base of the spring barrel to support the spring.

Time Action

The time of running is governed by the size of the arc extending counter-clockwise between the position of the hand when held by the trigger and the position of the slot in the dome hand race. The fuze is set by turning the head with the aid of a setting device which consists of a graduated ring surrounding a moveable ring on which there is a setting index and a handle. The device is placed over the fuze and the outer ring, bearing the graduations, is clamped by a key engaging in the key slot above the flange in the fuze body. A key in the inner ring, bearing the index, engages in the key slot in the head of the fuze. The inner ring is then rotated by means of its handle until the index is aligned with the required graduation and takes with it the head of the fuze. The dome inset, with the hand race formed in its upper part, is rotated with the head to the set position. The turning of the head is retarded by the waved wire tension spring between the securing ring and the flange at the base of the head.

On acceleration the two tapered locking plungers set back into the recesses in the top of the body. As their wider portions with the protruding knife edges move back through the slots, the knife edges cut into the wall of the dome and thus prevent rotation of the dome relative to the mechanism unit. At the same time, the trigger hinging on its pivot, sets back and releases the hand. The small spring loaded plunger in the trigger is then free to emerge and thus prevents the trigger rebounding. The release of the hand enables the main spring to rotate the centre arbor under the control of the escapement. The hand, rotating with the arbor, moves clear of the safety bridge and is pressed up against the hand race in the top of the dome by the spiral spring in the top of the arbor beneath the hand centre.

During flight, the safety catch is swung clear of the cam collar on the striker by centrifugal force and the striker is then supported only by the pillar. When the rotating hand reaches the slot in the hand race it is forced upwards by its spring and thus releases the safety lever keyed to the top of the striker. The striker, with the lever, is then rotated by the pressure of its spring combined with the effect of the inclined surface on the cam collar bearing on the pillar so that the collar moves clear of the pillar. The striker is driven away from the safety lever by its spring and pierces the detonator. The flash from the detonator, directed by the shape of the detonator holder, passes into the lower part of the recess containing the graze pellet and follows the same course as that described for the percussion action.

Percussion Action

When set for percussion, the arrow on the head of the fuze coincides with the index line on the securing ring and the key slots in the head and body are in alignment. At this setting, the slot in the hand race of the dome is masked by the safety bridge so that although the hand is released when acceleration occurs, it cannot rise through the slot to release the safety lever and the striker.

During flight the coil of the expanding spring ring, surrounding the segments engaging the shoulder of the graze pellet, is enlarged and the segments are swung clear of the pellet by centrifugal force. At the same time the centrifugal bolt is thrown outwards, compressing its spring, and the shutter opens.

On graze, the graze pellet overcomes the creep spring by its momentum and carries the detonator forward to be pierced by the needle. The flash from the detonator passes through the hole in the base of the recess, through the channel exposed by the open shutter, perforates the tin disc and emerges through the hole in the screwed plug at the base of the fuze.

FIG.397(ITEM.998)

SHELL, Q.F., SMOKE EMISSION, 95mm. TK. HOW. MK.I.

MODIFICATION OF M.O.F. D.D.(L) 14881A, SHOWING METHOD
OF ASSEMBLY, DELAY N° 1.

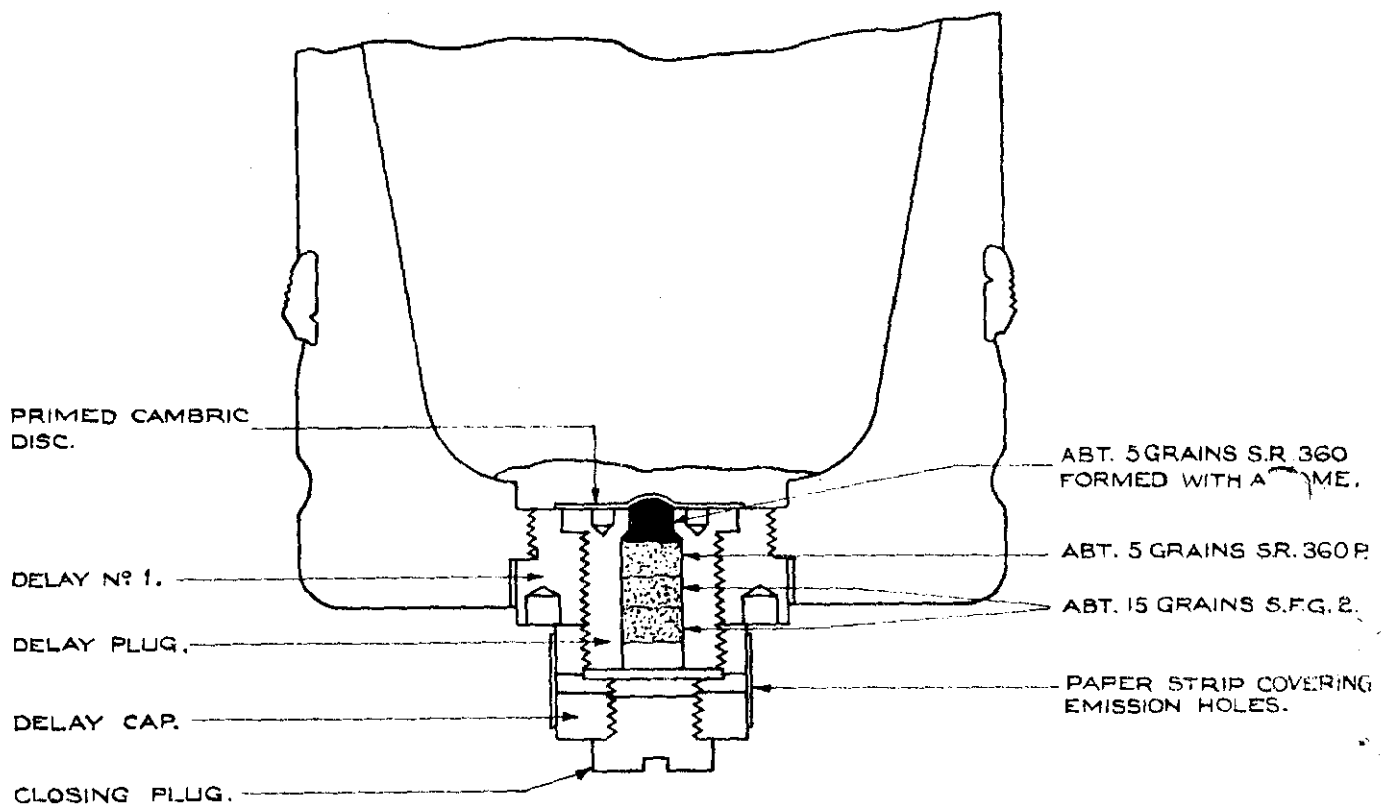
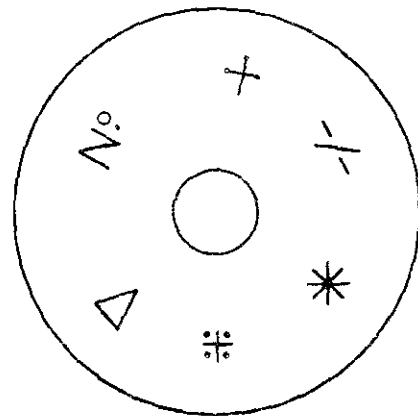
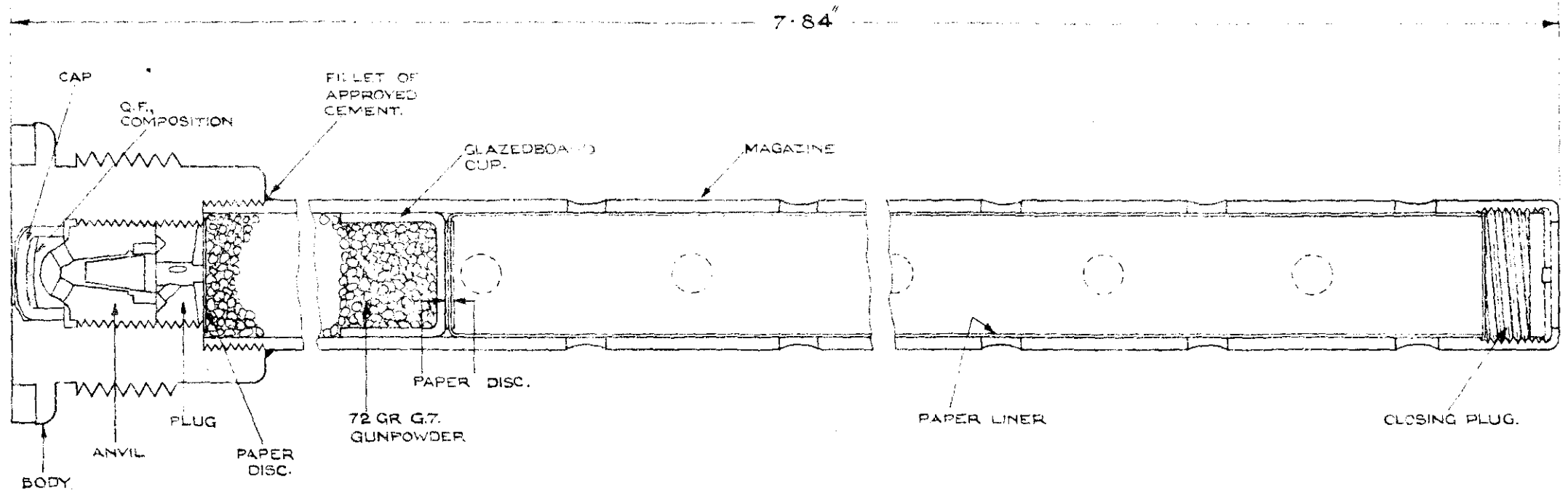


FIG. 398 (ITEM 1002.)

PRIMER, PERCUSSION Q.F. CARTRIDGE N° 34 MK. I.



MARKING ON BASE:-

- N° and Mark.
- + Contractors initials or recognised trade mark.
- /- Year of manufacture.
- * Lot number
- ‡ Monogram of filling station.
- Δ Date of filling (month and year)

(Not to scale.)

FIG. 399 (ITEM.1014.)
GENERATOR, SMOKE N° 25 MARK II.

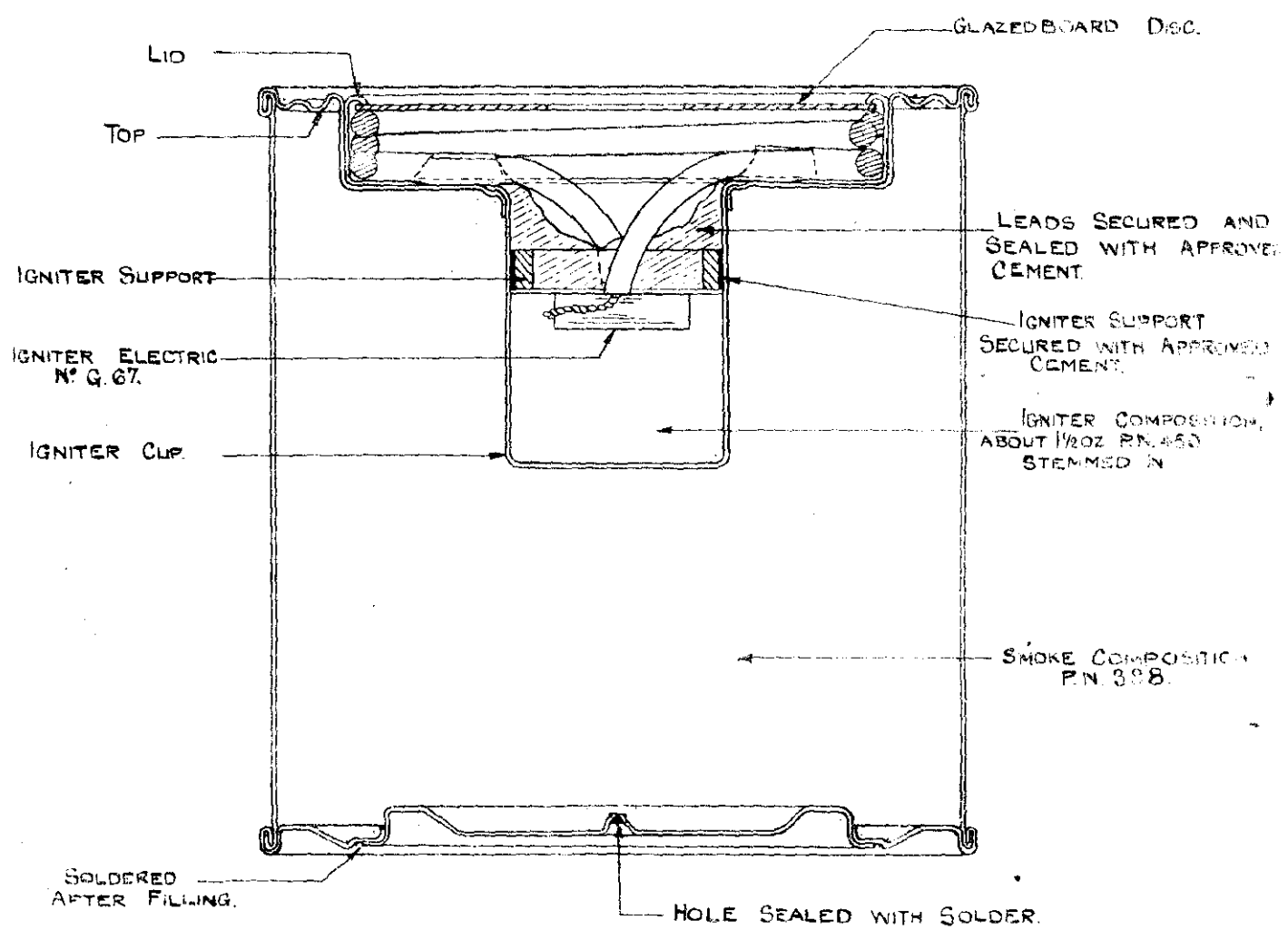
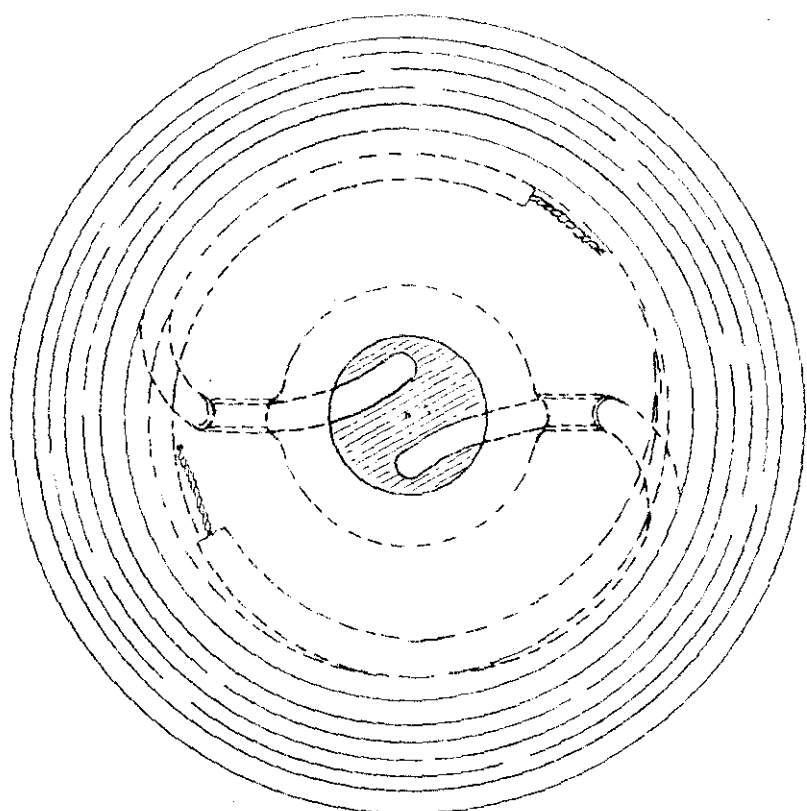


FIG. 400 (ITEM 1020)

GERMAN TELLERMINE (MUSHROOM) 43 WITH FUZE T.Mi.Z.42.
(T.Mi. Pilz 43/T.Mi.Z.42).

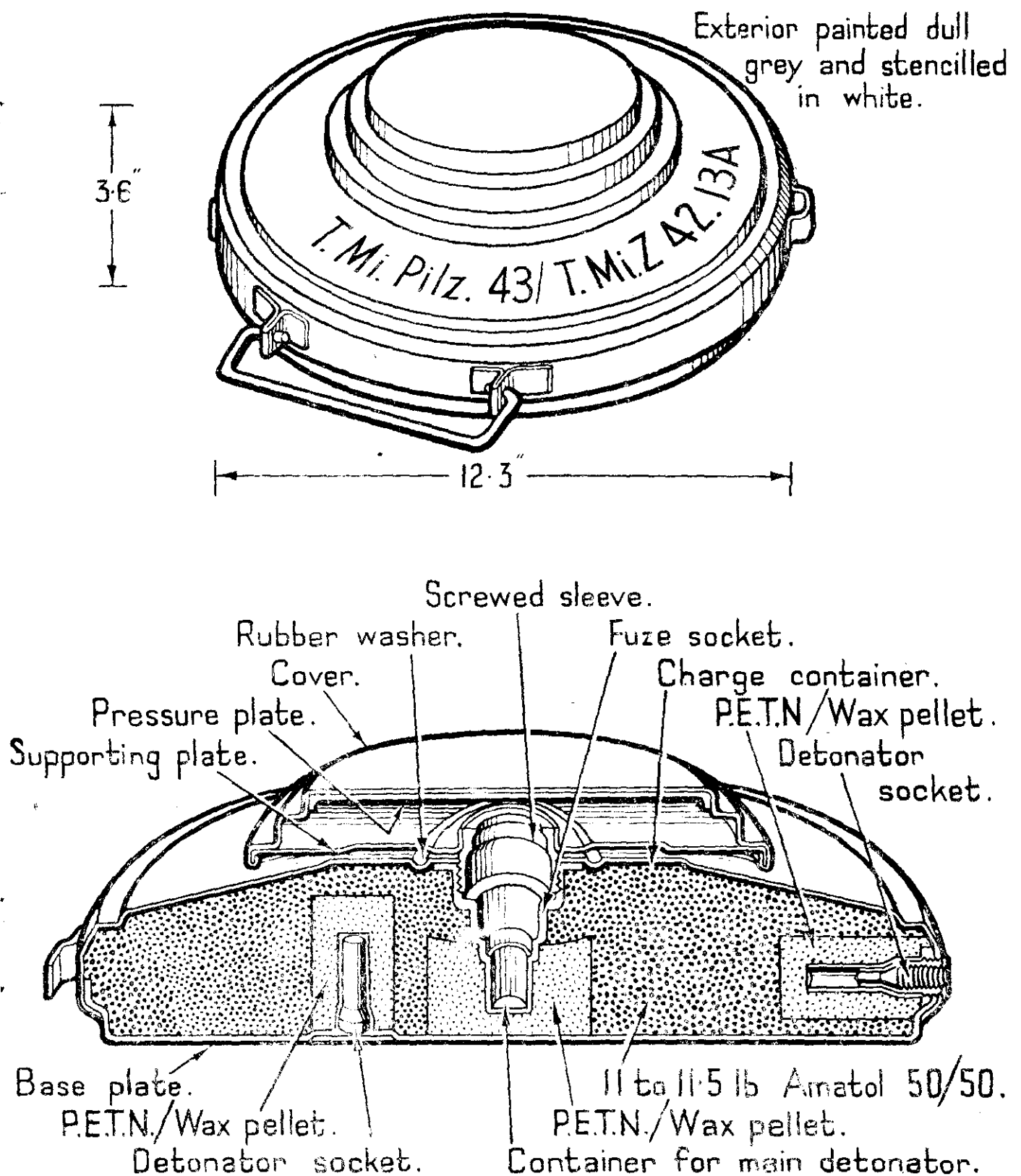
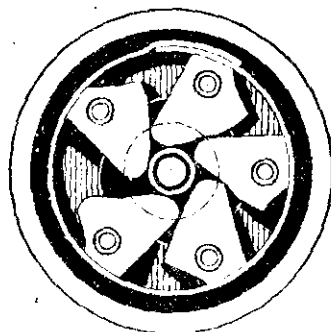
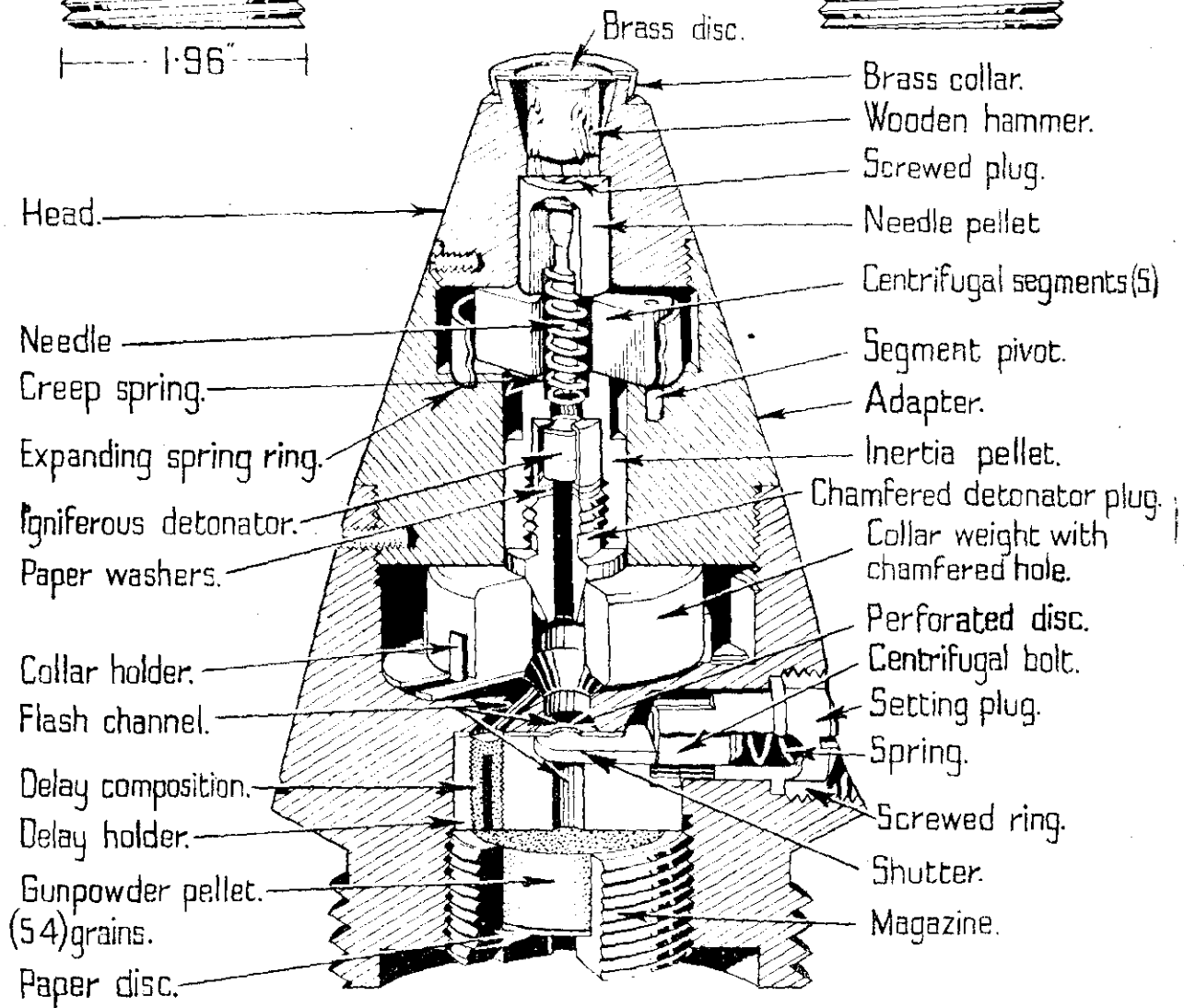
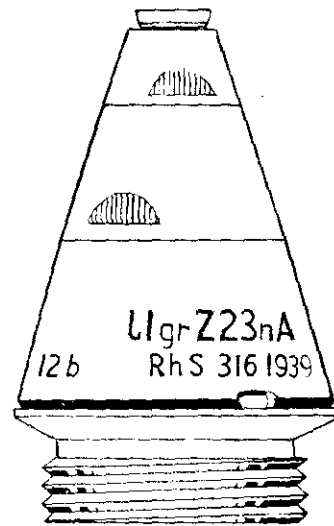
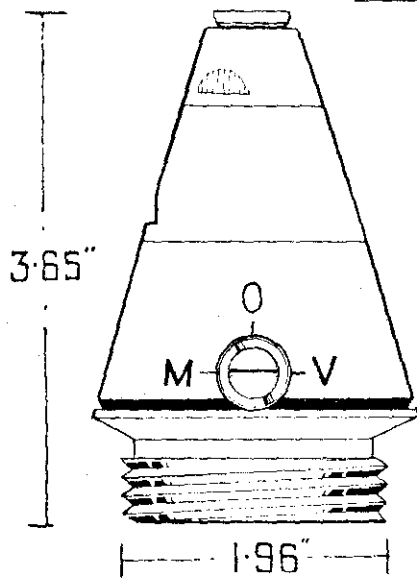


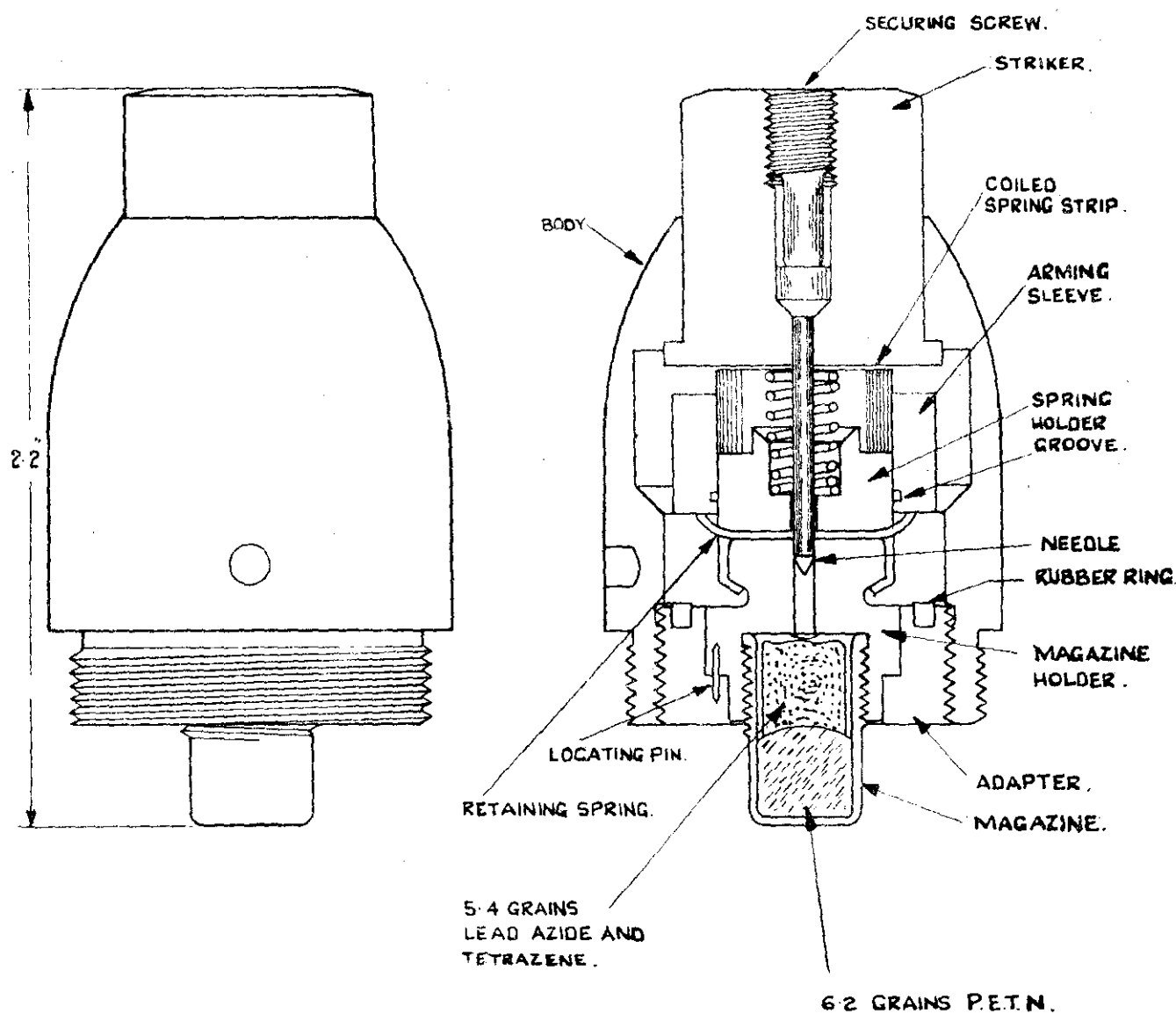
FIG. 401 (ITEM 1021)
GERMAN FUZE LIgr Z23nA.



CENTRIFUGAL SEGMENT ASSEMBLY.

GERMAN FUZE A.Z 5075.

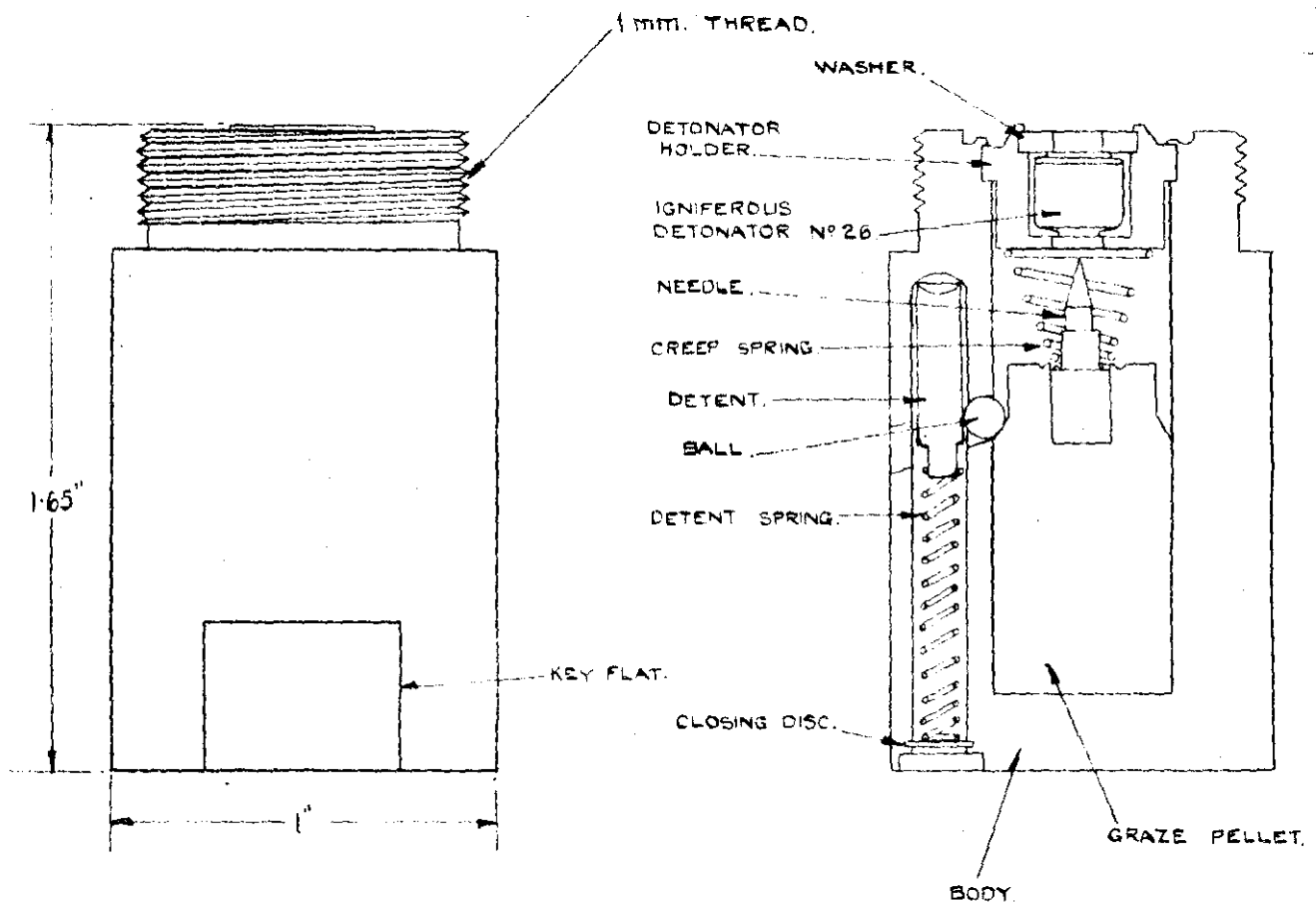
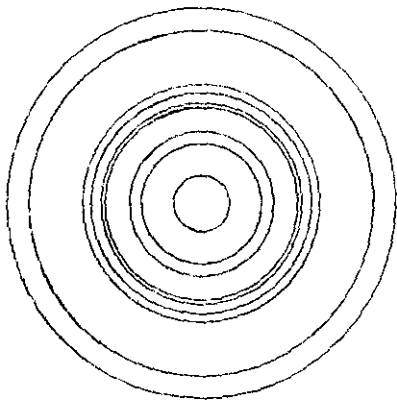
Fig. 402 (ITEM 1022)



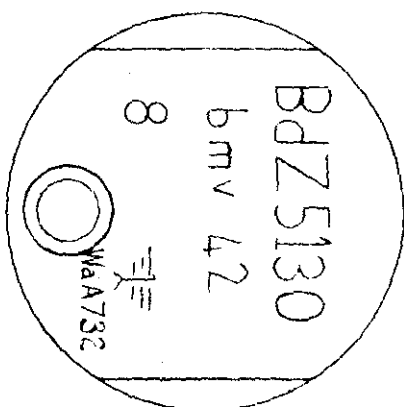
GERMAN FUZE BASE PERCUSSION Bd. Z. 5130.

FIG 403 (ITEM 1023)

TOP OF FUZE.



BASE STAMPINGS



GERMAN SMALL P.E.T.N. GAINE 34 WITH DELAY.

(Kl. Zdlg. 34 m.V.)

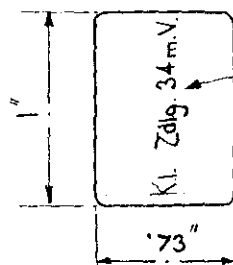
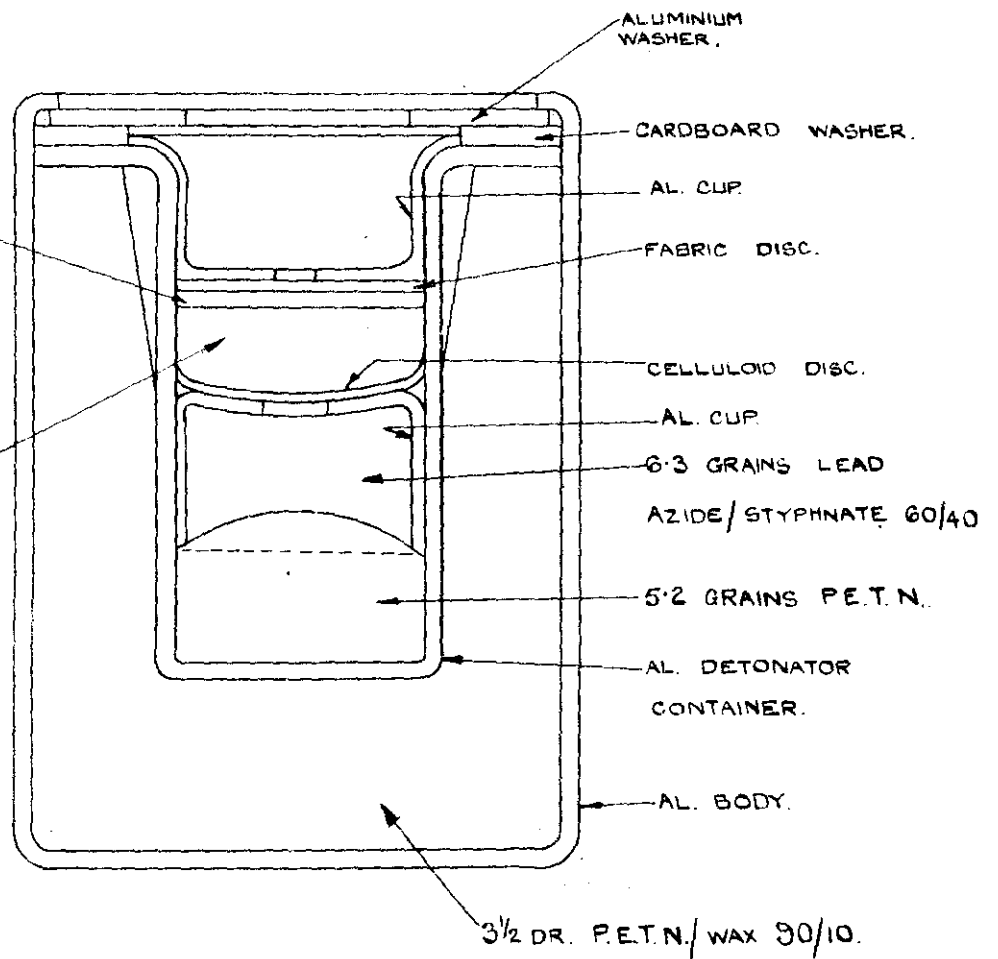
FIG. 404. (ITEM. 1024.)

1.2 GRAINS

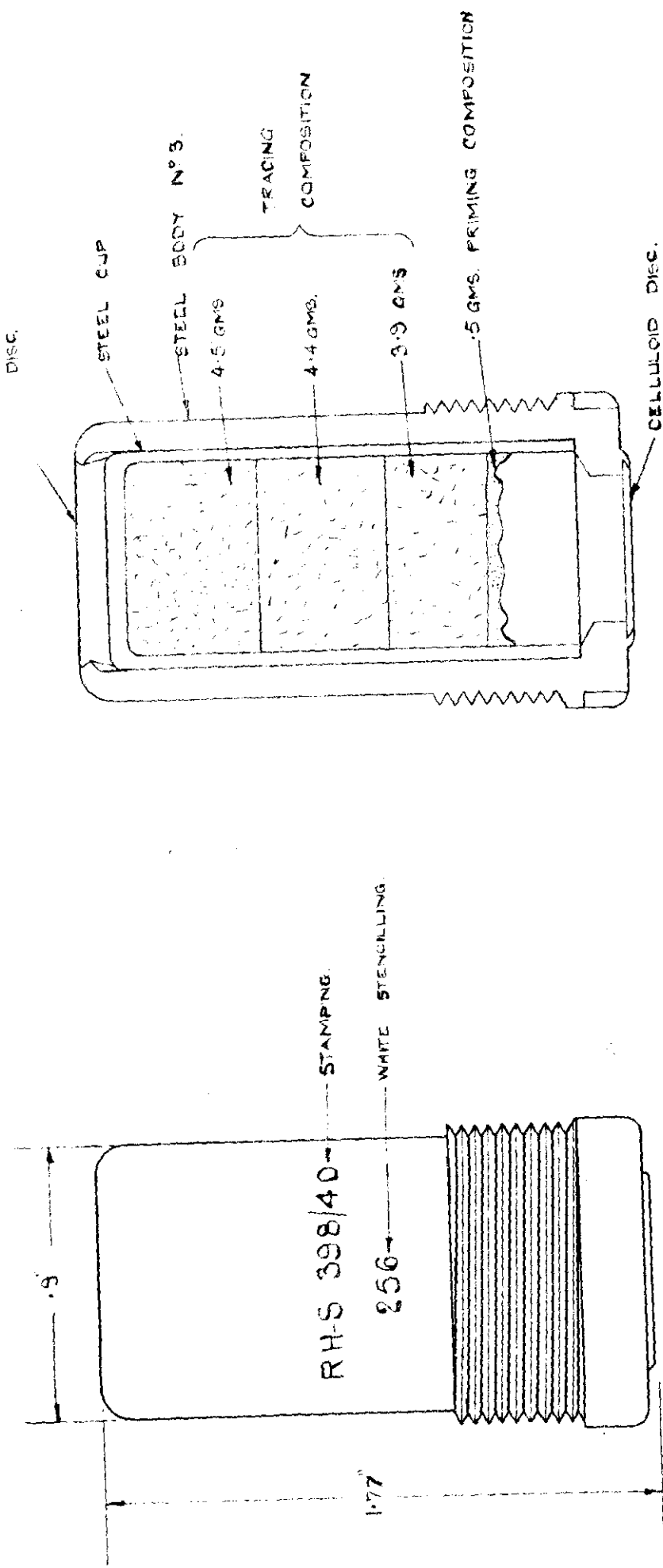
NITROCELLULOSE 5 $\frac{1}{2}$
LEAD OXIDE 76 $\frac{1}{2}$
SILICON 19 $\frac{1}{2}$

4.6 GRAINS.

POTASSIUM
PERCHLORATE 24.5 $\frac{1}{2}$
LEAD CHROMATE 52.3 $\frac{1}{2}$
SILICON. 23.2 $\frac{1}{2}$



GERMAN TRACER N°3
 (LICHTSPURHULSE Nr 3)
 FIG 405. (ITEM 1027)



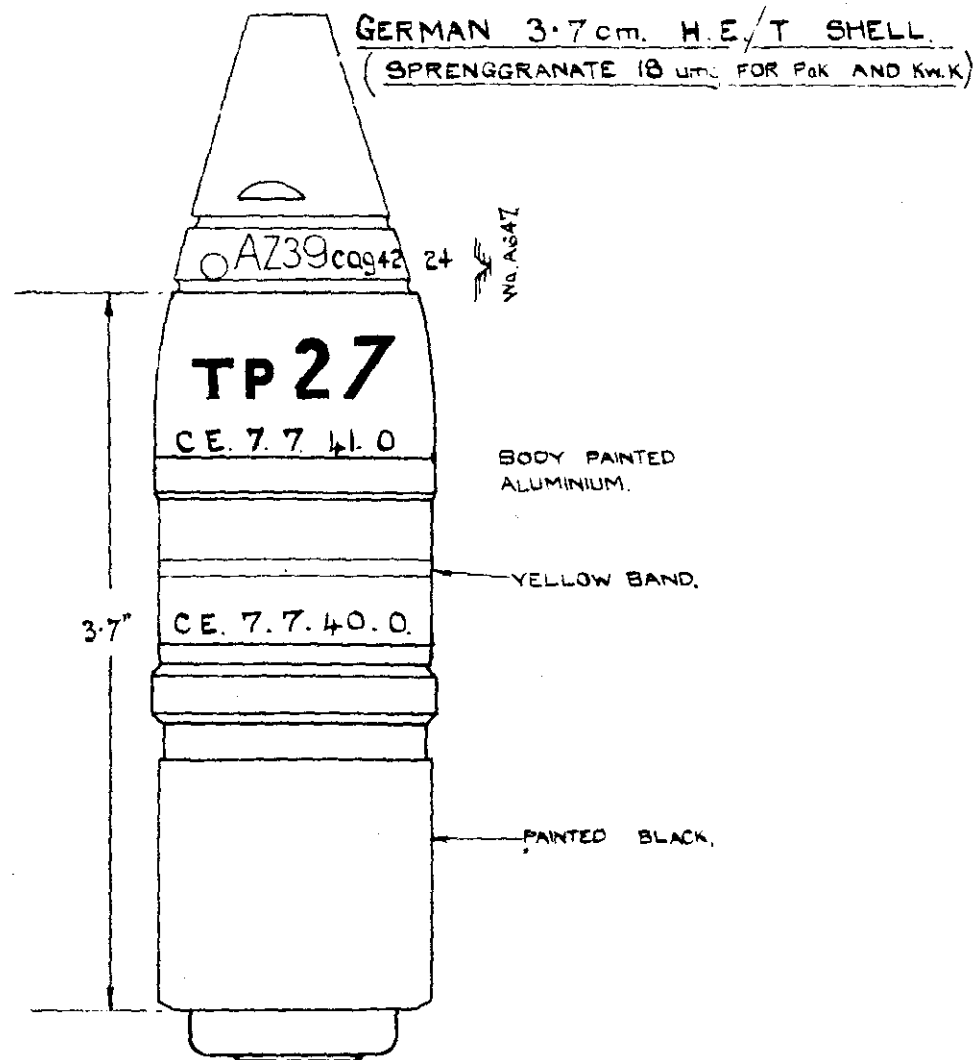
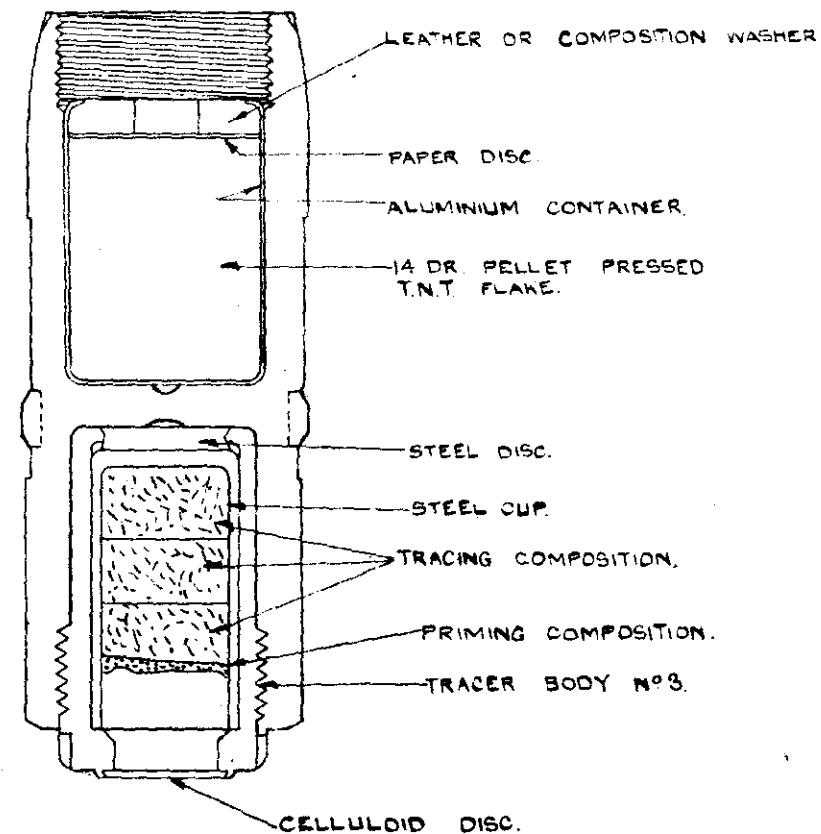
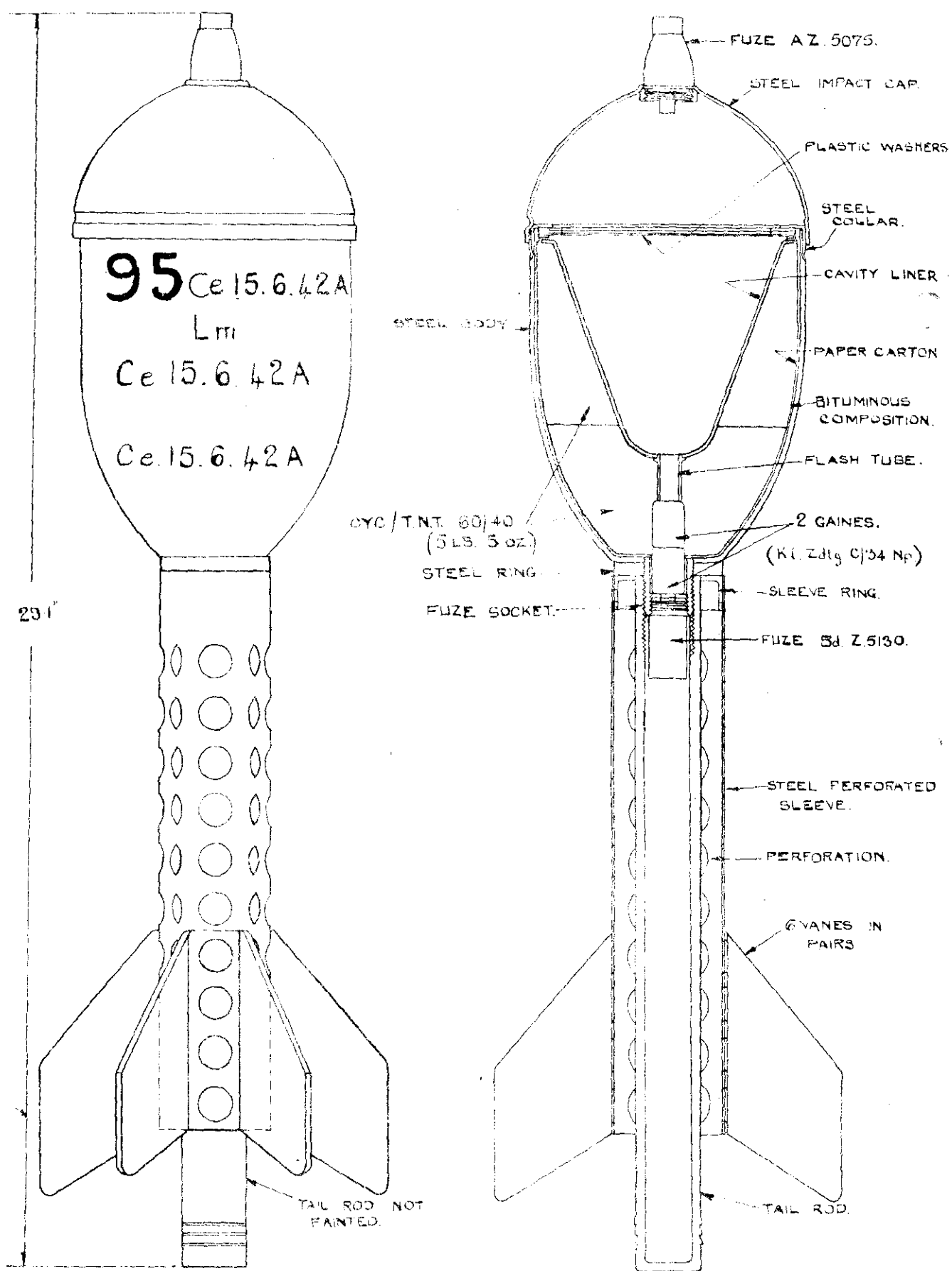


FIG 406 (ITEM 1028)



GERMAN 3-7 cm. F.A. HOWITZ. CHARGE MUZZLE STICK BOMB.
 (3754) STEEL (GRANITE)
 FIG 407 (ITEM 1022)

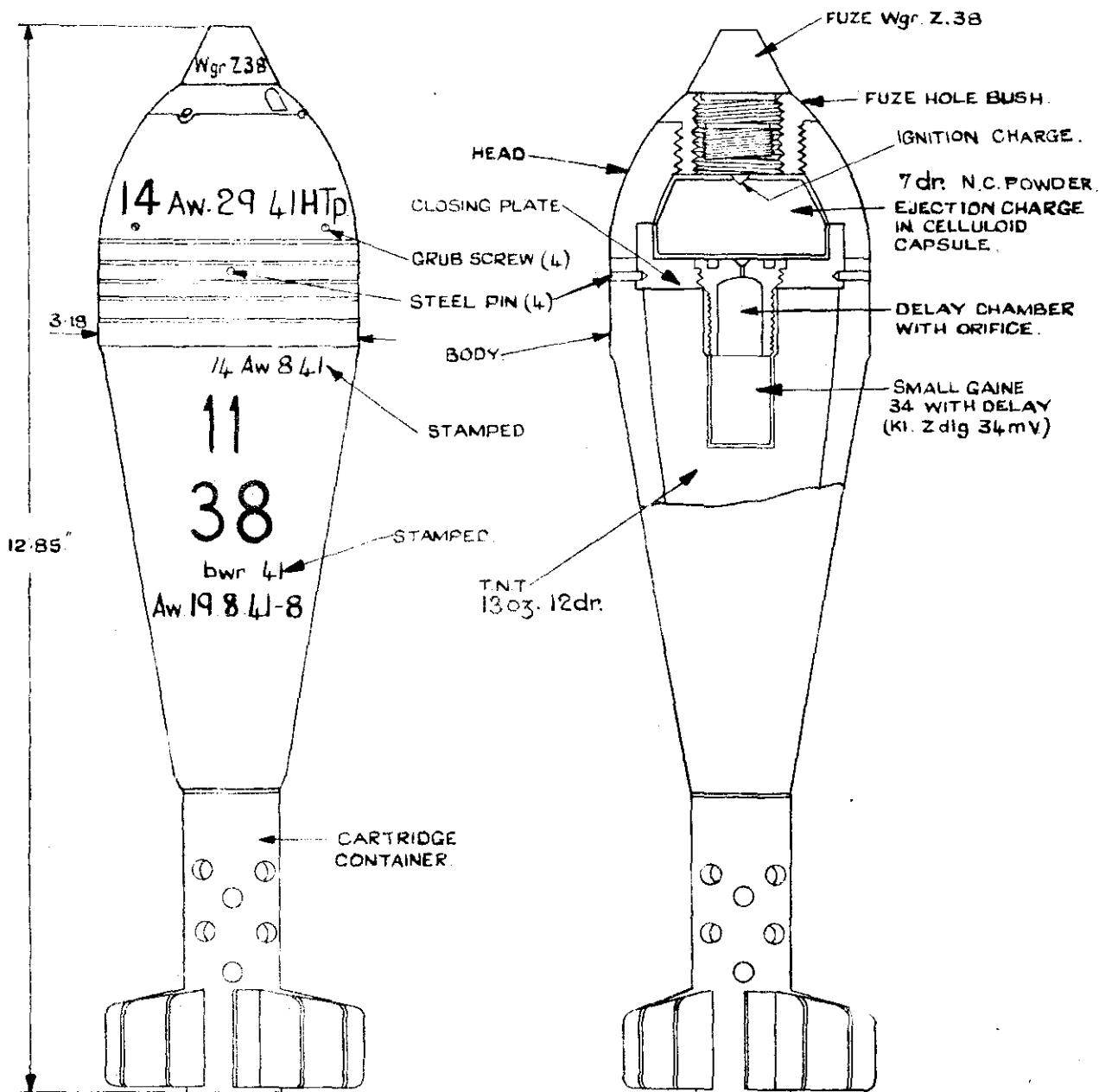
PAINTED DEEP OLIVE GREEN
 WITH BLACK STENCILLING.



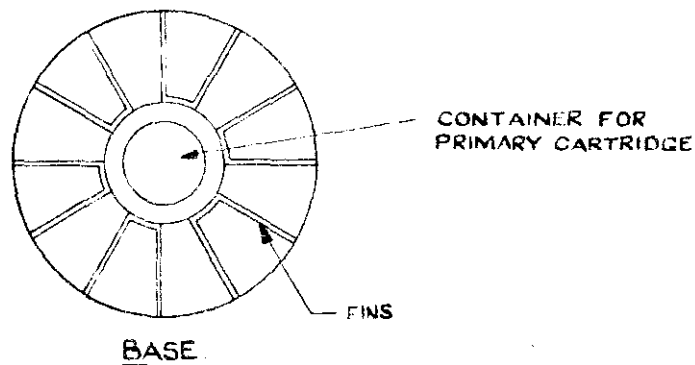
GERMAN 8 cm M.L. MORTAR H.E BOMB 38.

(8cm Wgr. 38)

FIG. 408 (ITEM. 1030)

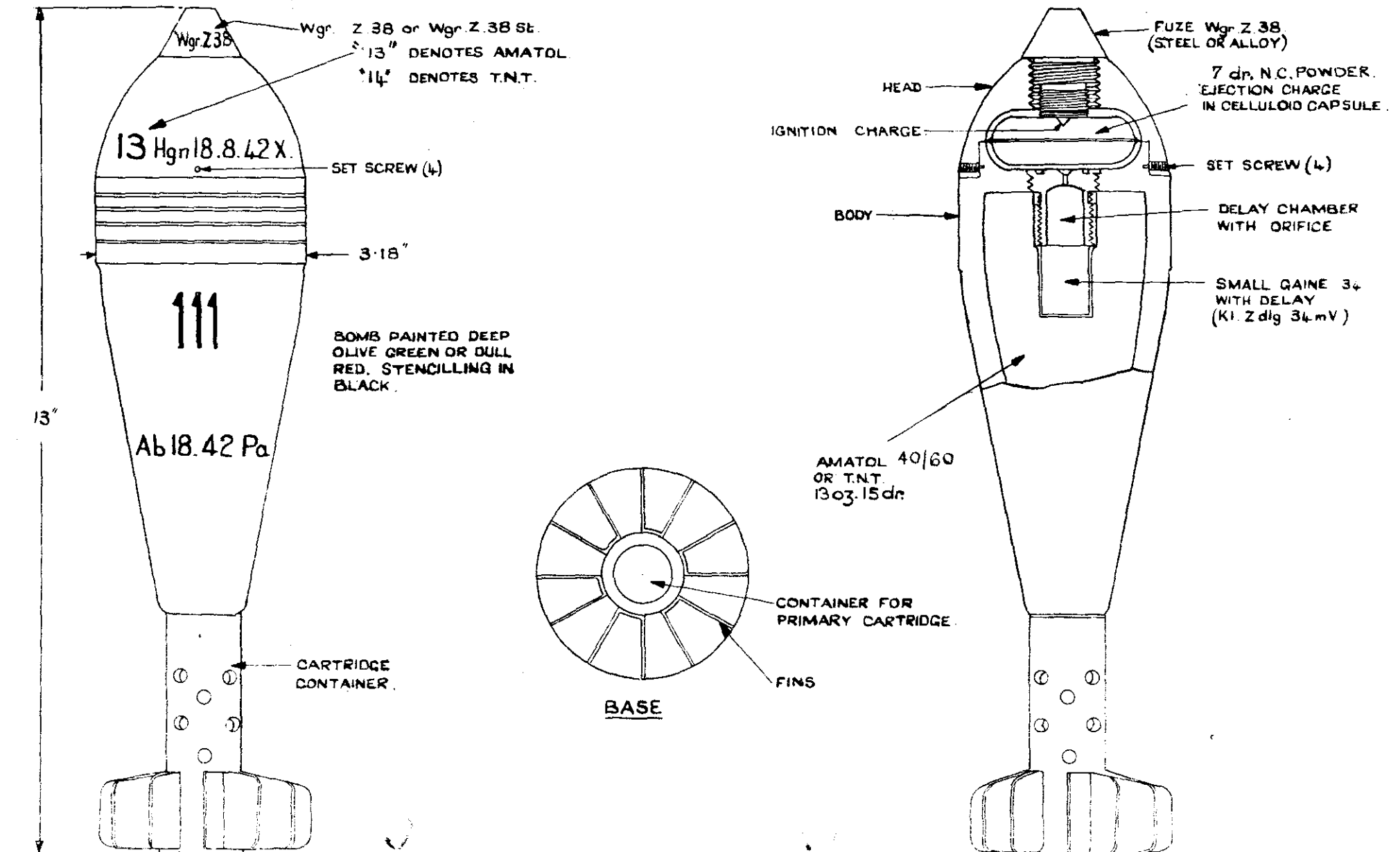


PAINTED DEEP OLIVE GREEN
AND STENCILLED IN BLACK



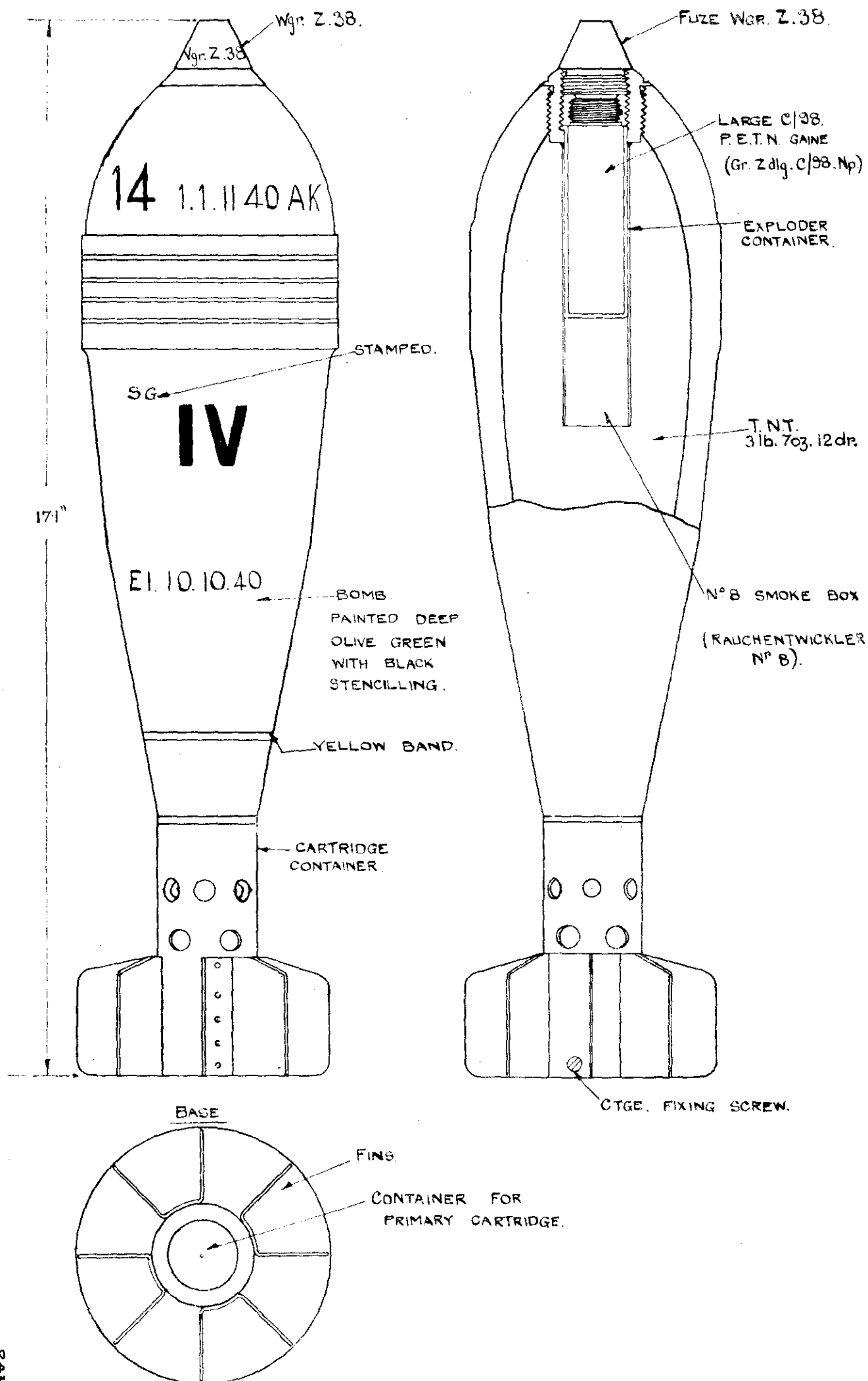
GERMAN 8 cm. M.L. MORTAR H.E. BOMB 39. (8 cm. Wgr. 39)

FIG. 409. (ITEM. 1031)

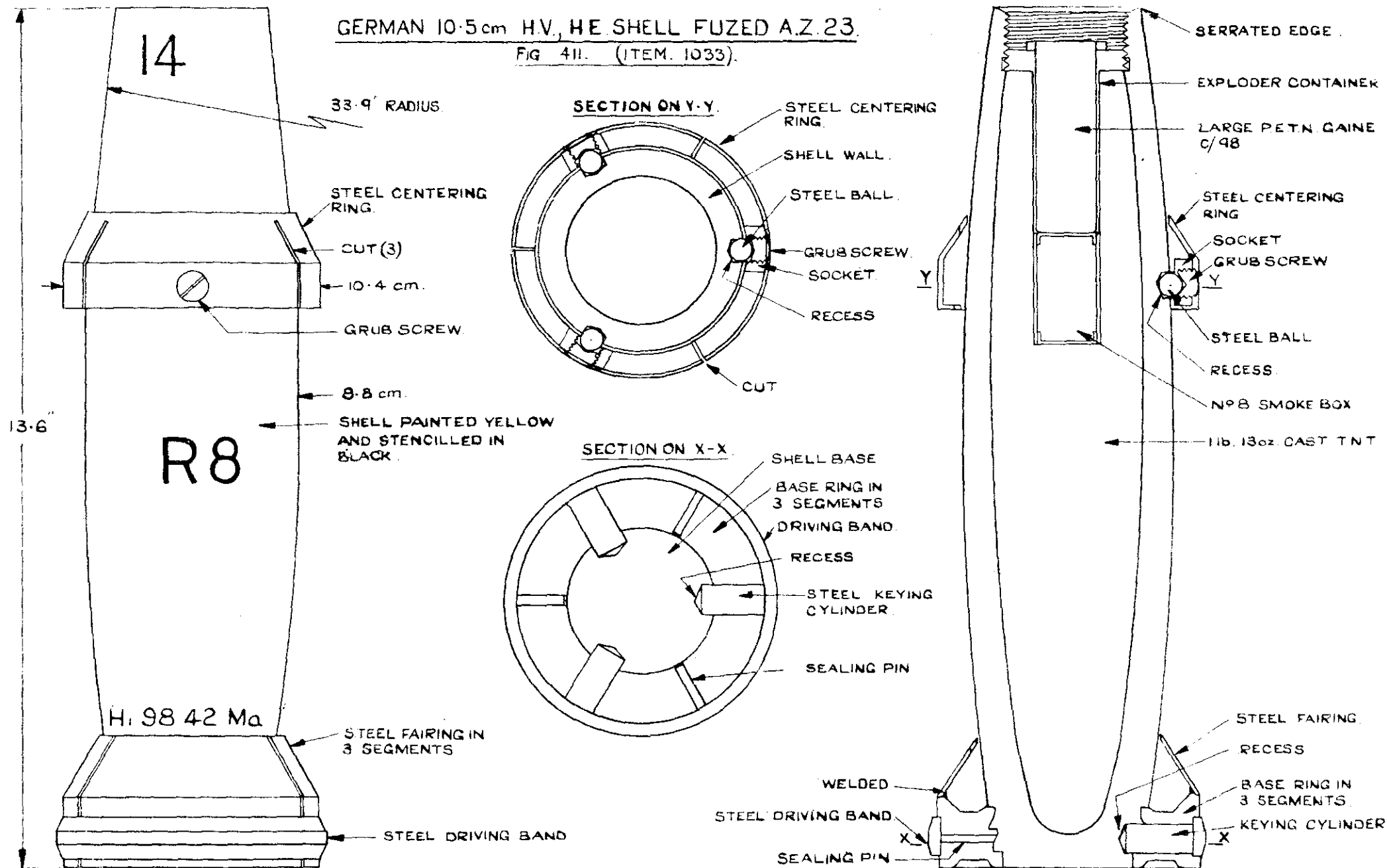


GERMAN 10 cm. Nb. MORTAR (10.5 cm. CALIBRE) H.E. BOMB

(10 cm. Wgr.)
FIG 410. (ITEM 1032)



GERMAN 10.5 cm H.V. HE SHELL FUZED A.Z. 23. FIG 411. (ITEM. 1033).



GERMAN 5cm. H.V. H.E. SHELL FUZED A.Z. 3.
FIG. 412. (ITEM. 1034)

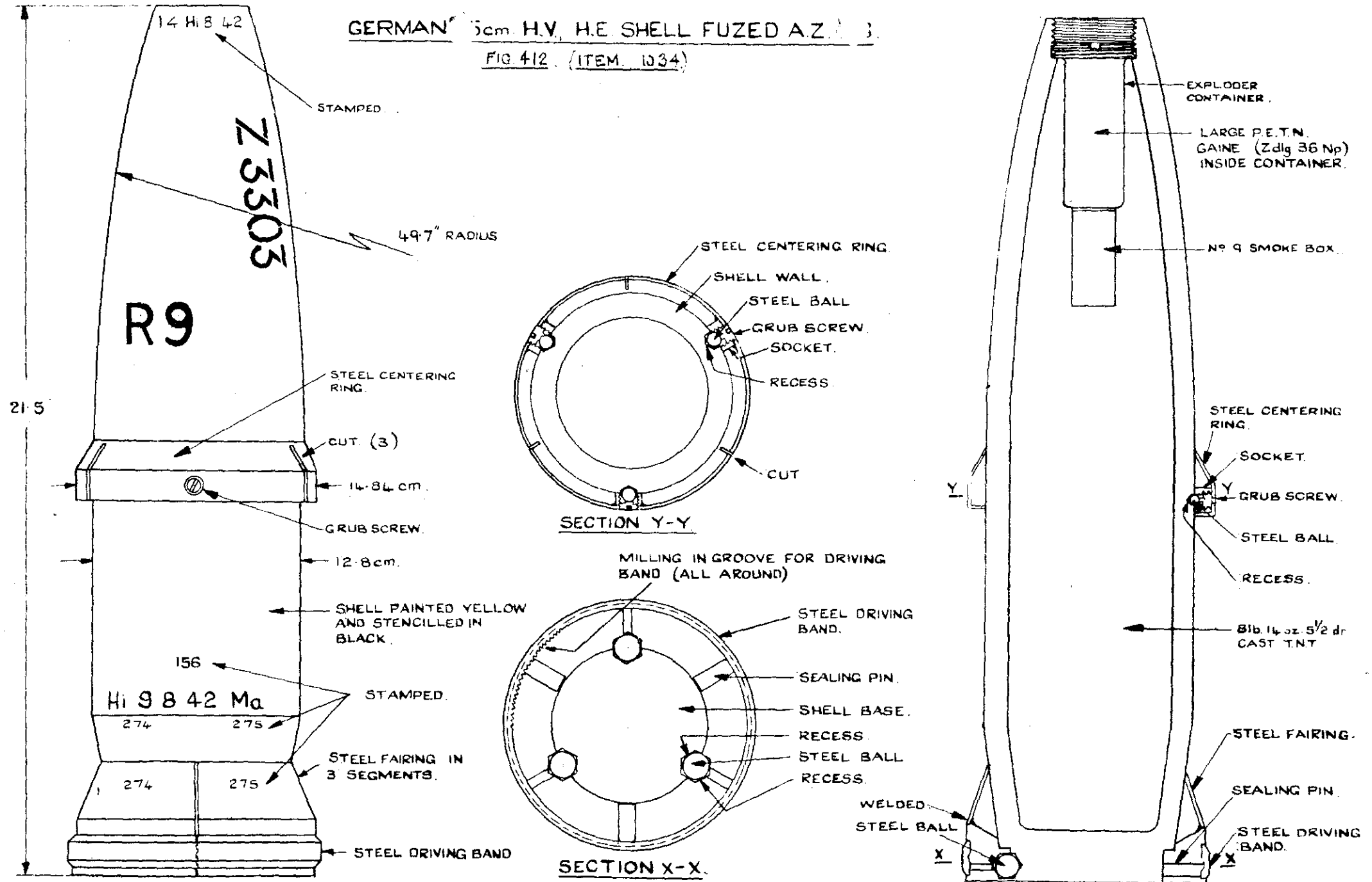
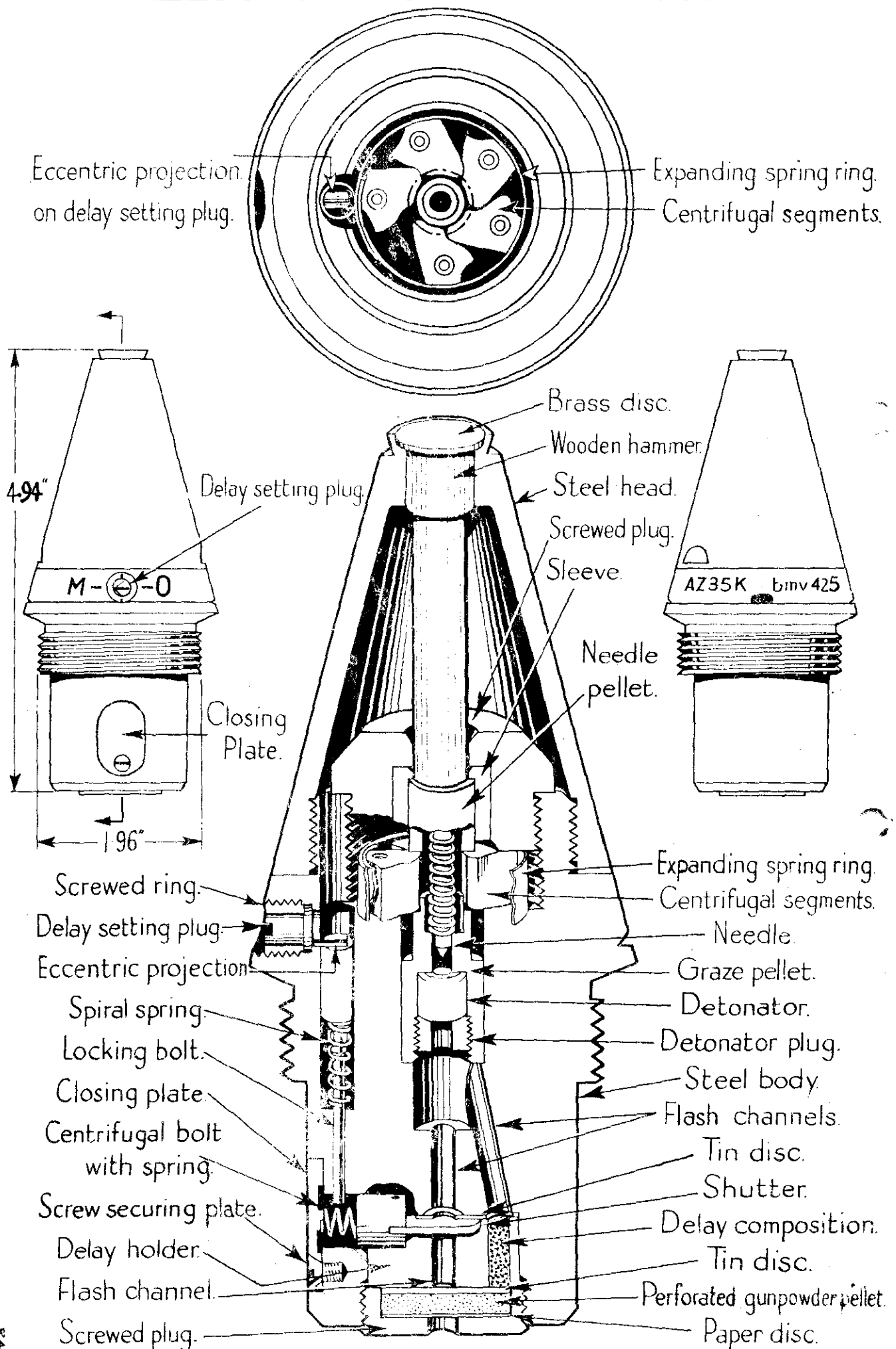


FIG. 413 (ITEM 1035)

GERMAN FUZE A.Z. 35 K.

PLAN VIEW WITH HEAD & SCREWED PLUG REMOVED.



GERMAN MECHANICAL TIME & PERCUSSION FUZE S/90/45

Dopp. Z. S/90/45.

FIG. 414 (ITEM 1036)

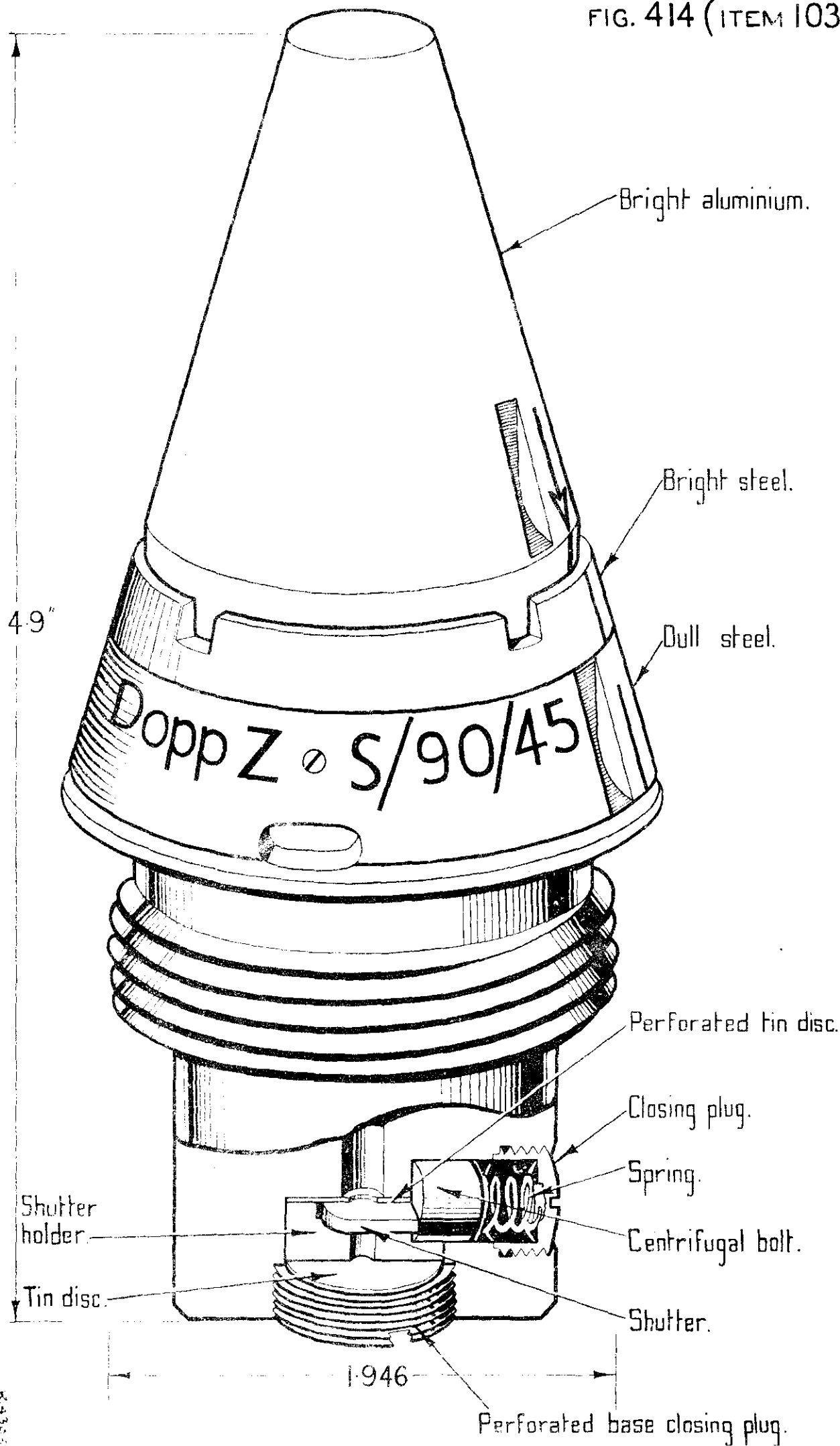
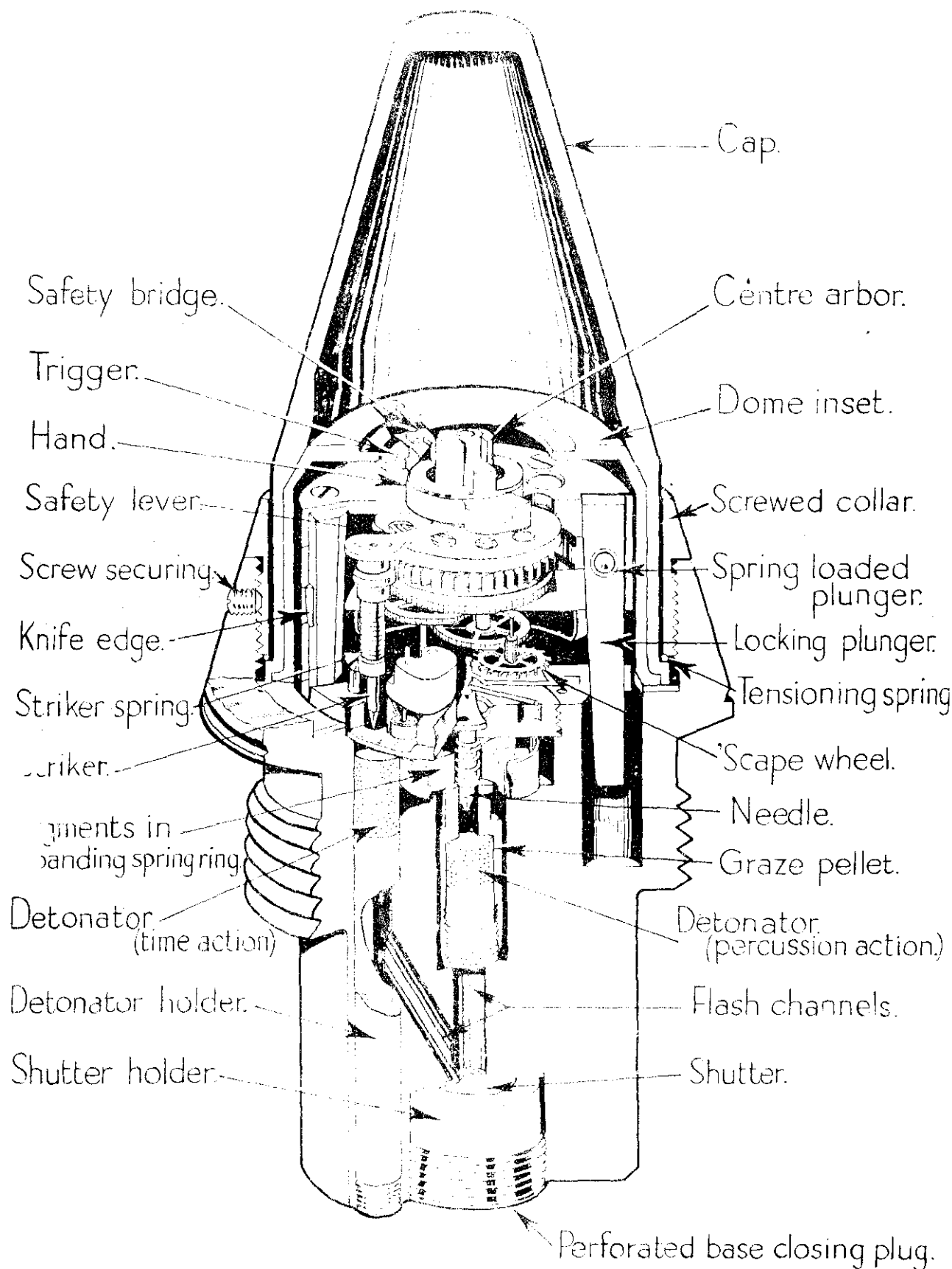


FIG. 415 (ITEM 1036)

GERMAN MECHANICAL TIME & PERCUSSION FUZE S/90/45
(Dopp.Z.S/90/45.)



GERMAN MECHANICAL TIME & PERCUSSION FUZE S/90/45

(Dopp. Z.S/90/45)

DIAGRAMMATIC ARRANGEMENT OF MECHANISM.

FIG. 416 (ITEM 1036)

