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JAPANESE AMMUNITION

C.T. AMN. TECHNICAL REPORT
No. 44

GRENADE, HAND OR RIFLE
H.E. TYPE '99-A

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C.I.A.M.N. TECHNICAL REPORTS

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JULY 1945

GRENADE, HAND OR RIFLE, H.E., TYPE '99-A

GENERAL

This grenade was first encountered during the invasion of Kiska and was for some time known as the 'Kiska' Type grenade. It has also been described under various names, e.g. "Type '00 Hand Grenade"; "Offensive Hand Grenade"; "New Type Hand Grenade"; "Improved Type Hand Grenade". It is now clear that the grenade is known to the Japanese as the Type '99-A. The nomenclature "Grenade, Hand or Rifle, H.E., Type '99-A" will therefore be used to describe it.

2. It should be noted that the Japanese use also a H.E. hand grenade known as the Type '99-B. This is a somewhat smaller grenade than the Type '99-A and uses a pull time friction igniter instead of the time percussion igniter of the Type '99-A.

3. The projection of the Type '99-A grenade is by hand or from a discharger cup fitted to a rifle. This is a new type of discharger cup known as "Grenade Discharger Type 100 or '00 (1940)" and appears to have been designed specially for the Type '99-A grenade. It is believed that the discharger cup was designed for attachment to the Type '99 rifle (7.7-mm.) but it could, with suitable adapter, be attached to any service rifle, provided tube dimension is suitable. A discharger cup with a smaller diameter tube is believed to be used with the 6.5-mm. rifle.

The design of the discharger cup follows a principle used by the French and Germans during the last war which allows a ball round to be used to propel the grenade. It will be useful to mention briefly some details of this discharger cup.

4. The "Type '00 Grenade Discharger" weighs 1-lb. 9-ozs. and is fitted to the muzzle of the rifle. It consists of a cup offset from the axis of the bore to hold the grenade and a tube which centres over the bore of the rifle, a gas vent leads from this tube into the cup. When the ball round is fired, the bullet, during its passage through the tube, traps the gases momentarily which are, therefore, vented into the cup to propel the grenade. Range adjustments are reported to be made by opening or closing a small gas port located on the cup. Ignition of the grenade occurs on firing in the usual way by the inertia pellet striker setting back to fire the cap, see C.I.A.M.N. Technical Report No 5 (Second Issue).

5. According to reports of trials carried out in America, an elevation of 30 degrees was found to give the maximum range. With different rifles these were as follows:-

Meiji 38 Long Rifle (6.5-mm.)	102 Yards.
Meiji 38 Short Rifle (6.5-mm.)	117 Yards.
Type '99 Rifle (7.7-mm.)	132 Yards.

6. A "Discharger Cup, Type '00" has not yet been received at Kirkee and it has not been possible to carry out any trials. Three grenades, hand or rifle, H.E., Type '99-A only were received early this year from P.O.S., ALFSEA and the detailed description given below is based on their examination.

DESCRIPTION

7. The drawing in Plate A shows the general appearance and construction of the grenade. For convenience of description it may be divided into two main components:-

- (i) The body and H.E. Filling.
- (ii) The Igniter Assembly.

BODY

8. The body (18) is made of cast iron, lacquered internally with a black finish and oil blackened externally. The surface is plain with a flange at the top and bottom machined to a diameter of 1.75-in for fitting in the discharger cup. The body is in the form of a cylinder closed at one end. The mouth is closed by a flat cast iron screwed plug (9) having two holes diametrically opposite to facilitate assembly. This plug (9) is bored and screw-threaded centrally to take the igniter assembly complete. Details of this are shown clearly in Plate A. The filling consists of two pressed picric acid blocks (14) weighing about 1.9-ozs. enclosed in a yellow varnished rolled paper container (19). To ensure snug fitting of the pellets in the grenade body cardboard washers are fitted at both top and bottom. The rolled paper container (19) for the pellets is stencilled in ink with the filler's monogram, inspection mark and nature of filling and date of filling. The details shown in Plate A are as found on the actual sample examined.

IGNITER ASSEMBLY

9. This consists of:-

- (i) An igniter into the body (6) of which screws,
- (ii) A delay tube (11)
- (iii) A detonator (15) which rests on a felt pad (17) in,
- (iv) A copper tube (igniter assembly tube) (16). This copper tube is crimped near the mouth on to the delay tube (11).

10. The igniter is somewhat similar to the igniter in the Types '97 and '91 grenades - C.I.A.M.N. Technical Report No.5 (Second Issue). There are, however, a number of differences. The striker is formed integral with a steel inert pellet, rust proofed. The brass cover (1) is positively fitted by means of a small screw (4) to the igniter body (6) but a slot in the side allows about 1/4 in. downward movement once the safety fork (1A) is withdrawn. A small slot is cut in the skirt of the cover (1) to avoid masking the vent hole when the cover is in the down or fire position. A tinned plate flash guard (7) is fitted and secured in position by the igniter when the latter is screwed home into the cast iron closing plug (9).

Two holes are bored in the flash guard diametrically opposite to coincide with the tommy hole in the igniter body (6). This flash guard probably meets two requirements; it protects the thrower's hand when the igniter is functioned and also hides the small flash and flame which might be visible at night to opposing forces and thus reveal the position of the thrower.

A brass cap holder (5) with an anvil and two flash holes are pressed into the igniter body (6). The cap holder carries a small cap something similar to that found in pistol cartridges. Below the cap holder (5) is stemmed a small quantity of mealed G.P. to prime the delay train and ensure correct ignition.

11. The delay tube (11) is much smaller than that used in the Types '97 and '91 grenades but the principle of construction is exactly the same. It holds a train of delay composition (about 6.3-grs. of G.P.) with a perforated booster pellet at the bottom of about 8-grs. of G.P.

12. The detonator is of the same size and generally similar in construction to that used in the Types '97 and '91 grenades and is interchangeable with these. It holds 22-grs. of lead azide, R.D.X. and wax; details are given clearly in Plate A.

13. A copper tube (16) holds the detonator and the mouth of the tube is crimped on to the delay tube (11), thus forming a complete igniter assembly unit. The time of delay 4 to 5 seconds is stamped on the delay tube as shown in the Plate.

14. Safety Devices:— The only safety device is the safety fork (1A) passing through holes in the igniter cover (1), through the body (6) and rests under flanges formed on the striker (2), thus positively locking the striker until the safety fork is withdrawn. When the safety fork is withdrawn the striker is held off the cap by a spiral spring (3). This spring ensures that the striker is kept well clear of the cap so that when the head of the igniter is struck, or it is functioned by inertia, it will fire with greater certainty.

ACTION

15. (a) When thrown by hand:— The grenade is held in the hand with the igniter downwards - see C.I.A.M.N. Technical Report No.5 (Second Issue) Plate C - and the safety fork withdrawn. The igniter is then struck on its head against a hard surface and the grenade at once thrown. On striking the cover (1) and the grenade together with the striker (2). This downward movement of the cover is allowed by a small slot as explained in para 10 above.

(b) When fired from a rifle:— The grenade is loaded in the Type '00 cup-shaped launcher. At the time of loading in the cup-shaped launcher the safety fork (1A) is withdrawn. It is then fired using a ball round. Set-back forces cause the striker (inertia pellet) (2) to set back and fire the cap. Owing to the short time of delay it is probable that air bursts will occur, particularly at the longer ranges. Owing to lack of grenade trials to check this point have not yet been carried out at Kirkee.

REMARKS

16. Only single grenades have been received at Kirkee. From

a photograph, reproduced in General Headquarters, India, Military Intelligence Directorate, Supplement to Periodical Technical Summary No.27, it appears that 20 grenades are packed in a wooden box in four rows of five each. Each five round unit is wrapped in asphalt impregnated paper.

MARKINGS

17. The grenade has a black finish owing to the oil blackening. A paper label is pasted round the body as shown in Plate A. This label has a small illustration showing how to hold the grenade with instructions for its use, a translation of which reads:-

"Grasp hand grenade as in picture.
Pull safety pin from top and firmly strike end.
Throw hand grenade immediately.

To prevent accidental discharge:-
Keep safety pin in place,
Wrap cord around shank and secure after pin is inserted.
Avoid striking end in this condition."

This translation is taken from General Headquarters, India, Military Intelligence Directorate, Periodical Technical Summary No.27 of April 1944.

18. The top of the cast iron closing plug (9) and up to about three quarters of the height of the flash guard (7) is painted red. This indicates that the grenade is filled.

Other markings on components were as follows:-

On the top of striker (2) of one sample was stamped a small square and on another the letters CH. The delay tube is stamped with the time of delay 4 to 5 seconds while the rolled paper container for the H.E. filling is stencilled with the filler's monogram, inspection mark, nature of filling and date of filling as described earlier in this report.

CHEMICAL ANALYSIS

(Chief Inspector of Military Explosives, Kirkee)

- | | | |
|--|-----|---|
| 19. <u>H.E. filling</u> | ... | Picric acid, M.F. 122°C. |
| 20. <u>Igniter Assembly</u> | | |
| Composition in percussion cap) | ... | Potassium Chlorate, Antimony Sulphide, Mercury Fulminate. |
| Priming composition below percussion cap) | ... | * G.P. consisting of Potassium Nitrate, Sulphur and Charcoal. |
| Delay composition in delay tube) | ... | * G.P. consisting of Potassium Nitrate, Sulphur and Charcoal. |
| Booster charge in delay tube) | ... | * G.P. consisting of Potassium Nitrate, Sulphur and Charcoal. |

* Quantity insufficient for quantitative analysis.

Detonator R.D.X. 98.05%
 Wax 1.95%
 with a topping of Lead Azide.

APPRECIATION

(Economic, manufacture and development aspects)

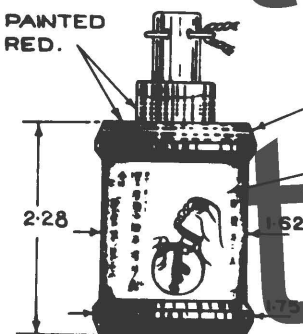
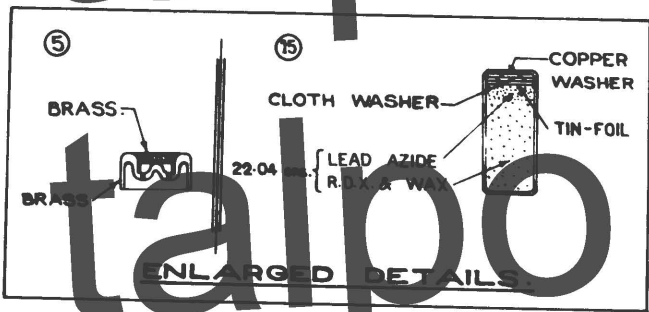
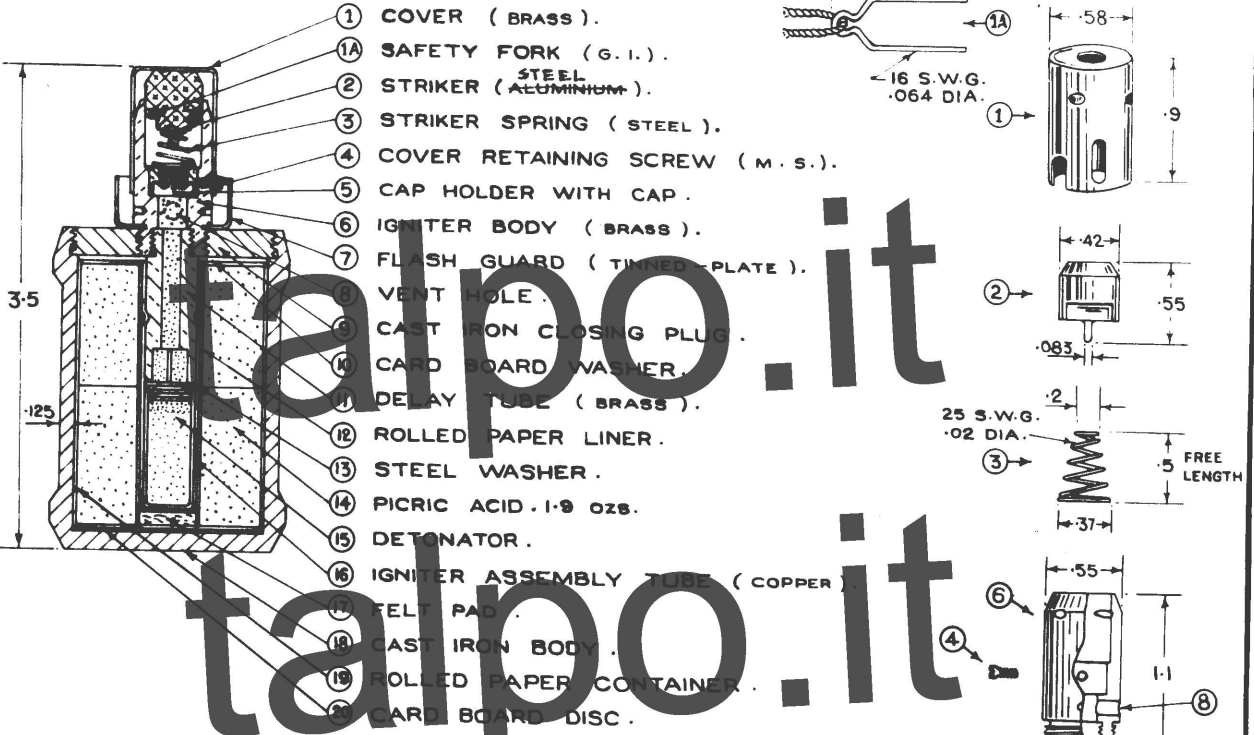
21. This is a much smaller and lighter grenade than the Type '97, weighing about 10½-ozs against just over 1-lb. for the Type '97. It has, however, a comparatively greater explosive content and may be regarded as an offensive grenade. The design is an improvement in a number of respects on the Type '97 and it is considered that it would be easier to manufacture.

22. One grenade has been fragmented to determine the degree of fragmentation to be expected. All original components were used and the striker functioned mechanically. The results of this fragmentation trial are given in Plate B. It will be seen that about 75% of the grenade forms metal dust and fragments below 1/25 oz in weight, the largest fragments being of the order of 102 grs., 88 grs., 68 grs. and 57 grs. These results support the belief that the grenade is largely intended as an offensive grenade.

SUMMARY OF DATA

23. Length overall 3.5-ins.
 Weight filled 10.6-ozs. (Mean of 3 grenades).
 Length of body 2.28-ins.
 Maximum diameter over body 1.62-ins.
 Maximum diameter over flanges 1.75-ins.
 Nature and weight of H.M. filling Picric acid, 1.94-ozs.
 Weight of delay composition 6.33-grs.
 Weight of perforated G.P. pellet 8.02-grs.
 Time of delay 4 to 5 seconds.
 Length of detonator (Overall) 0.87-in.
 Diameter of detonator 0.354-in.
 Weight of detonator filling 22.04-grs.

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WT. OF FILLED GRENADE :- 10.6 ozs.

BODY LACQUERED BLACK INTERNALLY AND OIL BLACKENED EXTERNALLY.

PAPER LABEL WITH USER INSTRUCTIONS PAINTED ON BODY.

STAMPINGS ON (8)

10

INSPECTION OCTOBER 1942

MARK

STENCILLING ON (19)

TOKYO EXPLOSIVES FACTORY 1942 SEPTEMBER OSAKA ARSENAL PICRIC ACID UNKNOWN ARSENAL

JAPANESE
GRENADE HAND OR RIFLE H.E. TYPE 99 A
 GENERAL ARRANGEMENT & ASSEMBLY SEQUENCE.

DIMENSIONS IN INCHES.

C.I. Amm S/1122 KIRKEE MAY 40

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GRENADE MANUFACTURED AND FILLED ABOUT OCT. 1942.

WT. OF GRENADE (COMPLETE)..... 10.6 ozs.
WT. OF EMPTY GRENADE..... 8.66 ozs.

WT. OF RECOVERED FRAGMENTS..... 6.13 ozs.
PERCENTAGE RECOVERY..... 70%



STATIC FRAGMENTATION

OF
A JAPANESE GRENADE, HAND OR RIFLE, H.E. TYPE 99-A

C.I. AMN S/1147
KIRKEE JUNE '45

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