1640

Notified in A.C.Is. 18th March, 1944

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TEXT BOOK

OF

AMMUNITION

PAMPHLET No. 1—EXPLOSIVES

1944

(This pamphlet supersedes the Text Book of Ammunition, 1936, Chapter 1, paras. 1.01—1.38)

By Command of the Army Council

THE WAR OFFICE,
18th March, 1944.

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TEXT BOOK

OF

AMMUNITION

PAMPHLET No. 3

PROJECTILES

1957

(This pamphlet supersedes the Text Book of Ammunition, 1936, Chapter V, paras. 5.01-5.31 and paras. 5.36-5.37)

By Command of the Army Council,

E.W. Playfair

THE WAR OFFICE,
13*th May*, 1957.

24/7/57

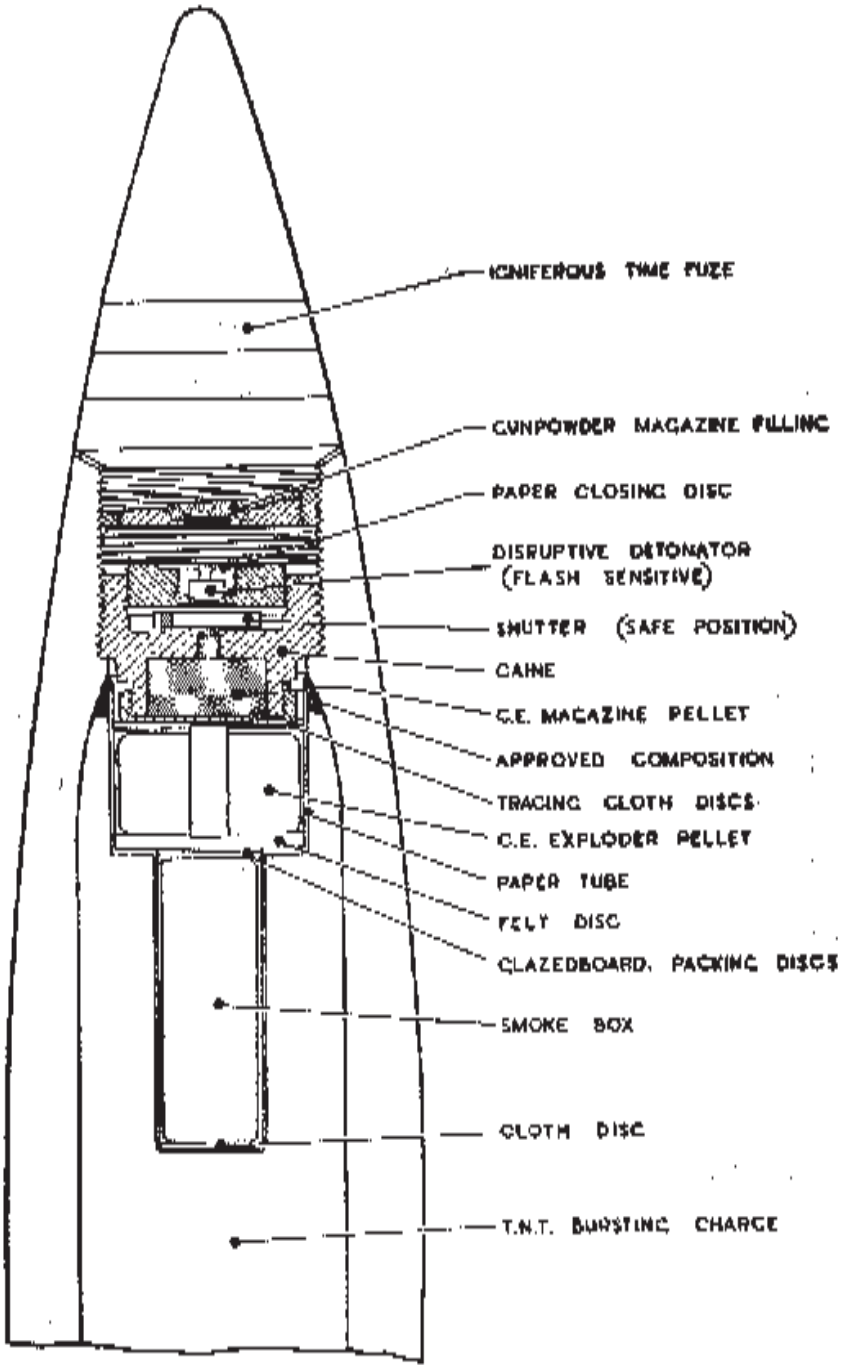

FIG. 13.—H.E. Shell with Gaine.

CHAPTER IV

THE MANUFACTURE OF H.E. SHELL

15. Materials

The steel for the shell body is chosen from the range of steels given in specification S.T.A./6*, and its composition depends on the mechanical properties required for the shell in question. Each steel is given a code reference number of the form SS/A19 ; the last letter indicating the treatment (which may be one of five types) to be given to the billet or bar, and the number corresponding to the minimum yield in tons/sq. inch.

Groups A, B, and C, are supplied in the " as rolled " condition for forging, or " as rolled " or " normalized " for machining, and for solid proof shot for 9·2-inch guns and above. Normalizing is carried out by heating to 850-950° C and then cooling in air, and is obligatory for the heavy proof shot. Groups D and E are low temperature annealed, cold drawn bars for machining, group E being free-cutting steels. Lead bearing steels are restricted to groups C and E bars under 2½-inch diameter, and the maximum amount allowed of phosphorus is 0·06 per cent., chromium 0·30 per cent., nickel 0·50 per cent., and copper 0·30 per cent. ; 0·25 per cent. silicon is specified as the maximum for groups C and E, and 0·35 per cent. for the others. Group A steels have yields of 19, 20 and 21, and group B of 24, 27, 30 and 32 tons/sq. inch ; steel with yield strength corresponding to those of Group B are available in the other groups. The remaining properties of a few typical ones with their chemical compositions are given in the following table :—

Code	Tensile properties			Composition				Examples
	Yield tons/ sq. in.	Ultimate tensile strength tons/ sq. in.	Elongation %	Carbon %	Manganese %	Molybdenum %	Sulphur %	Natures of shell for which used
S.S.A 19	19	38/48	15	·40/·50	·70/1·00	..	·06 max.	25-pr.
S.S.A. 20	20	40/50	15	·40/·50	·70/1·00	..	·06 max.	5·5-in. (80-lb.).
S.S.B. 30	30	43/60	12	·30/·40	1·20/1·65	·15/·30	·06 max.	17-pr.H.E.
S.S.B. 27	†28	40/55	15	·35/·45	·90/1·40	..	·06 max.	3·7-in. Mk. 6 gun.
S.S.D. 24	24	35/50	12	·22/·32	·90/1·40	..	·06 max.	40 mm.
S.S.D. 27	27	35/50	12	·22/·32	·90/1·40	..	·06 max.	20 mm.

It will almost certainly be necessary to harden and temper bodies for some shell in future to obtain the greater strength required for thin walls and high H.E. capacity.

Although most shell are made from steel, in a few cases it is possible to design shell for manufacture in cast iron, provided the chamber pressure is not very high. An example of this is one type of B.L. 5·5-inch 100-lb. shell that is fired at a maximum pressure of 17 tons/sq. inch. Pure, close-grained cast iron is used with a maximum phosphorus content of 0·75 per cent., and the shell after machining must not show any leakage with an internal hydraulic pressure

* Steel specifications for armament production have been correlated and systematised into a series for the Ministry of Supply. These specifications are identified by the letters S.T.A. followed by a number.

† Special design requirements.

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TEXT BOOK

OF

AMMUNITION

PAMPHLET No. 5

SMALL ARMS AMMUNITION

1944

The War Office,
5th February 1944.

By Command of the Army Council

L Pownall.

characteristic of the delivery. If the delivery passes proof, the remainder of the ammunition is then subjected to a 100 per cent. inspection. Automatic machines gauge and weigh the cartridges, and any cartridges which are too light or too heavy, too long or too short, or too big to fit the chamber of the weapon, are rejected. Rounds which are correct in these respects are then examined visually to see that they are free from damage or defects which could not be detected by the automatic machines.

Defects in small arm ammunition.

The following are some of the defects or failures which may be met with in proof or inspection of small arm ammunition :—

Proof defects.

Cap. Misfires ; failure of the cap to ignite the charge ; hang-fires ; pierced caps ; escape of gas around the cap ; cap out of case.

Case.—Burst cases ; stretched metal ; separated cases (i.e. part of the case is left in the chamber after extraction) ; splits at the neck ; cases hard to extract from the chamber after firing.

Bullet.—Stripping of the envelope and break-up on firing ; failure to take the rifling ; excessive metallic fouling ; inaccuracy due to lack of symmetry ; bullets striking the target broadside on (B.S.O.s), or slightly out of true (Tippers).

Inspection defects.

Cartridges long or short, heavy or light, high or low diameter ; thin or defective heads ; scaly, scored, or split cases ; defective or loose bullets ; defective caps ; no caps ; incorrect marking ; caps not ringed in or incorrectly varnished ; eccentric cap chambers.

CHAPTER II—DETAILS

10. Ammunition for ·303-inch Weapons.

(*a*) *Cartridge, S.A., Ball, ·303-inch, Mk. VII.*

The case is rimmed and is made of solid drawn brass. Its make-up follows the principles laid down in para. 5.

The cap, made of copper zinc alloy, contains about six-tenths of a grain of cap composition, pressed into the cap, covered with a disc of varnished lead-tinfoil and then varnished over the disc. The charge is about 36½ grains of Cordite M.D.T. or C.D.T. 5–2, or, in the Mk. VIIz, about 41 grains of nitrocellulose powder (N.C.(Z) 3).

There is a strawboard wad between the charge and the bullet. The bullet weighs 174 grains. The envelope may be made of cupro nickel, gilding metal, or mild steel coated with cupro nickel or gilding metal.

Other details of the bullet are given in para. 4 (*a*). The bullet is secured into the case by pressing the case with a cone-shaped die on to the parallel portion of the bullet, and by three ninety-degree indents into the cannelure. The weight of the complete round is about 386 grains.

(*b*) *Cartridge, S.A., Ball, ·303-inch, Mk. VIIIz.*

The cap and case are as for the Mk. VII Cartridge.

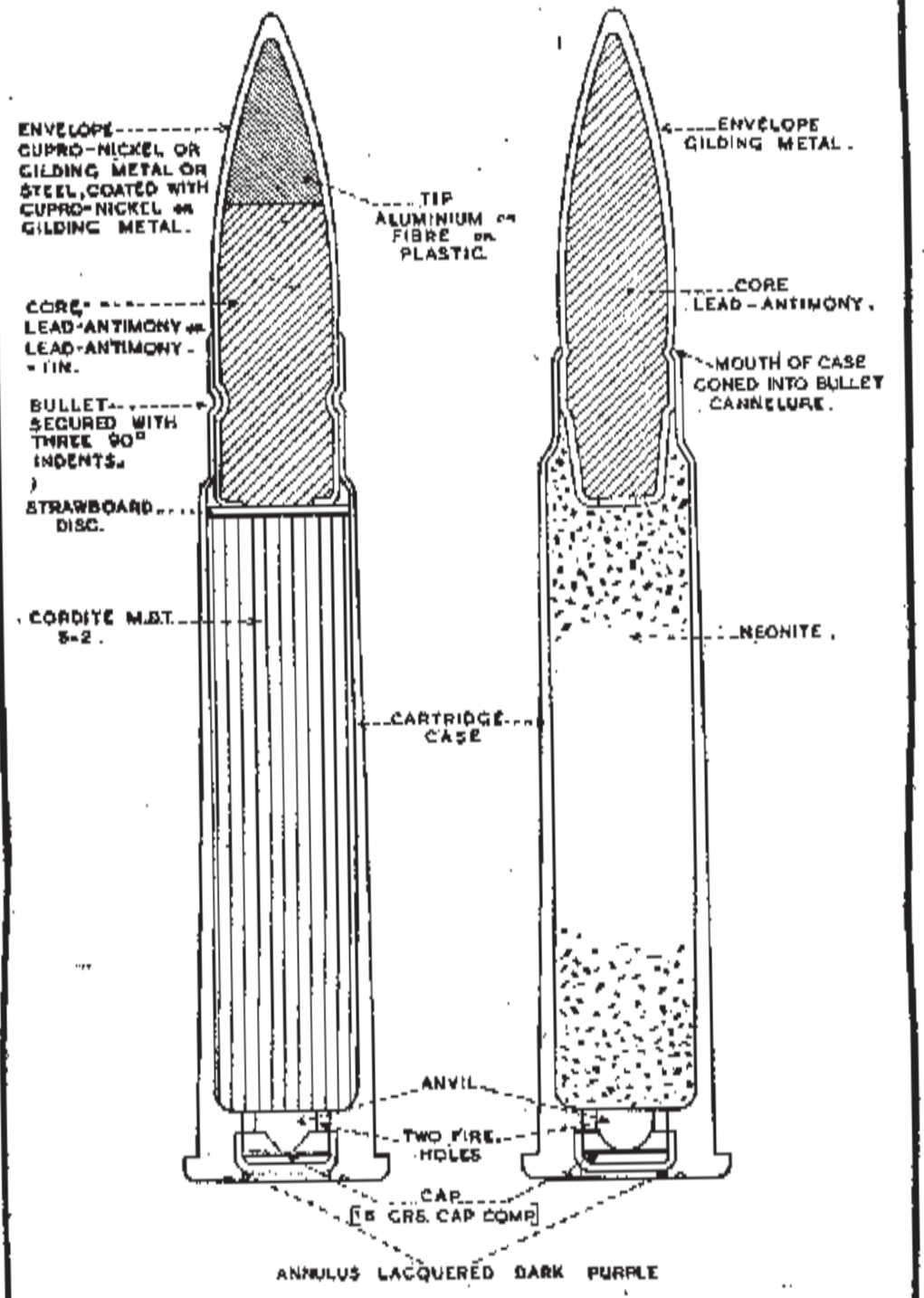
The charge is about 36½ grains of nitrocellulose powder (neonite). There is no wad.

The bullet, which is streamlined, has a gilding metal envelope, and a core of lead-antimony, 90/10. It has a flat-fronted cannelure, into which the mouth of the case is indented with four ninety-degree indents.

This ammunition is intended for use with machine guns, and, owing to the deleterious effects upon barrel wear produced by firing Mk. VIII bullets through

FIG. 2.

CARTRIDGES, S.A., ·303 INCH.



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TEXT BOOK

OF

AMMUNITION

PAMPHLET No. 6—GRENADES

1945

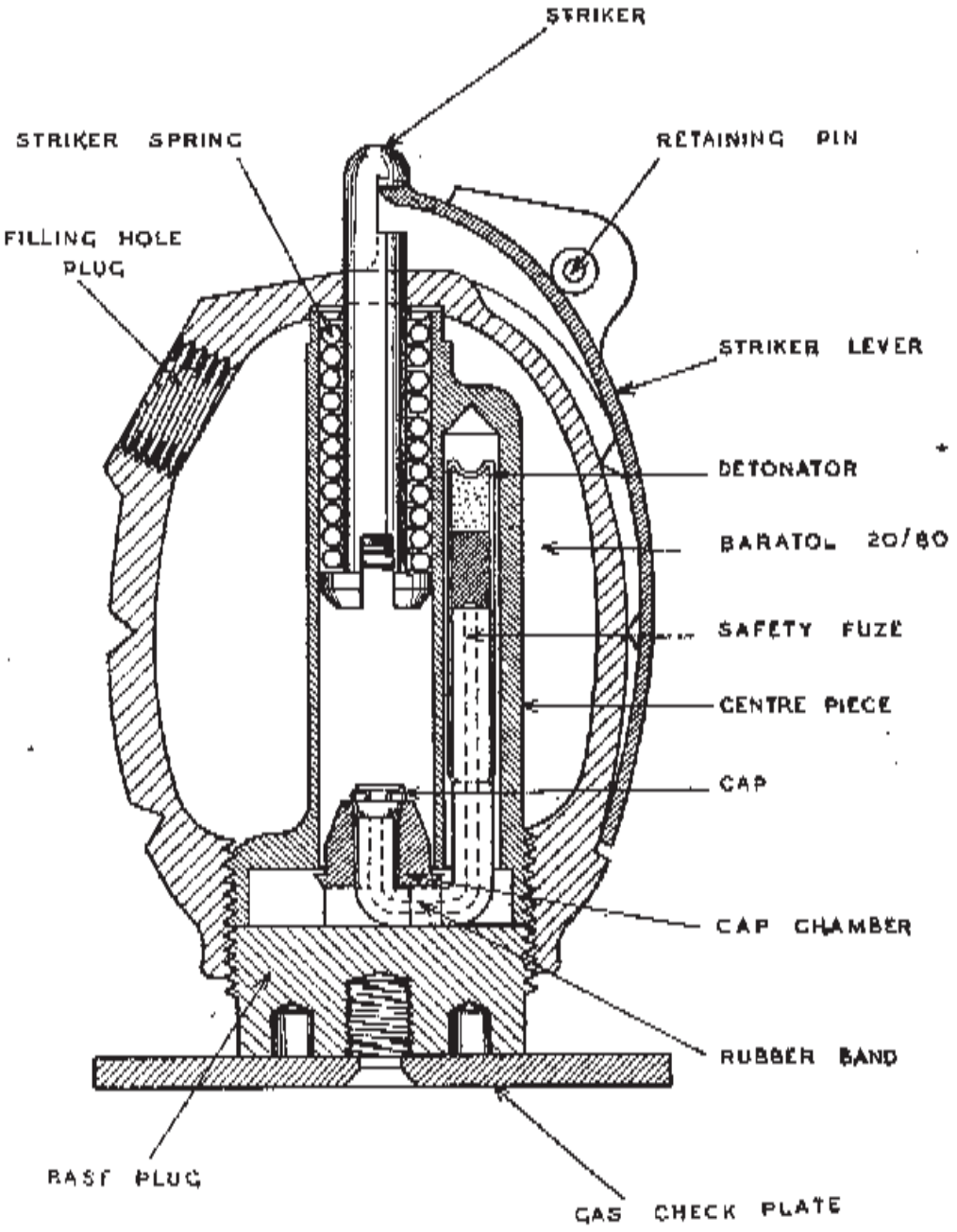
By Command of the Army Council,

L. Brownrigg.

The War Office,
19*th July*, 1945.

FIG. I.

GRENADE, NO. 36 M.



to allow the gases from the burning safety fuze to escape beyond the flange and so remove excessive pressure, which would alter the rate of burning of the safety fuze. The stem of the striker is surrounded by a spring which rests on the flange at the striker head, and which is under compression, pressing the striker downwards. The other end of the striker stem is slotted on one side, and while the spring is compressed this part of the striker projects from the top of the grenade. The end of the striker lever fits into the slot and prevents the striker from being forced down on to the rim-fire cap. The striker lever is made of rust-proofed steel. It has two trunnions projecting from it, which pivot on a fulcrum formed on the grenade body. It is curved to allow it to fit closely to the grenade body, and is retained in position by a retaining pin (commonly referred to as the safety pin), passing over it and through two holes in the fulcrum bracket.

As there are three holes through the body wall, it is difficult to ensure complete watertightness under normal conditions of storage in the field. It is therefore necessary to use a non-hygroscopic filling, and moreover, a filling which, even if it does get wet, will not attack the metals with which it is in contact. Baratol satisfies these conditions, and it is stemmed in to the capacity of the grenade, no fixed weight being specified. Waterproofing composition is pressed in around the striker where it protrudes from the grenade as a further protection against moisture entering the grenade. There are four Marks of igniter set in use with this grenade. The Mark II, which is obsolescent, comprises a rim fire cartridge, seated in a zinc alloy chamber. A length of safety fuze with a burning time of about seven seconds, has one end attached to the rim-fire cartridge, and the other end crimped into a No. 6 detonator (copper-cased) containing fulminate composition. The safety fuze is bent into a U-shape to fit the centre-piece. The Mark III igniter set differs from the Mark II in having an aluminium-cased detonator containing A.S.A. and C.E. It also has a seven-seconds delay.

The Mark V igniter set uses the same detonator as the Mark III, but the safety fuze, No. 17, burns for four seconds only.

The Mark VII igniter set burns for four seconds also, but differs from the Mark V in using safety fuze No. 20 to overcome bituminous exudation in hot storage, a defect liable to occur with the Mark V.

The Marks II and III igniter sets are used for grenades which are to be fired from a rifle or projector, while the Mark V igniter set is for hand grenades only. The distinguishing features of the various Marks of igniter sets may be summarized as follows :—

Mark II ..	Yellow safety fuze ; copper detonator with the closed end convex.
Mark III ..	Yellow safety fuze ; aluminium detonator with the closed end concave.
Mark V ..	White safety fuze ; aluminium detonator with the closed end concave ; rubber band one-eighth of an inch wide around the safety fuze at the bend ; in later issues, a paper band has been used instead.
Mark VII ..	External appearance and identification as for Mark V. Originally known as the Mark VI, but the nomenclature was changed as a Mark VI already exists to an Indian design.

Weight of filled grenade—approx. 1 lb. 11¼ oz.

Action.—To prepare the grenade for use, the base plug is unscrewed and the igniter set inserted. The base plug is then replaced and screwed fully home. Before throwing, the retaining pin is withdrawn, the striker lever being held down by the hand holding the grenade. On throwing, the lever is released

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ADDENDUM No. 1

1947

By Command of the Army Council,

Eric B. Speed.

THE WAR OFFICE,
23rd April, 1947.