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JAPANESE AMMUNITION

C.I.AMM. TECHNICAL REPORT

No. 34

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NOSE PERCUSSION FUZES TYPE '88

FOR GUN AMMUNITION

WITH

24-MM. FUZE HOLE.

RESTRICTED.

JAPANESE AMMUNITION.

C.I.AMM. TECHNICAL REPORTS.

REPORT NO. 34.

MARCH 1945.

THE TYPE '88 H.E. NOSE PERCUSSION FUZE
FOR
GUN AMMUNITION WITH 24-MM. FUZE HOLE.

G E N E R A L.

Japanese H.E. nose percussion fuzes, which have been found in Land Service gun ammunition (all calibres of 37-mm. and above)* are of two sizes:-

(a) 37-mm. Nose Fuzed H.E. Shell.

A small D.A. Nose percussion fuze (15-mm. fuze hole) with a spring loaded centrifugal bolt locking the striker, and a rotary shutter below the detonator. This fuze very closely resembles, except that it is larger in size, the nose fuze used in the Japanese Naval A.A. cartridge 25-mm. (rimless) described in C.I. Amm. Technical Report No.28.

This fuze will be described in a later Technical Report.

(b) All calibres of H.E. Nose Fuzed Gun Ammunition above 37-mm.

All nose fuzed H.E. shell above 37-mm. have a 24-mm. fuze hole (see note below for 40-mm. calibre) and take the Type '88 nose percussion fuze. The use of this fuze appears to be standard Japanese practice and there is no information to indicate that any other type of H.E. nose percussion fuze is used.

2. This Report describes in detail the Type '88 H.E. nose percussion fuze for gun ammunition with 24-mm. fuze hole, i.e. all calibres of gun ammunition above 37-mm. This type '88 nose fuze covers three distinct natures which for convenience of reference are described as below:-

- 'A' - Nose Percussion Fuze D.A. , Instantaneous Action, (two kinds).
- 'B' - Nose Percussion Fuze D.A., Slight Delay Action only.
- 'C' - Nose Percussion Fuze D.A. and Graze Action, with Slight Delay.

3. The Instantaneous Action - 'A' fuze, see Plates A and B, although identical in external appearance and action, is of two kinds:-

- (i) One fuze is marked with the Japanese characters "88 Type Field Mountain Gun" as shown in the plates. It indicates that the fuze has a comparatively strong stirrup spring (8) restricting its use to guns with a relatively high velocity. The stirrup spring is stamped with the Japanese character for A. The set-back ferrule (6) used with it has been found in all cases to have two external circular grooves. The top groove

* No samples of 40-mm. calibre ammunition have been examined but reports refer to the use of captured British ammunition with the usual D.A. nose fuze and Japanese versions using a combustion time fuze.

takes the safety fork but the lower groove appears to have no function except to identify the ferrule for use in that fuze.

- (ii) The other fuze is marked with the Japanese characters "88 Type Pomegranate Mortar", see Plate B. This marking, by inference, refers to howitzer, i.e. a low velocity weapon. The stirrup spring (8) in this fuze is comparatively weak and will arm with a much lower velocity. It bears the Japanese character for B and the set-back ferrule used with it has only one external circumferential groove. It is thought that this fuze was intended for use in the 70-mm. Type '92 Battalion Gun* and possibly the 105-mm. and 150-mm. Howitzers etc.

4. The first fuze can be described as the "Type '88 instantaneous action gun fuze", while the other is the "Type '88 instantaneous action howitzer fuze".

5. The Slight Delay Action only - 'B' fuze, see Plates A and C, has similar Japanese markings to (ii) above, i.e. "88 Type Pomegranate Mortar". This fuze has a weak stirrup spring (9) and is assumed also to be intended only for use in howitzers as explained above. While these fuzes are intended for use in howitzers they could, of course, be used in guns. The converse does not, however, hold good.

6. The Graze Action with Slight Delay - 'C' fuze, see Plates A and D, has the markings in Japanese characters "88 Type Field Mountain Gun" and has a comparatively strong stirrup spring (9). It is assumed, therefore, that its use is restricted only to guns with a comparatively high velocity, i.e. it is not suitable for use in the 70-mm. Type '92 Battalion Gun and Howitzers. Note that the last Japanese character has been interpreted to mean "gun" although its literal interpretation is understood to be "add on or increased velocity". The inference is clear, as it distinguishes the fuze for use in a gun from that for use in the howitzer.

7. Although the internal structure and mechanism of the fuzes differ they all have the same fuze hole threads and are, therefore, interchangeable except that, as mentioned above, fuzes with a strong stirrup spring are intended for use in guns and may not arm in howitzers or relatively low velocity guns. The fuzes are described in more detail below.

DESCRIPTION.

TYPE '88 H.E. NOSE PERCUSSION FUZE D.A., INSTANTANEOUS ACTION - 'A'.

8. A detailed drawing of this fuze is given in Plate B while its general appearance is shown in the photograph at Plate A. For purposes of description the fuze may be divided into three main parts:-

- (i) Brass body, upper half (1) containing the striker (2) and the striker mechanism.
- (ii) Brass body, lower half (9) to which is fitted (spring attachment) the stirrup spring (8).
- (iii) Gaine (12) holding the main filling and a screwed detonator holder (10).

* Translations refer to this weapon as a gun but it is more correctly a howitzer - semi fixed with adjustable charge.

9. All gaines examined have been filled according to the method shown in Plate B but it is possible that variations may exist. It will be seen, for instance, that in the graze action with slight delay fuze - see Plate D - a simplified version of gaine, filled R.D.X. with a lead Azide pellet above, has been used.

10. The construction of this fuze will be clear generally from the fuze section in Plate A and the detailed drawings in Plate B. Note that the safety fork (1A) passes by means of holes in the fuze through the top groove in the set-back ferrule (6) thus securing the latter.

11. As mentioned above, this fuze will be found with either a strong or a weak stirrup spring according to the markings stamped on the fuze. Details are shown in Plate B. The reason for the lower external groove in the set-back ferrule (6) is not clear. This type of ferrule has always been found with the strong stirrup spring (8). It is identical in dimensions etc. with the single groove ferrule and small differences in weight only have been noticed which appear to have no significance. Further details are given in para. 24 below.

12. Rough tests were carried out to determine the load required for the ferrule (6) to be pushed back over the stirrup spring (8). In the case of the gun fuze (strong stirrup spring marked with Japanese character for A) the load was of the order of 70 to 110 lbs. while for the howitzer fuze (weak stirrup spring marked with Japanese character for B) the load was 25 to 40 lbs.

Safety Devices.

13. The fuze incorporates three safety devices:-

(a) A safety fork (1A) which, during handling and transport, secures the set-back ferrule (6) in position and prevents it from riding back over the stirrup spring (8) in case of a fall or severe jolt to the round.

(b) Four centrifugal brass segments (7) which fit snugly round the striker and prevent any appreciable movement of the striker in the direction of the detonator. The segments are retained in position by the set-back ferrule (6).

(c) A steel striker spring (3) which, riding under a flange of the striker head, keeps the striker clear of the detonator (10A) during flight.

Action.

14. Before loading the round into the gun, the safety fork (1A) is withdrawn leaving the set-back ferrule (6) free to move. On firing, the ferrule (6) sets back over the stirrup spring (8) while the four spring fingers on the ferrule (6) move out to engage in the internal annular groove in the ferrule (6). The ferrule (6) is thereby locked in the rear position leaving the four centrifugal segments (7) free to move outwards. At the same time, however, the striker and the striker head set back on to the segments holding them in position during acceleration up the bore. This retention of the segments (7) in position is assisted by serrations knurled on the underside of the striker head. On deceleration the striker spring causes the striker to rise slightly while at the same time centrifugal force causes the segments to fly out, thus freeing the striker which, on impact, is driven on to the detonator.

TYPE '88 H.E. NOSE PERCUSSION FUZE D.A.,

SLIGHT DELAY ACTION ONLY - 'B' (HOWITZER FUZE).

15. A detailed drawing of this fuze is given in Plate C while its general appearance is shown in the photograph at Plate A. For purposes of description the fuze may be divided into three main parts:-

- (i) Brass body, upper half (1) holding the striker head (2), striker (3) and the striker spring (4).
- (ii) Brass body, lower half (11) into which is screwed the detonator housing (12).
- (iii) Gaine (15) holding the main filling and a screwed closing plug (13) containing a perforated gunpowder pellet. Note that a somewhat complicated method of filling is used in this gaine. It is possible, however, that different methods of filling are used and a more simplified method of gaine filling is used in the slight delay and graze action fuze, see Plate D.

16. The construction of this fuze will be clear generally from the Plates. Note that the mechanism below the striker differs considerably from that of the instantaneous action fuze - 'A'. The detonator housing (12) screws into the lower body of the fuze (11) above the gaine and carries the detonator and a perforated delay pellet. The perforated delay pellet is inserted in a recess in the housing and secured in position by a screwed closing plug. In the other end of the housing is the detonator secured by spinning over the mouth of the housing on to the detonator shell. A brass distance piece (10) is then placed over the housing followed by the stirrup spring (9) and held in position by the striker guide (8) being screwed on to the detonator housing (12). The position of the set-back ferrule will be clear from the drawing. This has only one external annular groove in which the safety fork (1A) fits. An internal groove is positioned round the ferrule about midway along its length.

17. All fuzes of this type bear the marking "88 Type Pomegranate Mortar" as shown in the drawing and are D.A. fuzes with a slight delay action. They are intended for use in howitzer and low velocity guns, e.g. 70-mm. Type '92 battalion gun.

This fuze has a comparatively weak stirrup spring owing to the prongs being only .077-in. wide (stirrup spring prongs in the gun fuze of this type are .16-in. wide). The weight required to push the ferrule over the stirrup spring is very low - of the order only of 15 to 20 pounds.

Safety Devices.

18. The same safety devices are used as in the instantaneous action - 'A' fuze, minor differences being in the centrifugal segments (6) and the striker guide (8). It will be noticed that these have their adjacent surfaces bevelled as well as the underside of the striker head being knurled.

Action.

19. The action is identical with that for the instantaneous action - 'A' fuze described above. Note, however, that the bevelled surface of the centrifugal segments (6) assists in preventing the segments from flying outwards till acceleration ceases; this gives greater safety until projectile is clear of the bore. The set-back ferrule (7) is locked in the rear position by the three spring prongs of the stirrup spring (9) engaging in the annular groove. This type of fuze is intended

for use in howitzers and forces, on firing, may not be sufficient to cause the ferrule (7) to set back to the full extent for the prongs of the stirrup spring (9) to ride over the top of the ferrule and lock it fully back. The design of fuze body and detonator housing is such that in some cases there may not be sufficient space to accommodate ferrule when fully back and the internal groove is therefore essential. On impact, the striker is driven on to the detonator (10-A) from which a flash passes to the perforated delay pellet. From very rough trials carried out in this Inspectorate, it is estimated that the time of delay is of the order of .05 to .1 second. Further trials on a larger number of fuzes with more accurate apparatus will be carried out as soon as opportunity arises.

TYPE '88 H.E. NOSE PERCUSSION FUZE D.A.,

AND GRAZE ACTION WITH SLIGHT DELAY - 'C' (GUN FUZE).

20. A detailed drawing of this fuze is given in Plate D while its general appearance is shown on the photograph at Plate A. For purposes of description this fuze may be divided into three main parts:-

- (i) Brass body, upper half (1) which carries the striker mechanism.
- (ii) Brass body, lower half (11), which in conjunction with the upper half houses the graze pellet and arming mechanism.
- (iii) Gaine (14).

The construction of the fuze will be clear from the Plates. Note that the detonator (12A), perforated delay pellet and stirrup spring (9) are held in the graze pellet (12) in a manner similar to that in the detonator housing (12) in the slight delay action only - 'B' fuze, Plate C. The major differences being that the graze pellet (12) is not screwed, but is held loosely in the lower half of the body. Note that the set-back ferrule in this fuze has no internal annular groove and is intended to set back to the full extent over the graze pellet.

21. All fuzes of this nature have stamped markings in Japanese characters "88 Type Field Mountain Gun" and are intended for use in comparatively high velocity guns. This fuze would not, it is thought, arm in the 70-mm. Type '92 Battalion Gun or Howitzers.

The stirrup spring is much stronger than that of the previous fuze (howitzer fuze) owing to the prongs being .16-in. wide. The force required to push the ferrule over the stirrup spring is of the order of 30 to 40 pounds.

Safety Devices.

22. These are identical with those described earlier.

Action.

23. Action is similar to that described earlier except that once the fuze is armed it will function on graze action as well as on impact. This will be clear from Plate D.

Fuze Arming Details

Fuze Arming Details.

24.

FUZE INSTANTANEOUS ACTION-'A'.

DETAILS.

GUN.

HOWITZER.

Set-back Ferrule.

(1) Special features.	Has 2 external and 1 internal grooves.	Has 1 external and 1 internal grooves.
(2) Typical weights (in grains).		
(i)	133.18)	135.95)
(ii)	128.08*)	135.95)
(iii)	132.87)	131.55)
(iv)	132.72)	133.02)
(v)	133.95)	133.79)
	Mean 132.6.	Mean 133.58.
(3) Dead weight to arm.	70 to 110 pounds.	25 to 40 pounds.

Stirrup Spring.

(1) Special features.	Marked with Japanese character for A.	Marked with Japanese character for B.
(2) Typical weights (in grains).		
(i)	15.86)	
(ii)	15.7)	
(iii)	16.4)	
	Mean 15.98	11.85
(3) Metal thickness.	0.031-ins.	0.023-ins.
(4) Width of prongs.	0.14 -ins.	0.18 -ins.
(5) Maximum diameter across prongs.	0.52 -ins.	0.58 -ins.

FUZE SLIGHT DELAY ACTION ONLY-'B' (HOWITZER).

AND

FUZE GRAZE ACTION WITH SLIGHT DELAY-'C' (GUN).

Set-back Ferrule.		Stirrup Spring.			
Special features.	Typical weights (in grains)	Typical weights (in grains)	Metal thickness (ins.)	Width of prongs. (ins.)	Max. Dia. across prongs. (ins.)

FUZE SLIGHT DELAY ACTION ONLY-'B' (HOWITZER).

One external and one internal grooves.	(i)	81.43	(i)	10.78		
	(ii)	80.66	(ii)	10.47		
	(iii)	83.18	(iii)	10.47	0.017	0.077
	(iv)	82.57				
	(v)	80.81				
	Mean	81.8	Mean	10.54		

FUZE GRAZE ACTION WITH SLIGHT DELAY-'C' (GUN).

One external groove. No internal groove.	(i)	78.07				
	(ii)	82.23				
	Mean	80.15	10.16	0.017	0.16	0.54

P A C K I N G.

25. Japanese practice with all gun ammunition of 37-mm. calibre and above is to issue rounds plugged, the fuzes usually being packed in sealed metal cylinders in the same box as the rounds. The plug is generally of the 'push in' type made of cork composition or felt, but in some cases the shell are issued with a screwed plug made of metal or plastic.

26. The method of packing fuzes is shown in Plate E and varies according to the ammunition with which the fuzes are packed. The long cylinder (item 3), by means of suitable packing pieces, will take either two or three fuzes. The number of fuzes packed in the cylinder depends on the number of rounds packed in the box. It is believed that these long cylinders are used in the older steel pack transport boxes for the Type '92 battalion and Type '94 mountain guns etc. When ammunition is issued in the standard wooden boxes the fuzes are usually packed one per cylinder (items 2, 4 and 5 of Plate E). Fuzes of recent manufacture have been found in soldered tin banded cylinders (item 4). Full instructions for opening the cylinder etc. are stencilled by an enamel process on the cylinder or on a label on the lid of the cylinder. Fuzes issued in bulk, presumably for re-fuzing, are issued in tin boxes each holding 10 fuzes. Ten of these boxes, i.e. 100 fuzes, are packed in a wooden packing case.

METALLURGICAL ANALYSIS.

27. There is nothing to add to the details given in Plates B, C and D.

CHEMICAL ANALYSIS.

28. There is nothing to add to the details given in Plates B, C and D. The quantities of explosives examined were too small for any quantitative or detailed chemical analysis to be made.

A P P R E C I A T I O N

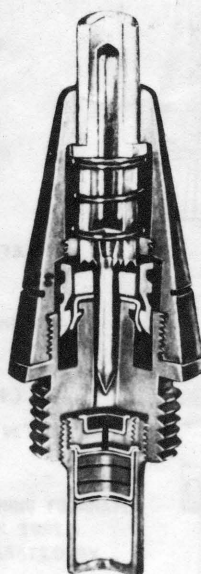
(Economic, development and manufacture aspects).

29. The Type '88 H.E. nose fuze (24-mm. F.H.) is the most commonly used fuze in Japanese gun ammunition. All fuzes examined at Kirkee have been found to be made of brass, although reports have been received that fuzes with steel bodies, rust-proofed with a black finish, were found in the South West Pacific Area. Some fuzes examined at Kirkee have been found with galvanised iron safety forks and wire, but the majority were of brass. All fuzes examined were either of Tokio or Osaka manufacture and the character indicating this is usually to be found stamped on the base of the gaine.

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八八式
野山
加



(A)

(A)

TYPE '88 (24MM.F.H.).

INSTANTANEOUS ACTION ONLY.
WEIGHT OF FILLED FUZE COMPLETE 6 oz.

(B)

TYPE '88 (24MM.F.H.)

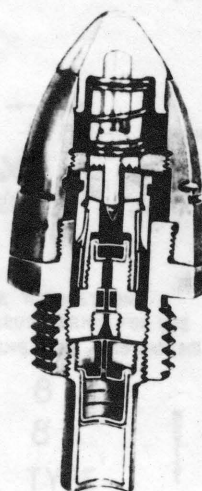
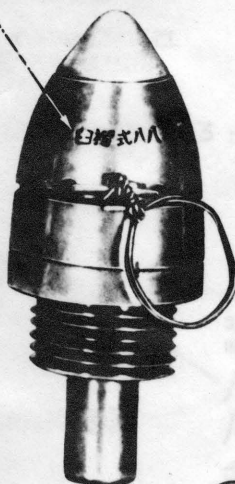
SLIGHT DELAY ACTION ONLY.
WEIGHT OF FILLED FUZE COMPLETE 6 1/2 oz.

(C)

TYPE '88 (24MM.F.H.).

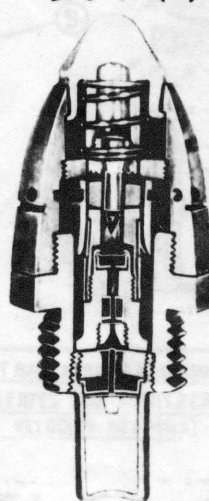
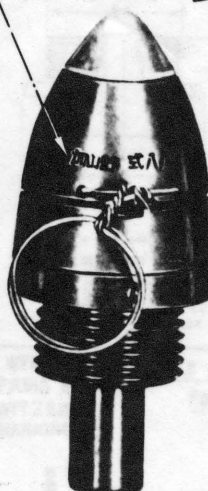
SLIGHT DELAY WITH GRAZE ACTION
WEIGHT OF FILLED FUZE COMPLETE 6 1/2 oz.

白榴式八八



(B)

加山野式八八



(C)

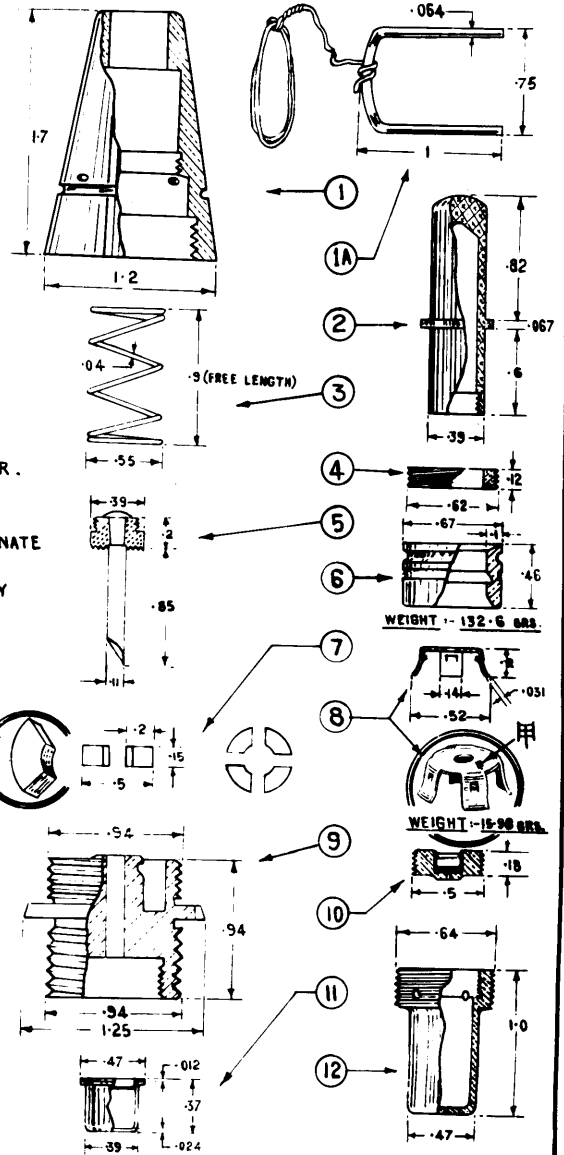
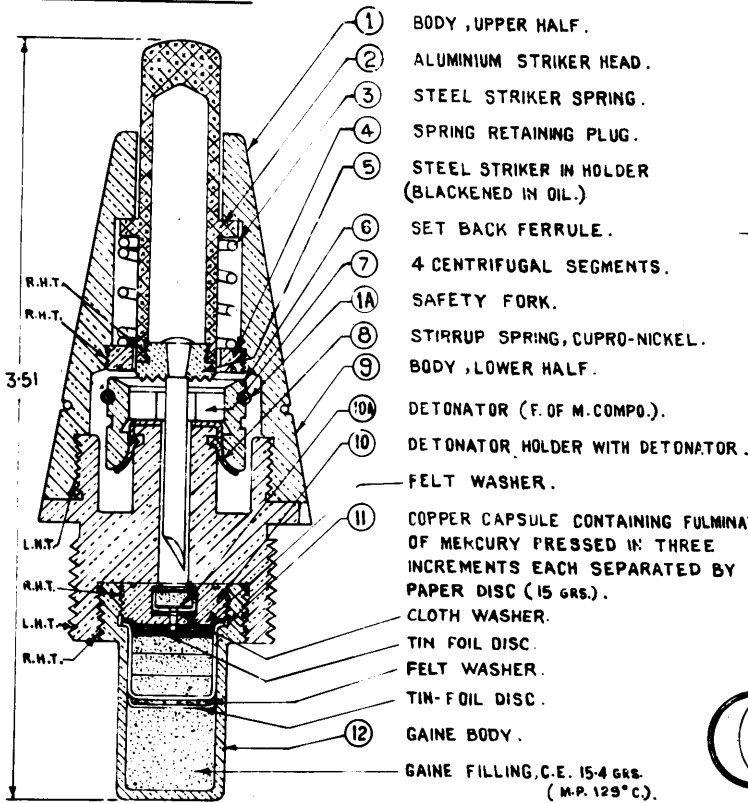
— JAPANESE NOSE PERCUSSION FUZES. —

— TYPE '88. —

— FOR —

— GUN AMMUNITION WITH 24 MM., FUZE HOLE. —

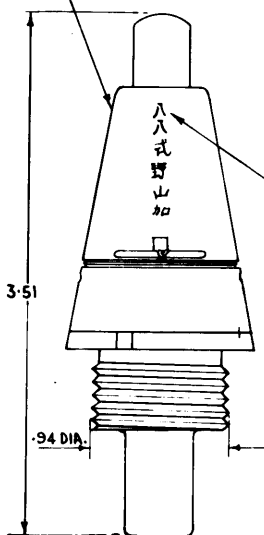
RESTRICTED



FUZE MADE OF BRASS EXCEPT WHERE OTHERWISE STATED.

ON REVERSE - 3 三 + 甲

MARCH 1938
 INSPECTION MARK.
 SAKA (OSAKA ARSENAL).



FUZE WITH STRONG STIRRUP SPRING FOR USE IN GUNS HAVE THIS MARKING.

八 8
 八 8
 式 TYPE
 野 FIELD
 山 MOUNTAIN
 加 GUN

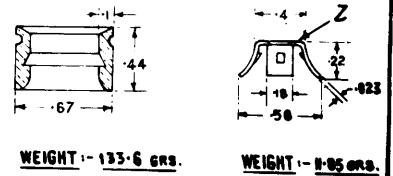
(ADD ON OR INCREASED VELOCITY)

MEAN WEIGHT OF FILLED FUZE: 6 grs.

FUZE WITH WEAK STIRRUP SPRING FOR USE IN HOWITZER HAVE THIS MARKING.

八 8
 八 8
 式 TYPE
 榴 POMEGRANATE
 臼 MORTAR.

DETAILS OF SET BACK FERRULE & STIRRUP SPRING. FOUND IN FUZES FOR HOWITZERS (LOW VELOCITY WEAPONS)



FOR USE IN HOWITZERS OR LOW VELOCITY GUNS (e.g. 70 MM. TYPE '92 BATTALION GUN.)

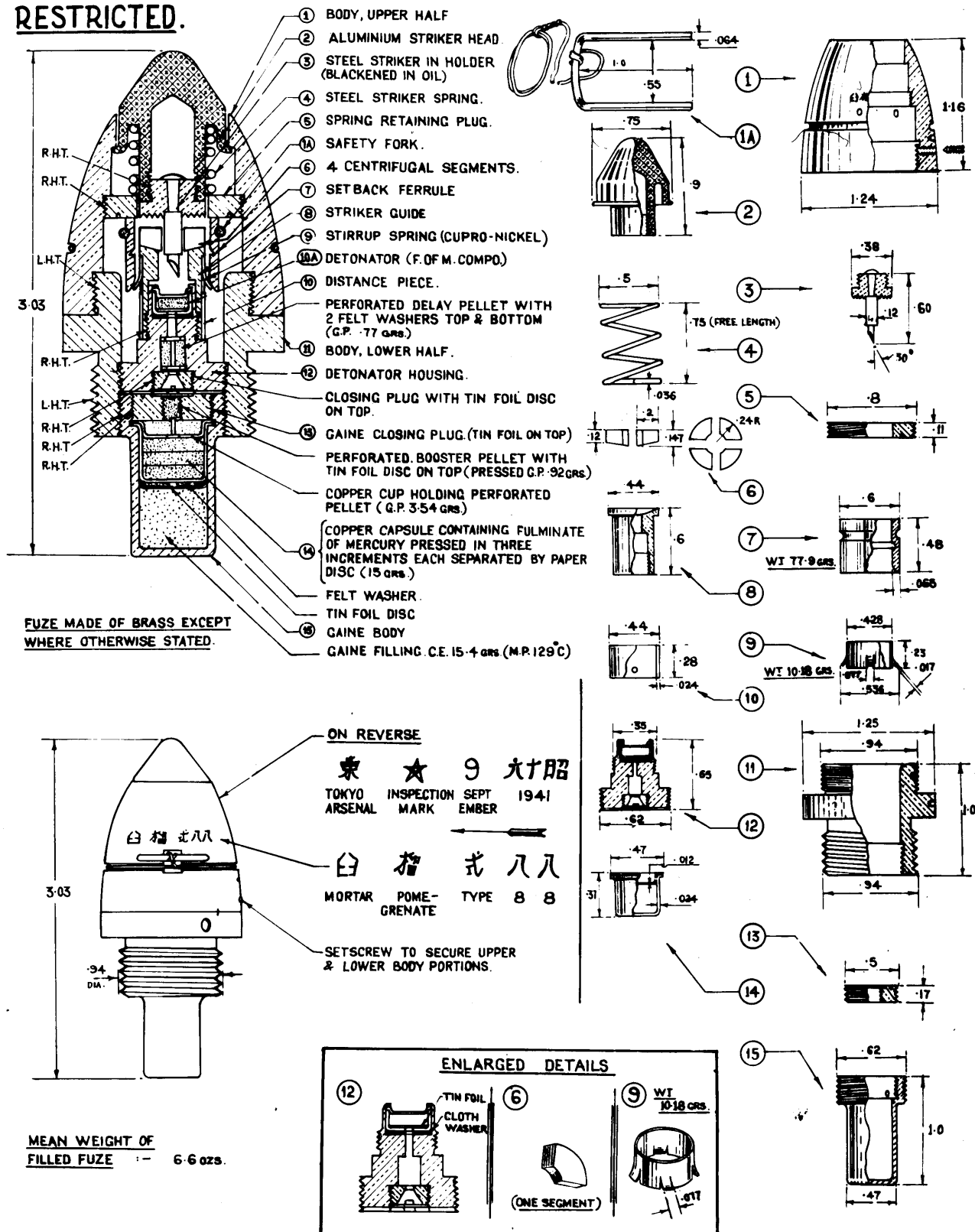
JAPANESE NOSE PERCUSSION FUZE, TYPE '88 INSTANTANEOUS ACTION - 'A'

— FOR —

GUN AMMUNITION WITH 24 MM. FUZE HOLE.

GENERAL ARRANGEMENT & ASSEMBLY SEQUENCE.

RESTRICTED.



**JAPANESE, NOSE PERCUSSION FUZE, TYPE '88
SLIGHT DELAY ACTION ONLY — "B"**

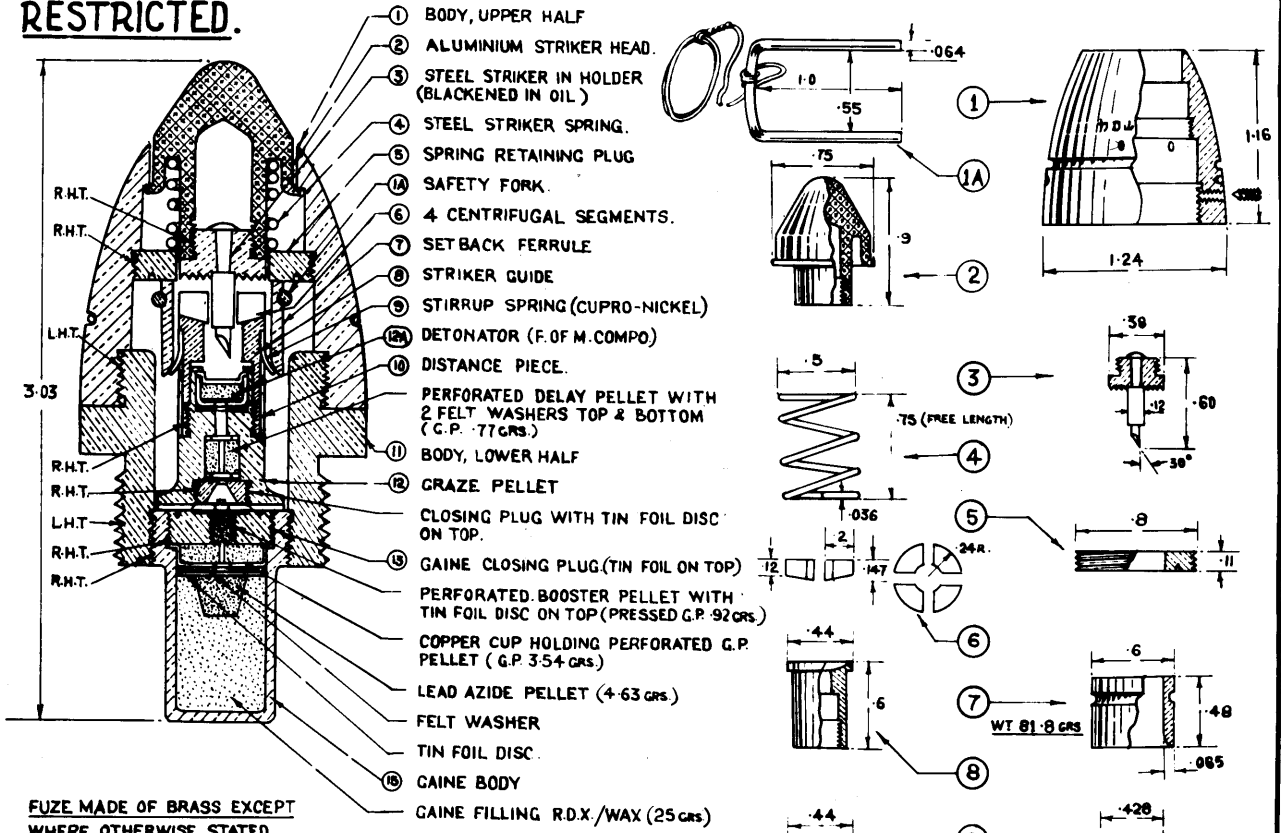
FOR

**GUN AMMUNITION WITH 24 MM. FUZE HOLE.
GENERAL ARRANGEMENT & ASSEMBLY SEQUENCE.**

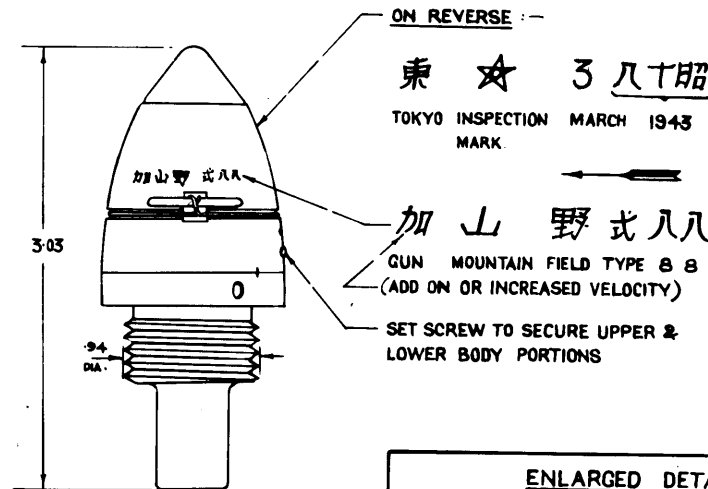
DIMENSIONS IN INCHES.

CI-MMM-8 1002
KUNIKIDA, MARSH, JAG

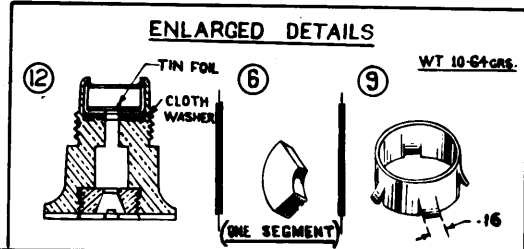
RESTRICTED.



FUZE MADE OF BRASS EXCEPT WHERE OTHERWISE STATED.



MEAN WEIGHT OF FILLED FUZE 6.6 OZS.



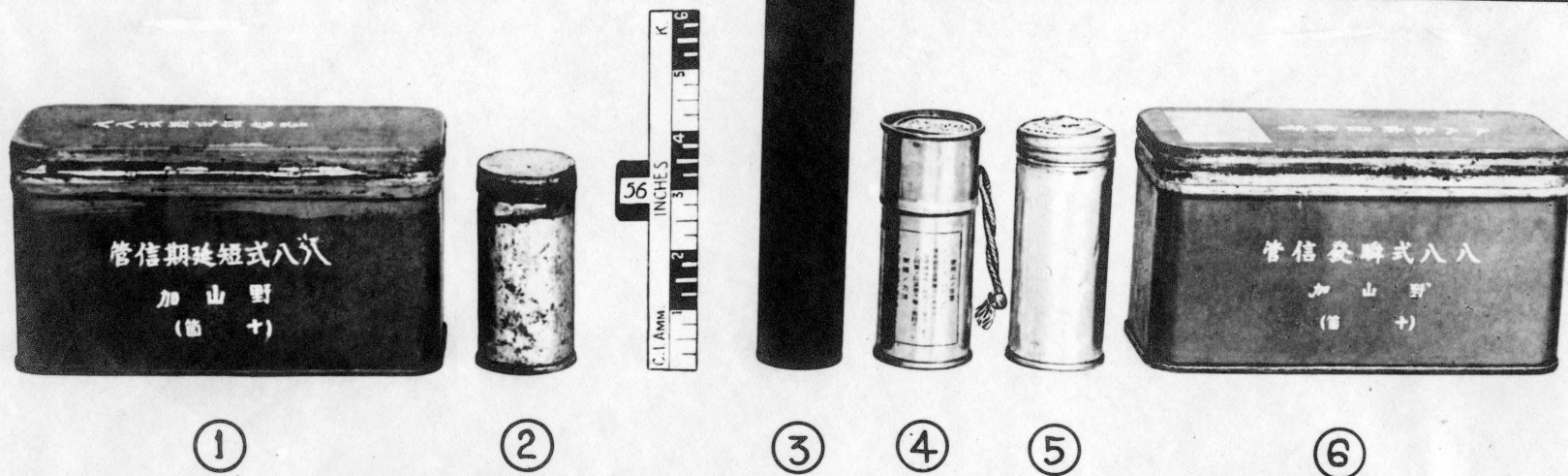
JAPANESE, NOSE PERCUSSION FUZE, TYPE '88
SLIGHT DELAY AND GRAZE ACTION — 'C'
FOR
GUN AMMUNITION WITH 24MM. FUZE HOLE.
GENERAL ARRANGEMENT & ASSEMBLY SEQUENCE.

DIMENSIONS IN INCHES

RESTRICTED

Nº	DESCRIPTION	CONTENTS	SIZE
1	TIN BOX, PAINTED OLIVE DRAB, SOLDERED TEAR OFF BAND	TEN C FUZES WITH TWO WOODEN PACKING BLOCKS	6.85 x 2.85 x 3.75"
2	TIN CYLINDER, SCREWED LID SEALED BY THICK PAPER BAND	ONE B OR C FUZE WITH TWO WOODEN PACKING PIECES	3.3 x 1.6"
3	M.S. OR ZINC CYLINDER WITH SCREWED LID	TWO OR THREE A OR B FUZES WITH SUITABLE PACKING PIECES.	11 x 1.5"

Nº	DESCRIPTION	CONTENTS	SIZE
4	TIN CYLINDER, LACQUERED GOLDEN COLOUR, SOLDERED TEAR OFF BAND WITH A STRING LOOP	ONE A FUZE WITH TWO WOODEN PACKING PIECES	4" x 1.5"
5	TIN CYLINDER SCREWED LID, SEALED BY WAX COATING.	ONE B OR C FUZE WITH TWO WOODEN PACKING PIECES	3.7 x 1.6"
6	TIN BOX, PAINTED OLIVE DRAB, SOLDERED TEAR-OFF BAND	TEN A FUZES WITH TWO WOODEN PACKING BLOCKS	6.85 x 2.85 x 3.75"



METHOD OF PACKING : —

JAPANESE NOSE PERCUSSION FUZES TYPE '88 (24 MM. FUZE HOLE)

C.I.A.M.M.S/1007
KIRKEE, FEB. 45